



DETERMINANTS OF CIRCULAR ECONOMY PRACTICES
IN INNOVATIVE SMES IN COVID-19 TIMES:
THE ROLE OF POLICY INCENTIVES

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Abstract

Purpose: Specific interventions enabling innovative small and medium enterprises (SMEs) to access finance during a time of crisis are essential for their survival. In Europe, the recovery plan prioritises specific funds to support SMEs' sustainability transition. This creates an opportunity for SMEs to innovate and survive during the pandemic. However, the role of public policies in supporting SMEs' sustainability innovation during the COVID-19 crisis has not been explored. Based on the Italian context, the present study aims to analyse how COVID-19 related incentives for innovative SMEs, issued by the Italian government, have supported circular economy (CE) practices, as well as the development of consistent competences and resources during the pandemic period. **Methodology:** The population of Italian innovative manufacturing SMEs was surveyed. Firms were required to indicate the extent to which they adopted CE practices in the Take, Make, Distribute, Use, and Recover fields of action, the consistent competences and resources they developed, and what incentives they accessed. The association between such incentives and CE practices, competences, and resources was tested using one-way analysis of variance.

Findings: COVID-19 related incentives were granted to 43.43% of the innovative SMEs. Firms that accessed incentives had higher levels of CE practices, competences, and resources, with slight differences considering the type of incentives.

Practical and social implications: This study argues that governmental COVID-19 related incentives may have played a role in enhancing CE practices of innovative SMEs. Public support allows firms to invest in the development of internal assets that are needed to capture new business opportunities. This study provides managers with resource and competence knowledge that allows for the adoption of CE practices in a time of crisis. **Originality:** The study sheds light on the relevance of dedicated incentives to include innovative SMEs in perspective policies' decisional processes, which contribute to their sustainability transition.

1. Introduction

In most OECD countries (OECD, 2020), the vast majority of companies contributing to growth and employment are small and medium enterprises (SMEs) that represent their economies' competitive core.

As a result of their size, ownership structure, and limited technical and financial resources, SMEs are more vulnerable to external shocks than large companies (Juergensen et al., 2020). This pattern has been exacerbated by the outbreak of the COVID-19 pandemic, which emphasises the weaknesses of SMEs (Juergensen et al., 2020).

Innovative and growth-oriented SMEs are likely to be highly impacted by the pandemic as their traditional finance sources, such as equity (i.e. venture capital), tend to decrease in times of recession, and credit access is difficult because of their risky structure, which is characterised by unstable cash flow and limited intellectual property (Lee and Brown, 2017; Brown, 2020). In such a context, policy interventions can play a role, helping SMEs mitigate the negative effects of the crisis (Brow, 2020). Governments' incentives have generally focused on grants, deferral of tax and debt payments, and the extension or simplification of the provision of loan guarantees to enable SMEs to access credit (OECD, 2020). Nevertheless, specific interventions that enable innovative SMEs to access finance during crises should be pursued while considering the peculiarities of such knowledge-based businesses. (Brown, 2020). Policy responses to the crisis at the European level were routed towards the establishment of a recovery plan for the years 2021–2027. These responses include both the European Union Next Generation program aimed at mobilising €750 billion raised from the financial markets and a reinforced long-term budget of the European Union of about €1,100 billion. The transition to a green, climate-neutral economy is prioritised as part of the strategies that will be implemented by Next Generation EU-specific funds. The European Green Deal has also posed new sustainability transition guidelines through circular economy (CE) challenges and aims to increase the competitiveness of the European socio-economic system. Italy will undertake these major challenges following the Recovery Plan, which will implement the Next Generation EU Program through concrete interventions dedicated to enhancing SMEs' sustainability (Deloitte, 2020).

The transition of SMEs toward sustainability innovation has been widely recommended by European institutions (Bontoux and Bengtsson, 2015). However, the COVID-19 pandemic can also represent an opportunity for SMEs to innovate their strategy by introducing innovations such as CE to survive the financial crisis (Pencarelli et al., 2020; Ibn-Mohammed et al., 2021; Prieto-Sandoval et al., 2021). CE has been defined as an 'industrial system that is restorative or regenerative by intention and design.

It replaces the “end-of-life” concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models’ (Ellen McArthur Foundation, 2012; p. 7). In this regard, CE innovations may contribute to the transition toward sustainability, although potential trade-offs have been identified between CE implementation and the achievement of the United Nations Sustainable Development Goals 2030 that need to be addressed through further empirical research (Shroeder et al., 2018). For instance, waste management and recycling targets related to CE practices can potentially hinder the health of recycling workers if not accompanied by measures to improve working conditions (Shroeder et al., 2018). In addition, the social aspects of sustainability, as well as environmental aspects other than waste, resource use, and CO₂ emissions have been poorly covered by CE research (Schöggel et al., 2020). Nevertheless, public interventions to support the socio-economic system, including SMEs, to overcome the crisis and develop new business opportunities linked to digitalisation and sustainability have been considered fundamental. The role of public policies oriented to financially support CE practices during the COVID-19 crisis has not been properly investigated, especially when focusing on innovative SMEs and those operating in the manufacturing field. In the Italian context, dedicated interventions aimed at supporting innovative SMEs during the pandemic were issued in May 2020 by the so called ‘Relaunch Decree’ (Italian Parliament, 2020). Based on this premise, which our study aims to analyse, we investigate how COVID-19 related incentives for innovative manufacturing SMEs can make a difference in supporting CE innovations that contribute to the transition toward sustainability.

2. COVID-19’s effect on SMEs and the need for public funding to overcome the crisis

The effect of COVID-19 on Italian SMEs has been severe (Deloitte, 2020): Of 6 100 Italian SMEs, 60% saw a decrease in productive activities with a consequent reduction in business turnover, and 70% ended in financial trouble, with liquidity problems due to a partially rigid fixed cost structure and reduced or delayed revenue streams. These firms were characterised by a) a consequent inability to cover current expenses, b) a need for financial support to rebalance the circulating capital, and c) a need to support post-lock-down activities in uncertain times. These firms’ characteristics can make recovery easy or difficult depending on how they enact strategies and mobilise resources to react to the crisis. Indeed, SMEs are deemed to suffer from the liability of smallness, meaning that the smaller the size,

the less resources the firm controls, which makes it more vulnerable to crises (Palazzi et al., 2018) such as the one led by the global COVID-19 pandemic (Eggers et al., 2020). The liability of smallness in the time of COVID-19 threatens to weaken the ability of SMEs to overcome the negative effects of the crisis that impacted market demand, liquidity, and profitability (Pencarelli et al., 2020). Nevertheless, the small size can provide closeness to customers and stakeholders, making SMEs more flexible and ready to capture new business opportunities and shift their business models to new value propositions (Eggers et al., 2020). Firms developing innovativeness and proactive postures as elements of entrepreneurial and market orientation have been found to have a higher probability of overcoming the crisis (Eggers et al., 2020). During COVID-19, SMEs investing in digital technologies and e-commerce have found ways to face a decline in demand and satisfy new customers' needs (Pencarelli et al., 2020) and in general, more of these firms dedicated specific investments to the conversion of their plants, or to new marketing campaigns and internationalisation strategies, thereby supporting the expansion of their business (Deloitte, 2020).

Innovativeness of SMEs requires financial resource availability to reorient strategies to satisfy unexpressed market needs (Eggers et al., 2020). In this context, the transition toward sustainability and digitalisation has been regarded as an opportunity for SMEs to overcome the pandemic crisis. In times of disruptive shocks, the set of material and immaterial infrastructures is fundamental to allow the socio-economic system to persist (Bellandi et al., 2020). This implies a higher level of business sector investments compared to those sustained for the simple strategy of restoration and bearing uncertainty in financial returns. The latter does indeed increase in consequence to meet the need to coordinate private strategies with public goods. Consequently, public policies can reduce the uncertainty caused by the crisis, partly funding business investments and public goods (Bellandi et al., 2020). In this sense, public incentives help firms preserve critical assets that allow them to overcome a crisis (Lim et al., 2020). In fact, a firm can be considered as a bundle of strategic, physical, financial, human, and organizational resources, which are interconnected and co-evolve, allowing the firm to grow (Lim et al., 2020 based on Penrose, 1959). In the pandemic period, SME entrepreneurs are required to assess the state of their bundle, determine which resources need an intervention, and pursue a new balance between them to limit the crisis' negative effects and identify new business opportunities. The role of financial resources, in terms of public support through incentives and growth platforms, is therefore essential to allow SMEs not only to survive but also to recover as a result of investments oriented to support the bundle's other resources (Lim et al., 2020). Thus, in a time of crisis, financial incentives can help SMEs to better preserve their physical and organizational resources and

competences compared to SMEs that do not benefit from support. Le et al. (2020) showed that, among others, tax support policies and capital support packages from the government positively affected SMEs' development during the COVID-19 pandemic.

Regarding CE as a sustainability-based innovation, it has been considered an opportunity to rethink the current unsustainable economic and business models amidst the COVID-19 pandemic. Indeed, CE can alleviate the negative effects of the COVID-19 pandemic in several ways, such as the transition from polluting and energy-intensive manufacturing systems to a CE based on renewables, smart materials, remanufacturing, and digital technologies (Ibn-Mohammed et al., 2021).

3. A resource-based view to advance SMEs' CE practices

A resource-based view (RBV) of the firm theory (Barney, 1991) and its advancements (Hart, 1995; Chan, 2005) have been used to explain firms' engagement in environmental practices, and more recently in CE (Garcés-Ayerbe et al., 2019). Firm-specific resources can facilitate the development of organizational capabilities as competencies that are conducive to environmental practices (Chan, 2005), such as CE practices, to enhance firms' competitiveness. Scholars claim that the lack of support from public institutions, resources, and technical expertise, along with the cost of meeting regulations and complexity of administrative procedures, are the main barriers for SMEs to shift towards CE practices (Rizos et al., 2016; Ormazabal et al., 2018; García-Quevedo et al., 2020; Mura et al., 2020). Further, barriers related to entrepreneurs' commitment and employees' skills in CE implementation as well as concerning the use of information systems to support CE and sustainability have been discussed in recent studies (Ormazabal et al., 2018) When referring to the use of information systems, studies have also underlined how strategic performance measurement tools that support environmental monitoring often lack to consider the peculiarities of SMEs (Johnson and Shaltegger, 2016). Finally, the role competences and resource play in implementing CE practices have recently been investigated, with a focus on the role of financial resources and government incentives (Section 3.1) and CE practices, competences, and resources (Section 3.2).

3.1 Role of financial support and government incentives

Policies to promote sustainability and provide access to financial resources in the form of tax credits, financing, and subsidies are key to SMEs' CE engagement (Mura et al., 2020). When SMEs can access public financial support, the literature shows that it bolsters environmental innovations,

eco-innovation, and ultimately, CE practices. For instance, Scarpellini et al. (2018) reported that public incentives promote eco-innovation, which reduces the risk associated with those investments and improves their profitability. Cecere et al. (2020) examined the role of private and public funding in promoting SMEs' eco-innovation, where private funding sources generally include bank loans, business angels' capital, venture capital, corporate venturing, and crowd funding, while public funding sources consist of public loans and guarantees, publicly owned equity, and subsidies (prizes, tax credits, grants, etc.) (Cecere et al., 2020 based on Myers and Majluf, 1984; Hall, 2002; OECD 2012; Olmos et al., 2012). The availability of public funding and access to fiscal incentives are levers of eco-innovation, especially for small businesses that suffer from a lack of external private fund sources, and public funding is effective when it is complemented by private sector funding (Cecere et al., 2020). In addition, self-financing, followed by public funding and ultimately debt financing, are CE business model enablers. The availability of alternative funding forms, such as venture capital, business angels, and peer-to-peer lending, does not support CE and tends to 'crowd-up the resort to CE', supporting more linear-risk activities (Ghisetti and Montresor, 2020, p. 559). Aranda-Usón et al. (2019) also found that the adoption level of CE practices depends on the level of investments made; more specifically, the public incentives' source and subsidies were shown to increase the CE practice adoption level, along with the quality (presence of guarantees required to finance CE activities) and availability of funds.

3.2 CE practices, competences, and resources

Dey et al. (2020) and Prieto-Sandoval et al. (2019) adopted mixed-method approaches to explore how SMEs can advance CE. They identified practices, competences and resources for the following five fields of action, related to the CE's 'reduce, reuse, and recycle' principles: (i) 'Take' refers to the raw material supply needed for the production process; (ii) 'Make' relates to the production process itself and conversion of raw materials into products; (iii) 'Distribute' concerns the distribution processes to users; (iv) 'Use' implies that consumers benefit by using the products; and (v) 'Recover' attains to reuse and recycle practices that extend products' lifecycle (Dey et al., 2020). These fields of action have previously been investigated by Kalmykova et al. (2018), who reviewed CE practice literature characterising the value chain of production processes. The authors identified 'Use' and 'Recover' as the value chain parts that have been firms' main CE practice objectives, while emphasising the need to further explore CE applications in the 'Make' and 'Distribute' fields.

Together, these studies provide a comprehensive framework for the investigation of CE practices, competences, and resources in each field of action. Table 1 presents an overview based on Dey et al. (2020), Prieto-Sandoval et al. (2019), and Kalmykova et al. (2018).

Table 1: Fields of action, CE practices, competences, resources

Field of action	Practices	Competences	Resources
Take	<ul style="list-style-type: none"> • Recovery of energy from waste • Purchase of raw materials with lower environmental impact • Use of renewable materials • Use of methods to quantify emissions and resources consumed and the related impact on the environment and health 	<ul style="list-style-type: none"> • Select suppliers on the basis of their environmental impact • Information exchange with suppliers to increase the use of circular raw materials • Define the circular characteristics of raw materials • Share circular economy values with suppliers 	<ul style="list-style-type: none"> • Biodegradable raw materials • Regenerated raw materials • Recyclable raw materials • Competent suppliers in the field of circular economy
Make	<ul style="list-style-type: none"> • Production of tailor-made products • Manufacture of products considering the need to disassemble them for repair, refurbishment or recycling • Production separating the organic parts from the inorganic ones • Design of the product based on its life cycle • The design and production take place with a view to reducing the use of raw materials and of harmful substances • Use of resources or materials that last more than a single life cycle 	<ul style="list-style-type: none"> • Eco-design • Ability to design products with an extended life cycle • Ability to design a production process that optimize the use of resources • Project management to develop new CE products 	<ul style="list-style-type: none"> • Standard production processes • Qualified personnel • Technologies to monitor energy consumption • Technologies to monitor resource consumption • Technologies to reduce energy and resource consumption

Distribute	<ul style="list-style-type: none"> • Use of packaging that reduces transport costs • Use of packaging with low environmental impact • Use of distribution channels that limit road transport • Provide customers with information on the nature and disposal of packaging 	<ul style="list-style-type: none"> • Commitment to reduce logistics' environmental and economic impact • Warehouse management expertise • Logistics expertise • Packaging design with low environmental impact 	<ul style="list-style-type: none"> • Traceability system of raw materials and processes for customers • Availability of qualified third-party logistic services providers • Cooperation with packaging manufacturers • Cooperation with distributors
Use	<ul style="list-style-type: none"> • Product as a services • Pay per use • Offering products with sustainability related certifications • Offering products where part of their components can be disassembled and reused • Take back programs to favour the reuse/regeneration of components 	<ul style="list-style-type: none"> • Ability to involve customers in the design of circular products and services • Ability to use communication channels to create long-term relationships with customers • Ability to involve customers in recycling activities/take back programs • After-sales service's ability to encourage the repair/reuse of products 	<ul style="list-style-type: none"> • Market analysis techniques • Business intelligence platforms • After-sale service • Communication channels
Recover	<ul style="list-style-type: none"> • Use of production processes' waste as raw material for the manufacturing of new products • Refurbishing • Remanufacturing • Industrial symbiosis 	<ul style="list-style-type: none"> • Commitment to production waste reduction through the philosophy of reduce, reuse, and recycle • Reverse-logistic capabilities 	<ul style="list-style-type: none"> • Management attentive to reducing, reusing, and recycling • Personnel attentive to reducing, reusing, and recycling • Standardised processes • Customer relationships • Availability of third-party logistic services providers who recover materials

As can be seen from the above-cited literature, the resources, competences, and practices required to implement CE innovation have been the subject of many recent studies. In addition, the role of financial government support in promoting the development of the bundle of resources needed to adopt CE practices is currently under investigation. Therefore, we propose the following hypotheses:

H1: SMEs receiving pandemic-related government financial support report greater CE practices compared to those that do not receive dedicated financial support.

H2: SMEs receiving pandemic-related government financial support report greater CE competences compared to those that do not receive dedicated financial support.

H3: SMEs receiving pandemic-related government financial support report having greater CE resources compared to those that do not receive dedicated financial support.

4. Innovative SMEs and COVID-19 incentives in the Italian context

Innovative SMEs are SMEs that operate in innovative technology fields. European law (Recommendation 2003/361/EC; European Commission, 2003) defines innovative SMEs as SMEs that present at least two of the following three characteristics: (i) set out to research and develop an expense volume greater than 3% of the greater cost and total value of production; (ii) the employees are highly qualified (at least one-fifth of employees have a PhD or are graduates with three years research experience, or at least one third of employees are masters graduates); (iii) own a patent or a copyrighted software. The requirements for innovative SMEs are as follows: (i) they must have less than 250 employees; (ii) their turnover must be less than €50 million or they must have assets that are less than €43 million; (iii) the headquarters need to be in Italy or Europe, with at least one production site or branch in Italy; and (iv) the SME cannot be listed on a regulated market.

Based on such criteria, innovative SMEs refer to 1,820 firms¹ that operate in the manufacturing, tourism, services, commercial, agriculture, and fishery sectors. They mainly operate in the service sector (e.g. consulting firms or software companies, 69.5%; n = 1 264), followed by the manufacturing sector (23.6%; n = 430), the commercial sector (5.8%; n = 106), the tourism sector (e.g. tour operators, 0.7%; n = 13), and agricultural and fishery sectors (0.2%; n = 4), while three pertain to unspecified sectors (0.2%; n = 3).

Specific incentives for innovative SMEs in Italy have been issued by the Italian government. Some of them were already in place when the COVID-19 pandemic spread, while others have been specifically introduced to assist firms and businesses in general to counter the loss of revenue due to the emergency situation. The former refers to a more flexible corporate management, tax incentives for investments, support in covering systematic losses, internationalisation support by the Italian Trade Agency, and equity crowdfunding mechanisms (Ministry of Economic Development, 2020). COVID-19 related incentives were foreseen in the “Relaunch Decree” (Italian Parliament, 2020), which introduced urgent measures to support the Italian economy and foresaw the need for specific innovative SME incentives.

¹ <https://startup.registroimprese.it/> (accessed 12th of February 2021).

These COVID-19-related incentives refer mainly to three categories: (i) Additional resources (€200 million) to the “Venture Capital Support Fund”, (ii) Additional resources (€100 million) to refinancing of the relief granted in the form of soft loans, and (iii) The provision of relief granted on capital injections that may support investments.

5. Method

A survey was administered to the total population of innovative manufacturing SMEs operating in Italy for the period September - November 2020 using the Qualtrics² package. Based on the survey’s aims and the questionnaire’s adopted framework (herein presented), firms operating in other sectors were excluded. Innovative manufacturing SMEs were identified using the AIDA dataset by Bureau Van Dijk (AIDA, 2021), which is the national dataset of firms’ financial information, integrated with the Registroimprese³ dataset by the Italian Ministry of Economic Development. Of the total population of 430 innovative manufacturing SMEs, 16 firms were wound up at the time of the survey; therefore, the final sample included 414 firms.

Innovative SMEs in the sample are mainly located in the north of Italy (n = 55; 56%), followed by the centre (n = 26; 26%) and the south (n = 18; 18%). In terms of regions, they were predominantly located in Lombardy (n = 29; 29.63%), Piedmont (n = 11; 11.11%), and Marche (n = 10; 9.88%). Firms in the sample (for the year 2019) have an average number of employees of 30, average revenue of 4.307 million, and average net profit of €58,917 (AIDA, 2021).

Firms’ email addresses were collected online; invitation to fill in the questionnaire was directed to the firms’ CEOs, and follow-ups were conducted to increase the overall response rate (Millar and Dillman, 2011). Appendix 1 presents the survey.

Table 1 identifies CE practices, competences, and resources. Firms were required to indicate the extent to which they adopted these CE practices and developed consistent resources and competences in each field of action, based on a 7-point Likert scale (1 = “not at all”; 7 = “completely”).

Firms were also investigated with regard to their reception of COVID-19-related incentives. Therefore, respondents were asked to indicate whether they had been addressers of the different types of incentives, namely the “Venture Capital Support Fund” (VCSF), the refinancing of the relief granted in the form of soft loans (RGSL), and the provision of relief gran-

¹ <https://www.qualtrics.com>.

² <https://startup.registroimprese.it/> (accessed 12th of February 2021).

ted on capital injections that may support investments (RGCI). Furthermore, firms who have been addressers of COVID-19 related incentives were asked the extent to what some factors do limit (or can limit) CE implementation based on a 7-point Likert scale (1 = “not at all” to 7 = “completely”). According to the literature (Rizos et al., 2016; García-Quevedo et al., 2020; Mura et al., 2020), these barriers refer to difficulties in identifying funding sources to support CE innovation, the amount of investment required to implement circular practices, the availability of human resources to address CE innovation, a lack of a clear normative framework on CE, a lack of economic support from institutions, the scarce adaptability of environmental monitoring tools to SME characteristics, and a lack of knowledge regarding the benefits of CE implementation (in economic and non-economic terms).

6. Results

A total of 99 questionnaires were returned, with an overall response rate of 23.91%, which is in line with other SME studies (Nawrocka and Parker, 2009). Non-response bias tests were performed by comparing early and late responses available in the sample, based on the assumption that late respondents are more likely to be non-respondents (Amstrong and Overton, 1977). A comparison of the groups gave no indication of response bias, based on Mann-Whitney-U at the 5% significance level; none of the variables proved to be significantly different in their distribution.

Of the 99 respondents, 43 (43.43%) were granted COVID-19-related incentives, which were introduced to support innovative SMEs during the COVID-19 pandemic. The remaining 56 firms did not receive such incentives. The 43 firms were asked about the incentives received, and the respondents reported the number and type of incentives received.

As data for dependent and independent variables were collected from the same respondents, Harman’s single-factor test was performed to ensure the absence of common method bias (Podsakoff et al., 2003).

Considering CE practices, competences, and resources, three composite normalised indexes were created, merging the items in the different fields of action. The composite index approach has previously been used to assess the level of SMEs’ CE implementation in regions and sectors that focus on business practices (see for e.g., García-Sánchez et al., 2021). In this study, composite index creation was based on an additive function, and equal weighting schemes were applied hierarchically (Gan et al., 2017).

6.1 The effect of COVID-19-related incentives

We first tested whether SMEs receiving pandemic-related government financial support reported greater CE practices compared to those that did not receive dedicated financial support. We performed a one-way analysis of variance (ANOVA) using the SPSS software package (Miller, 1997; Field, 2000; Kutner et al., 2005). As shown in Table 2, the analysis reported significant differences between the groups for all performance variables considered. In fact, for all three variables the p-value is significant ($p = .000$, two-tailed test). In particular, firms that did not access the COVID-19-related incentives reported lower levels of CE practices (mean = .209, s.d. = .216 versus mean = .429, s.d. = .230), competences (mean = .211, s.d. = .250 versus mean = .464, s.d. = .246), and resources (mean = .226, s.d. = .259 versus mean = .538, s.d. = .270).

Table 2: Variance analysis (incentives)

		Sum of squares	df	Mean square	F	Two-tailed sig.
Practices	Between Groups	1.178	1	1.178	23.941	.000
	Within Groups	4.773	97	.049		
	Total	5.951	98			
Competences	Between Groups	1.560	1	1.560	25.235	.000
	Within Groups	5.995	97	.062		
	Total	7.555	98			
Resources	Between Groups	2.364	1	2.364	33.979	.000
	Within Groups	6.749	97	.070		
	Total	9.113	98			

Given these results, we undertook further analysis, focusing on the number of such incentives. Of the 43 firms that received COVID-19-related incentives, 32 firms (74.42%) were supported by one incentive, and the remaining 12 (25.58%) received two incentives. Therefore, the following analysis tests the significance of the differences among the three groups (no incentives, one incentive, and two incentives) for the development of CE practices, competences, and resources (Table 3).

Firms that did not receive COVID-19-related incentives presented significantly different values concerning CE practices, competences, and resources when compared to those who received one incentive ($p = .000$, two-tailed test) or two incentives ($p = .001$, two-tailed test). Concerning practices, firms that did not receive incentives presented a mean = .209, s.d. = .216, while firms with one or two incentives presented higher values related to CE practices (mean = .410 (s.d. = .228) and mean = .483 (s.d. = .237), respectively). Non-significant differences emerged between the second and third group of firms ($p = .613$, two-tailed test).

Considering CE competences, firms that did not access COVID-19-related incentives presented significant differences compared to the other groups to the same extent ($p = .000$, two-tailed test). The first group reported a slightly higher mean than those already presented (mean = .211; s.d. = .250), but differences were higher due to higher values of CE competences related to the other firm groups. In this regard, firms that accessed one incentive reported a mean = .438 (s.d. = .242), while firms that accessed two incentives presented a higher mean = .541 (s.d. = .251). In addition, in this case, non-significant differences emerged between the two latter types of firms ($p = .461$, two-tailed test). Lastly, significant differences also emerged concerning CE resources when firms that did not receive incentives and other types of firms were considered ($p = .000$, two-tailed test). The means were higher than the previous ones for these three categories. Firms that did not receive incentives reported a mean = .226 (s.d. = .259), those that received one incentive reported a mean = .520 (s.d. = .279), and the remaining group reported a mean = .589 (s.d. = .249). Again, no significant difference was found between firms that received one or two incentives ($p = .736$, two-tailed test).

Table 3: Variance analysis (number of incentives)

Dependent variable	(I) Number of incentives	(J) Number of incentives	Mean difference (I-J)	Std. error	Two-tailed sig.
Practices	0	1	-.201331	.04919	.000
		2	-.274629	.07320	.001
	1	0	.201331	.04919	.000
		2	-.073298	.07758	.613
	2	0	.274629	.07320	.001
		1	.073298	.07758	.613
Competences	0	1	-.226772	.054971	.000
		2	-.330156	.081810	.000
	1	0	.226772	.054971	.000
		2	-.103383	.086701	.461
	2	0	.330156	.081810	.000
		1	.103383	.086701	.461
Resources	0	1	-.294087	.05859	.000
		2	-.363189	.08719	.000
	1	0	.294087	.05859	.000
		2	-.069102	.09240	.736
	2	0	.363189	.08719	.000
		1	.069102	.09240	.736

6.2 The different COVID-19-related incentives

Following the results presented here, firms who benefited from COVID-19-related incentives reported greater CE practices, resources, and competences than those who did not receive incentives. Consequently, we also performed an ANOVA to assess whether significant differences could be found in our sample with reference to the kind of incentive received (VCSF, RGS, or RGI) in terms of reported CE practices, competences, and resources. Tables 4a, 4b, and 4c report the results for the three types of incentives and the three groups.

In the sample considered, of the 43 firms that had access to incentives, 32 received RGS incentives, 18 RGI incentives, and only four accessed VCSF incentives. Nine firms received both RGS and RGI incentives, two were addressers of RGI and VCSF incentives, while only one was subjected to RGS and VCSF incentives.

The VCSF incentive did not present significant differences for either CE practices, competences, or resources (Table 4a). Those who accessed the VCSF presented higher values for all the variables considered than those who did not access this specific incentive, but the differences were not significant.

Table 4a: Variance analysis (VCSF vs other incentives)

		Sum of squares	df	Mean square	F	Two-tailed sig.
Practices	Between Groups	.063	1	.063	1.193	.281
	Within Groups	2.155	41	.053		
	Total	2.218	42			
Competences	Between Groups	.156	1	.156	2.670	.110
	Within Groups	2.389	41	.058		
	Total	2.545	42			
Resources	Between Groups	.062	1	.062	.841	.365

Conversely, the ANOVA, performed with regard to the refinancing of the relief granted in the form of soft loans, provides evidence of significant differences between those who accessed the COVID-19 related incentive and those who did not, although limited to CE practices ($p = .041$). As Table 4b reports, RGS incentives recipients' results presented lower levels of CE practices (mean = .387, s.d. = .207) than those who did not receive such incentives (mean = .550, s.d. = .259). In contrast, no significant differences were detected with regard to CE competences and resources.

Table 4b: Variance analysis (RGLS vs other incentives)

		Sum of squares	df	Mean square	F	Two-tailed sig.
Practices	Between Groups	.218	1	.218	4.464	.041
	Within Groups	2.000	41	.049		
	Total	2.218	42			
Competences	Between Groups	.080	1	.080	1.329	.256
	Within Groups	2.465	41	.060		
	Total	2.545	42			
Resources	Between Groups	.091	1	.091	1.258	.269
	Within Groups	2.977	41	.073		
	Total	3.068	42			

Lastly, the analysis of the access to RGCI did not present significant results, as shown in Table 4c. Consistent with previous analysis, firms that received RGCI incentives did not report differences in CE practices, competences, and resources compared to those that did not access this incentive.

Table 4c: Variance analysis (RGCI vs other incentives)

		Sum of squares	df	Mean square	F	Two-tailed sig.
Practices	Between Groups	.053	1	.053	1.007	.321
	Within Groups	2.165	41	.053		
	Total	2.218	42			
Competences	Between Groups	.017	1	.017	.277	.602
	Within Groups	2.528	41	.062		
	Total	2.545	42			
Resources	Between Groups	.012	1	.012	.160	.691
	Within Groups	3.056	41	.075		
	Total	3.068	42			

6.3 Reasons for not implementing CE

Firms that were addressers of COVID-19 related incentives to a different extent were further investigated concerning the barriers to implementation of CE practices. Table 5 reports the results of the question "To what extent do you believe that the following factors limit (or may limit) the adoption of CE practices in your firm?".

Table 5: Barriers to CE implementation

	Not at all (1)	2	3	4	5	6	Totally (7)
Difficulties in identifying funding sources to support CE innovation	16.3	14.0	2.3	20.9	14.0	14.0	18.6
Amount of investments required to implement circular practices	12.5	15.0	15.0	17.5	10.0	22.5	7.5
Availability of human resources to address CE innovation	16.3	20.9	4.7	20.9	14.0	11.6	11.6
Lack of a clear normative framework on CE	5.0	17.5	10.0	22.5	17.5	17.5	10.0
A lack of economic support from institutions	11.6	11.6	9.3	16.3	11.6	20.9	18.6
Scarce adaptability of environmental monitoring tools to SME characteristics	7.3	12.2	9.8	14.6	17.1	24.4	14.6
A lack of knowledge regarding the benefits of CE implementation	0.0	20.9	16.3	20.9	7.0	9.3	25.6

These results might support the comprehension of the main factors that prevent firms from implementing CE in SMEs. Focusing on the last three points of the scale for each item (from 5 to 7), which show medium or high perception of the barrier, some factors are perceived more than others to limit CE practice implementation. In particular, 56.1% of respondents rated the scarce adaptability of environmental monitoring tools to SME characteristics as a limit to CE implementation, followed by a lack of economic support from institutions (51.2%). Further, 46.5% of firms that received COVID-19 related incentives found difficulties in accessing funding sources to support CE innovation, while 45.0% emphasised a lack of normative framework on CE. Finally, 40.0% identified a limit in the amount of investments required to implement CE practices, and 37.2% reported the scarcity of human resources to address CE innovation as a limitation.

7. Discussion and Conclusions

This study emphasises financial resources derived from the role of dedicated governmental support and their association with CE practices of innovative SMEs during the COVID-19 pandemic. The results of the empirical analysis show that innovative SMEs that benefited from dedicated COVID-19 related incentives also reported more CE practices than those who did not benefit from them. Thus, incentives may play a role in supporting investments in CE. Indeed, incentives could allow these firms to not reduce R&D investments during a financial crisis, as such investments support their innovation, growth, and profitability (Roper and Turner, 2020).

Furthermore, firms' competences and resources dedicated to CE projects were greater in those innovative SMEs that received COVID-19 related incentives, highlighting that external financial resources may allow these firms to invest in the development of internal assets that are needed to capture new business opportunities, such as CE.

Public incentives can help innovative firms sustain or recalibrate their resources and competences to find new business opportunities, such as CE, to overcome the pandemic crisis (Lim et al., 2020). SMEs that can seize these opportunities can restore their profitability and recover their relations with investors. This, in turn, can help firm managers access additional resources to support further innovation and firm growth. Regarding the typology of incentives, results also show that firms accessing the RGSL were less active in developing CE practices compared to those accessing VCSF or RGCi that may support investments. Even though the RGSL has been widely used as an SME support measure during the pandemic, it cannot be considered sufficient support for the SME recovery phase. It should be noted that such SMEs, if already in financial distress, may be reluctant to take out new loans and aggravate their debt position (Brown, 2020). A call for dedicated grants, therefore, seems to be the most promising solution to help innovative SMEs adapt to the pandemic situation (Brown, 2020). In the analysed sample, VCSF was the least accessed source of finance, and innovative SMEs accessing VCSF did not show differences in CE practice implementation and CE competences and resource development, compared to firms that did not access this finance source. Although the availability of equity finance, such as venture capital in the seed stage, has tended to decline during the pandemic (Brown et al., 2020; Bellavitis et al., 2021), this source is key to supporting innovative growth-oriented SMEs (Brown and Lee, 2019). As mixed results are found in the literature with reference to the role of venture capital supporting CE innovation, more research is needed to investigate how governmental incentives dedicated to the provision of additional venture capital funds can promote SMEs' innovativeness around CE in a time of crisis. In this study, RGCi and VCSF were associated with higher CE practices compared to those firms that accessed the RGSL. Additional funds from VCSF and RGCi may have supported investments in their resource bundle to bolster CE adoption through the development of proper CE competences.

In this regard, the way firms create synergies between the available assets in its bundle, also thanks to incentives, can be a key to the implementation of CE practices and deserves further investigation. Indeed, public incentives can help these firms sustain or recalibrate their resources and competences to find new business opportunities, such as CE, to overcome the pandemic crisis (Lim et al., 2020). SMEs that can seize these opportunities can restore their profitability and recover their relations with inve-

stors. This, in turn, can help firm managers access additional resources to support further innovation and firm growth. In this regard, the paper also provides managers with knowledge of the resources and competences that allow the adoption of CE practices in the time of crisis.

Regarding CE barriers, innovative SMEs perceived the scarce adaptability of environmental monitoring tools to SME characteristics as a limit to CE implementation, followed by a lack of economic support from institutions. Environmental monitoring tools have been said to provide information that can support the reconfiguration of the business model around specific CE strategies (Ormazabal et al., 2018; Scarpellini et al., 2020), and the literature has underlined the need to adapt these strategic performance measurement tools to the peculiarities and sector-specificities of SMEs to favour their implementation (Johnson and Shaltegger, 2016). The lack of economic support and difficulty in accessing CE-dedicated funds (Rizos et al., 2016; Ormazabal et al., 2018), as well as the lack of a clear supportive normative framework (Mura et al., 2020) also emerged as discouraging factors affecting the innovative SMEs' journey toward CE. The lack of qualified personnel was also identified as another issue to be solved (Rizos et al., 2016; García-Quevedo et al., 2020), despite literature showing mixed results on this barrier. To solve some of these issues, the Italian Recovery Plan, which operationalises the Next Generation EU and the React EU packages, will forecast venture capital support to bolster innovation. Indeed, one of the interventions proposed in the Plan is to stimulate the growth of an innovation ecosystem with a focus on ecological transition through investments in green venture capital funds, start-ups, and incubators. Other incentives dedicated to innovative SMEs relate to an additional resource provision that promotes the development of firms that specifically contribute to scientific progress and the national economy, which will provide support to at least 250 innovative SMEs with investments of €700 million. In the Plan, more traditional forms of funding, such as subsidised finance and tax credit, are also expected to support SMEs' internationalisation through digitalisation and sustainability. It is hoped that such a package of interventions, in which traditional financing tools are flanked by others that are more focused on innovative SMEs, will help these firms preserve their R&D focus and allow them to seize the opportunities derived from the ecological transition. In this study, we examined the role of occasional incentives (the COVID-19 related ones), whose principal aim was to provide financial relief to innovative SMEs affected by the crisis. In this regard, we were not able to test the extent to which such incentives promoted a business model reconfiguration around CE to support their competitiveness in the long run. In addition, the short period intercurrent from May 2020, in which the Relaunch Decree became operative and September 2020, when the survey was sent for the first time, could not be suf-

efficient for incentives to produce important effects on the business models of the innovative SMEs under investigation, both in terms of CE adoption and the latter's impact on competitiveness. In this regard, further research may investigate whether COVID-19 related incentives will produce meaningful effects in terms of the adoption of CE practices in the long run and how these factors will, in turn, contribute to the competitiveness of SMEs. Indeed, at the time of writing this paper, it was not yet possible to retrieve financial data on innovative SMEs considering a sufficiently consistent time period to allow the conduction of a quantitative study and to be able to control for variables that could affect the above-cited relations (i.e. the year in which these firms have started to implement CE practices that may be prior to the attainment of a COVID-19 incentive). Another limitation of this study lies in the limited sample size, as the CE in SMEs is an emergent topic, and the pandemic may have prioritised practical and operational issues, impacting innovative SMEs' participation in this research, as confirmed by some of the feedback received from non-respondents. Further, consistent with the resource-based view of the firm (Barney, 1991), quantitative studies may test how financial incentives, derived from public policies specifically aimed at supporting CE, mediate the relationship between the firms' physical and organizational resources and the developed competences, and to what extent the latter impact the adoption of CE practices in SMEs.

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Appendix 1: The questionnaire

Section 1: Take

	1 (Not at all)	2	3	4	5	6	7 (Completely)
<i>Please rate the extent to which you agree with the following sentences related to CE practices in your firm:</i>							
I produce energy from by-products or waste from the production process that I use to run the plant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I choose to purchase raw materials with a lower environmental impact	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use renewable materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use methods to quantify the relevant emissions and resources consumed and the related impacts on the environment and health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>Please rate the extent to which you apply the following competences to reach the aforementioned CE practices</i>							
Ability to select suppliers on the basis of their environmental impact	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exchange of information with suppliers to increase the use of circular raw materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to influence the characteristics of raw materials from a circular economy perspective	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sharing of circular economy values with suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>Please rate the extent to which you use the following resources to reach the aforementioned CE practices</i>							
Biodegradable raw materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regenerated raw materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recyclable raw materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Competent suppliers in the field of circular economy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 2: Make

	1 (Not at all)	2	3	4	5	6	7 (Completely)
<i>Please rate the extent to which you agree with the following sentences related to CE practices in your firm:</i>							
I make tailor-made products in order to reduce waste and prevent overproduction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I manufacture products considering the need to disassemble them for repair, refurbishment, or recycling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I produce products separating the organic parts from the inorganic ones	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I design the product with attention to its environmental impacts during the entire life cycle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The design and production take place with a view to reducing the use of raw materials and harmful substances	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use resources or materials that last longer than a single life cycle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>Please rate the extent to which you apply the following competences to reach the aforementioned CE practices</i>							
Eco-design skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Design of products whose life can be maintained or increased through repair	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Design of production processes with a view to reducing waste, increasing energy efficiency, and using renewable materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project-management skills to facilitate the development of new CE products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>Please rate the extent to which you use the following resources to reach the aforementioned CE practices</i>							
Standardized production processes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Qualified personnel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technologies for monitoring energy consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technologies for monitoring the consumption of materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technologies that reduce energy consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 3: Distribute

	1 (Not at all)	2	3	4	5	6	7 (Completely)
<i>Please rate the extent to which you agree with the following sentences related to CE practices in your firm:</i>							
I use packaging that reduces transport costs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use packaging with reduced environmental impact	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use product distribution channels that limit road transport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I provide customers with information on disposal of packaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>Please rate the extent to which you apply the following competences to reach the aforementioned CE practices</i>							
Attention to reducing the environmental and economic impact in logistics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Warehouse management skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Logistic skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Packaging design with reduced environmental impact	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>Please rate the extent to which you use the following resources to reach the aforementioned CE practices</i>							
Traceability system of raw materials and processes to guarantee the customer compliance with the principles of the circular economy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of third-party logistics service providers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cooperation with packaging producers with a view for sustainability (environmental and economic) of the packaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cooperation with distributors with a view for (environmental and economic) sustainability of distribution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 4: Use

	1 (Not at all)	2	3	4	5	6	7 (Completely)
Please rate the extent to which you agree with the following sentences related to CE practices in your firm:							
The product remains the property of my company which carries out maintenance, repair, and recycling activities throughout its life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The product remains the property of my company and the customer pays me to use it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I offer products guaranteed by environmental certification or eco-sustainability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The products or part of their components can be reused	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of second-hand collection systems that guarantee a continuous flow of material for re-generation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the extent to which you apply the following competences to reach the aforementioned CE practices							
Dialogue with customers to extend the life cycle of the product and reuse and recycle it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Development of long-term customer relationships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Involvement of customers in the design of products and services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Development of an effective after-sales service that encourages the repair/reuse of products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the extent to which you use the following resources to reach the aforementioned CE practices							
Market analysis techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business intelligence tools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
After sales service	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Channels of communication with customers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 5: Recover

	1 (Not at all)	2	3	4	5	6	7 (Completely)
Please rate the extent to which you agree with the following sentences related to CE practices in your firm:							
I use the by-products of my production processes as raw materials for the manufacture of new products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I convert used products into new products of the same quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I convert used products into new products of lower quality or reduced functionality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I convert unusable waste materials into energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exchange and / or share with other companies by-products to be used as inputs in production processes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the extent to which you apply the following competences to reach the aforementioned CE practices							

Attention to the reduction of production waste through the philosophy of reduction, reuse, and recycling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Return logistics use: recovery of products or components to create new ones	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please rate the extent to which you use the following resources to reach the aforementioned CE practices							
Management attentive to the processes of reduction, reuse, and recycling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Staff attentive to the reduction, reuse, and recycling processes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Production processes that allow the recovery of materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Relationship with customers for the purpose of recovering products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Presence of third-party service providers who recover the materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 6: Barriers

	1 (Not at all)	2	3	4	5	6	7 (Completely)
<i>Please rate the extent to which the following factors do limit (or can limit) CE implementation in your firm</i>							
Difficulties in identifying funding sources to support CE innovation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of investments required to implement circular practices	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of human resources to address CE innovation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of a clear normative framework on CE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A lack of economic support from institutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scarce adaptability of environmental monitoring tools to SME characteristics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A lack of knowledge regarding the benefits of CE implementation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section 7: Incentives

Recent normative provisions foresaw occasional incentives to support firms during the pandemic. Please indicate which of the following economic benefits your firm accessed following the COVID-19 emergency:
<ul style="list-style-type: none"> • The “Venture Capital Support Fund” • Refinancing of the relief granted in the form of soft loans • Provision of relief granted on capital injections that may support investments • None of them