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An integrated view of eco-innovation in the service sector: Dynamic capability, cooperation and corporate environmentalism

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Abstract

This study integrates the insights of the dynamic capabilities theory with the perspective of strategic orientations to provide an integrated view of eco-innovation in service organizations. We empirically test this integrated view of eco-innovation in the case of Spain with a sample of 3192 service firms from the Spanish Technological Innovation Panel from 2012 and 2015. Our results allow the verification of the properties of persistence, complementarity and dependence on resources for eco-innovation, thus being able to conceptualize it as an innovation capability. Moreover, we support that both eco-innovation and cooperation, once set in motion, could reinforce each other, suggesting that the relationship between cooperation and eco-innovation is complementary and sequential. We also argue that the strength of strategic orientations, particularly corporate environmentalism, will spur service firms to integrate and adapt capabilities to undertake more cooperative innovation in order to deliver outcomes in tandem with their strategic objectives.

KEYWORDS
cooperation, dynamic capabilities, eco-innovation, strategic orientations

1 | INTRODUCTION

The service sector is increasing its economic importance in society, as it has become the main contributor to both GDP and employment in the world (Aboal & Tacsir, 2018; Gallouj & Savona, 2009; Hipp, 2010). In parallel with its economic growth, Duan et al. (2015) also highlight the importance that this sector is acquiring for the environment as it grows. For instance, Rodríguez-Antón et al. (2012) point out the excessive consumption of water and the lack of recycling of plastic containers in the tourism sector, as the main environmental problems. Besides, the European Union notes the problem of the service sector's food waste, estimating that around 90 million ton of food waste is generated each year in the member countries (Hennchen, 2019). Moreover, Camarero et al. (2015) highlight the rapid growth of annual rates of energy consumption by the service sector, with respect to the manufacturing sector. Therefore, it is expected that the service sector will encourage the development of eco-innovative practices that reduce the environmental impact of business activities and will be

Abbreviations: CMB, common method bias; CMV, common method variance; GDP, gross domestic product; IC, information and communication; PITEC, Spanish Technological Innovation Panel; R&D, research and development; RBV, resource-based view.

able to obtain competitive advantages through the implementation of eco-innovation measures (García-Pozo et al., 2016).[1]

However, despite the importance of the service sector in terms of both the economic value and its environmental impact, the empirical evidence on eco-innovation and environmental sustainability in the service sector remains scarce, in comparison with the abundant literature on the manufacturing sector (Doran & Ryan, 2012; Dumitrescu et al., 2015; Horbach, 2008). There are several reasons behind this lack of academic attention to the service sector and its environmental practices. First, the environmental impact of the services sector is lower than that of the manufacturing sector since the former carries out operations and processes that produce relatively little pollution in the form of smoke, odours, sounds or chemical pollutants (Kirk, 1995). Second, unlike what happens in the industrial sector, the scarcity of environmental legislation in the service sector means less institutional pressure on companies to implement environmental practices (Carmona-Moreno et al., 2004). Third, the service sector is characterized by heterogeneity of industries, which makes it difficult to conceptualize eco-innovation in this sector and to find common patterns of environmental practices (Gallouj & Savona, 2009). Finally and derived from this heterogeneity, the service sector lacks environmental indicators, which means that the implementation of new management measures in this sector, as well as their impact on productivity, has hardly been addressed by the literature (Sousa-Zomer & Miguel, 2018).

This paper aims to investigate *how the service sector develops eco-innovation*, integrating the insights from the dynamic capabilities theory (Eisenhardt & Martin, 2000; Teece, 2007; Teece et al., 1997) with the corporate environmentalism perspective (Banerjee, 2002). We select this framework based on previous literature indicating that product innovation-oriented theories are not appropriate to understand service innovation because formal research and development (R&D) activities are an exception rather than a norm in the service sector (Djellal & Gallouj, 2018). We follow Janssen et al. (2016), who find innovation in service organizations to be better understood by explaining its organizational antecedents. For example, dynamic capabilities have been identified to have immense impacts on innovation in service organizations (Janssen et al., 2016; Lütjen et al., 2019). Extant research has also identified collaborative innovation capacity as part of the service organization's dynamic capabilities (Agarwal & Selen, 2009). Therefore, important insights emerge from the knowledge of the organizational antecedents of service innovation (Tether & Tajar, 2008). First, the organization's cooperation capacity is pivotal to its service innovation. Second, both cooperation and innovation are underpinned by unique firm-specific collaborative capability and innovation capability, as a consequence of the strategic orientation of firms. Such insights can help explain what drives service organizations to develop eco-innovation.

We empirically test this integrated view of cooperation and eco-innovation in service organizations for the case of Spain. We use data from the Spanish Technological Innovation Panel, obtained during 2012 and 2015, and we focus on a sample of 3192 service firms.

The contribution of the paper is multifold. First, we expect that the organization's cooperation capacity will be pivotal to eco-innovation in the service sector, so that our paper takes an integrated view of eco-innovation and cooperation in service organizations. In this line, we contribute to the literature noting that while cooperation facilitates eco-innovation in service organizations, eco-innovation in turn reinforces the innate motives and recreates the capability to collaborate. This effect of cumulative causation suggests that the relationship between cooperation and eco-innovation is necessary and complementary as a result of reconfiguration and recreation of capabilities. Second, while we frame the synergies and complementarities between cooperation and eco-innovation from the dynamic capability lens, we contribute to the literature by highlighting that the source of dynamic capability underpinning interactive collaborative eco-innovation comes from the strength of environmental orientations. From the corporate environmentalism perspective, we conclude that a service organization is more likely to adapt capabilities and to be involved in cooperation-enabled eco-innovation if it displays environmental orientation. This is to acknowledge that service organizations could be engaged in various sets of behaviours such as creating and keeping customer value, maintaining efficiency throughout their value chain or developing a new service.

2 | THEORETICAL BACKGROUND

2.1 | Eco-innovation in the firm

Eco-innovation has been largely conceptualized in the literature (e.g., Cainelli et al., 2015; De Marchi, 2012; Diaz-Garcia et al., 2015; Ghisetti et al., 2015); for example, Cainelli et al. (2015) consider eco-innovation as an innovation that is capable of producing environmental and sustainable products and services. For their part, Kemp (2010) affirms that eco-innovation is the development, assimilation or exploitation of a product, process, service or organizational/business method that is novel for the organization and whose results are the reduction of environmental risk, pollution or other negative impacts of the intensive use of resources. Following these studies, in this paper, we conceptualize eco-innovation as an innovation whose objective is to develop new products, services or business practices, aimed to create new business opportunities and benefit the environment.

Despite conceptualizing eco-innovation as an innovation, the literature has highlighted several aspects that differentiate eco-innovation from other innovations (De Marchi, 2012; Ghisetti et al., 2015). The first difference arises from the fact that environmental innovations pose an environmental problem that needs an urgent solution, implying a private cost and an associated external cost to firms (De Marchi, 2012). In fact, De Marchi (2012) points out that in this situation, there is no incentive for companies to invest in environmental innovation, since social costs would be reduced with such innovation and private costs would increase, since innovation takes a

[1]García-Pozo et al. (2016) pointed out, for the tourism sector, that the greater awareness of consumers about the reduction of environmental impacts is leading to a greater demand for environmentally friendly services and, therefore, to better revenues for the companies.

long time, requires expensive investments in R&D and involves many unsuccessful efforts to achieve market expansion (Mazzanti & Zoboli, 2006). De Marchi (2012, p. 615) argues that this market failure induces a second peculiarity of eco-innovations, namely, the need for greater political intervention to promote their development (Cainelli et al., 2015; Díaz-García et al., 2015). Several contributions focused on environmental innovations support that, given the low private incentives for companies to invest in them, regulatory and institutional frameworks must play a key role in promoting the development of eco-innovations (Porter & van der Linde, 1995). One final difference is the importance of cooperation agreements for the development of eco-innovation (De Marchi, 2012). De Marchi (2012) empirically demonstrates that the development of eco-innovation needs the use of cooperation agreements, more than when it comes to introducing other types of innovations. That is, eco-innovation very often requires changes in the raw materials or components used, where cooperation with suppliers is important to guarantee the supply of inputs with ecological characteristics, which may not be readily available on the market. Moreover, the development of eco-innovations sometimes means changing the business model in companies, as is the case with the implementation of the circular economy, which requires technical and organizational interdependencies with suppliers and customers (Lüdeke-Freund et al., 2019).

2.2 | Dynamic capabilities and eco-innovation

As indicated in the previous section, we explore eco-innovation in the service sector from the dynamic capabilities perspective. Teece et al. (1997, p. 516) considered dynamic capabilities as the firm's ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments. Eisenhardt and Martin (2000) have presented dynamic capabilities as specific and identifiable processes, while Nelson and Winter (2002) considered dynamic capabilities as foreseeable behavioural patterns, through which the organization manages its resource, with the objective of obtaining the success of the company. The embeddedness of capabilities in companies is established through complex relations between the company's resources in response to market dynamism (Teece, 2007; Wang & Ahmed, 2007). The evolution of dynamic capabilities is shaped by the learning mechanisms that manifest themselves in the processes of experience accumulation, and knowledge articulation and codification (Zollo & Winter, 2002). It is through these mechanisms that firms continually integrate, reconfigure, renew and recreate their capabilities to attain and sustain competitive advantage (Teece et al., 1997).

Previous studies have approached environmental sustainability from the perspective of dynamic capabilities (e.g., Da Giau et al., 2020; Prieto-Sandoval et al., 2019). Aragon-Correa and Sharma (2003) argue that sustainability management is a process of integrating capabilities and resources. Hart and Dowell (2011) point out that the perspective of dynamic capabilities allows an understanding of the processes by which companies implement sustainable development strategies. Moreover, this theoretical perspective has studied the competencies and sustainable capabilities in companies, such as the capacity to develop sustainable suppliers (Foerstl et al., 2010), corporate environmental innovation (Wong, 2013) or environmental search routines (Hilliard & Jacobson, 2011).

Within this framework, we assume that eco-innovation is the capacity to modify, re-design and create products, processes and procedures in order to reduce environmental impact. Building on this idea, we conceptualize eco-innovation as an innovation capability. This is in line with Cohen and Levinthal's (1990) conceptualization of innovation capability, as a series of processes and organizational routines that allow the company to seek out, acquire, assimilate and use resources to improve the firm's performance. Hence, eco-innovation capabilities manifest themselves in firms' eco-innovation processes, that is, the capabilities of organizations to successfully adopt and implement new ideas, processes and sustainability products with the environment.

2.3 | Corporate environmentalism orientation

In this respect, Banerjee (2002, p. 178) introduces the concept of 'corporate environmentalism', which he defines as 'the organization-wide recognition of the legitimacy and importance of the biophysical environment in the formulation of organization strategy and the integration of environmental issues into the strategic planning process'. Moreover, corporate environmentalism orientation supposes the recognition and integration of environmental concerns in the decision-making process of a company, addressing environmental problems and being able to produce an implication in the company's strategy.

Corporate environmentalism is developed and integrated into varying degrees in companies, where environmental problems are incorporated at various levels of the business strategy in the form of objectives and policy development (Arici & Uysal, 2022; Banerjee, 2002; Chan & Ma, 2021; Liao, 2018; Niemann et al., 2020). That is, we can find proactive companies, which have capabilities to implement environmental strategies for the development of eco-innovations, and more reactive companies, which passively assume environmental standards, pollution correction measures and waste elimination.

3 | HYPOTHESES

3.1 | Cooperation relationships as drivers–antecedents of eco-innovation in the service sector

Regarding the relationship between cooperation and eco-innovation, we can find important results in the literature. First, studies on eco-innovation point out that cooperation, especially in the supply chain, is a driver for the development of environmental innovation (Cainelli et al., 2015; De Marchi, 2012; Horbach, 2008; Mazzanti & Zoboli, 2005). De Marchi (2012, p. 614) points out that 'given their systemic, credence and complex character, environmental innovations are

peculiar in that R&D cooperation with external partners is even more important than for the introduction of other innovations'. Second, in the innovation literature on the service sector, it has already been noted that innovation is developed in a peculiar way compared with product innovation (Aboal & Tacsir, 2018; Alam & Perry, 2002; Gallouj & Savona, 2009; Hoyer et al., 2010; Leiponen, 2012). That is, service innovation is characterized by cooperation with clients, suppliers and other partners (Hipp, 2010; Oliveira & von Hippel, 2011; Tether & Tajar, 2008). Along the same lines, it is expected that cooperation is a common practice in the development of innovations, allowing service firms to acquire knowledge of customer needs, obtain complementary resources and mitigate risks and uncertainties of markets (Cainelli et al., 2020; Carmona-Moreno et al., 2004; Castellacci, 2008; Doran & Ryan, 2012; García-Pozo et al., 2016; Lütjen et al., 2019). The distinct coupling of cooperation and eco-innovation in service organizations attests to the importance of the coexistence of organizations' cooperation and eco-innovation behaviours. It also hints that the eco-innovation process is difficult to understand without considering cooperation between agents in the service sector. This effect of cumulative causation suggests that the relationship between cooperation and eco-innovation is necessary and complementary as a result of reconfiguration and recreation of capabilities. In this context, we postulate that the eco-innovation in the service sector will be facilitated by the previous development of cooperation agreements.

As we have previously pointed out, the development of eco-innovation, from the perspective of dynamic capabilities, implies the development of processes where the resources and capacities of the company interact to achieve the objectives of eco-innovation. In this sense, the literature in the services sector already pointed out that the innovation process is characterized by interaction, collaboration and communication between partners (Ndubisi & Al-Shuridah, 2019; Oliveira & von Hippel, 2011; Tether & Tajar, 2008). Therefore, having prior organizational routines and capabilities for interaction and collaboration will facilitate the subsequent eco-innovation development process. So, following Arranz et al. (2016), experience in interaction with the supply chain in the service sector can be translated into negotiating competencies and skills, which implies a capability for interaction and communication with partners, and facilitating the development of eco-innovation. Moreover, experiences in collaboration can be translated into competencies of coordination and conflict resolution, which facilitates the management of eco-innovation in the service sector. Arranz and Fernandez de Arroyabe (2012) and Poppo and Zenger (2002) point out that communication and interaction in the supply chain will enable firms to better improve mutual adaptability and reciprocal expectations, which will, in turn, facilitate reaching agreements, solving problems and achieving performance targets, meaning the development of eco-innovation. In this sense, service companies will use previous cooperation to develop and customize innovations, they will accumulate experiences and sharpen their competencies of innovation. Thus, it is to be expected that the organization's cooperation capabilities will be pivotal to eco-innovation in the service sector. Hence, the following is proposed:

Hypothesis 1a. In the service sector, prior cooperation facilitates the development of eco-innovation.

Next, we postulate the existence of complementarities between eco-innovations and cooperation agreements in developing future eco-innovations. Previous studies have noted the potential synergies and complementarities between, for example, process and product innovations or organizational and technological innovations (Ballot et al., 2015; Doran, 2012). These complementarities arise from sharing resources, competencies or routines in the capability generation process, via learning processes and economies of scale (Camisón & Villar-López, 2014; Damanpour & Evan, 1984; Eisenhardt & Martin, 2000). Doran depicted complementarity across R&D activities 'as existing if the engagement of a firm in two types of R&D activity simultaneously resulted in greater returns to the firm than engagement in either of these forms of R&D separately' (Doran, 2012, p. 354). Therefore, following this definition, it can be inferred that previous eco-innovations undertaken through cooperation increase the probability of making future eco-innovations, as a consequence of the synergistic effects in the process, compared with previous eco-innovations without cooperation.

First of all, companies with previous innovation experiences have an increased probability of innovating later. That is, changes within organizations have been shown to be a cumulative and self-reinforcing process (Amburgey & Miner, 1992), which produces a competencies-enhancing effect. This analysis is consistent with studies on the persistence of technological innovations (see, for example, Arroyabe & Schumann, 2022; Peters, 2009; Sapprasert & Clausen, 2012; Tavassoli & Karlsson, 2015), which consider the innovation process as one of 'creative accumulation' (Rosenberg, 1976). Therefore, it is to be expected that firms will eco-innovate based on skills and competencies obtained from their previous eco-innovative activities, where knowledge generated from previous eco-innovations reinforces new eco-innovations since the course of learning and the economies of scale result in the process. Second, if these companies have also previously developed cooperation agreements, this will provide additional competencies, which will facilitate the subsequent eco-innovation process. Service firms' eco-innovation involves the development of a process where interconnection and communication are essential elements. In a sense, Arranz et al. (2016) point out that cooperation agreements are considered a constant negotiation between partners. Thus, previous experience in cooperation agreements can be translated into negotiating competencies and skills, which implies a capability for interaction and communication with partners, facilitating the development of subsequent eco-innovation. Moreover, previous experiences in cooperation agreements can be translated into competencies of coordination and conflict resolution, which facilitates eco-innovation management in the service sector. Therefore, the sequential relation of cooperation and eco-innovation in service firms is based on the competencies previously acquired in the realization of cooperation agreements, such as negotiation, coordination and conflict resolution. Third, conducting eco-innovation and cooperation processes together allows the sharing

capabilities of each of the process. Thus, in the light of the cumulative nature of the capabilities (Eisenhardt & Martin, 2000), carrying out processes with similar capabilities reinforces the skills and competencies of the companies, by developing them successively as a consequence of the learning processes (learning by doing). This will, in turn, translate, for example, into the reduction of time, generation of economies of scales, and greater skills and competencies (Arranz et al., 2019; Camisón & Villar-López, 2014; Doran, 2012). All this will facilitate the firm's subsequent eco-innovative activities.

Therefore, we see that previous experiences of eco-innovation through cooperation will produce a strong synergistic effect on eco-innovation in the future. In other words, prior experiences of eco-innovation through cooperation will equip service firms with a great incentive for the development of subsequent eco-innovations, due to the combinative cooperative competencies and eco-innovation capabilities acquired previously from cooperative eco-innovation. Therefore, the following is proposed:

> **Hypothesis 1b.** In the service sector, prior cooperation and eco-innovation are more likely to develop future eco-innovation than previous eco-innovation alone.

3.2 | Eco-innovation and cooperation relationships in the service sector: Impact of corporate environmentalism orientation

The service sector represents a heterogeneous conglomerate of industries. Hipp and Grupp (2005) point out that the innovation patterns in the service sector depend more on the mode of innovation than on the industry classification, making it possible to find different modes of innovation in each service branch studied. As a consequence of this heterogeneity, the study of innovation and eco-innovation patterns following the industry classification means it is often difficult to make generalized statements or come to clear conclusions (Licht et al., 1999). Thus, from the evolutionary view of technical change, previous studies have recognized the multiplicity of innovation patterns in the service sector, which has generated a profusion of studies that try to classify the service sector to enhance the grasp on the diversity of innovation in the service sector. According to Pavitt (1984) and Gallouj and Weinstein (1997), to classify companies in terms of their innovation behaviours in the service sector, we need to find groups of companies that are characterized by similar patterns of innovation, conceptualizing as non-ordered categories of innovation modes, forms or strategies (Chang et al., 2012; Hollenstein, 2003; Tether & Tajar, 2008; Trigo & Vence, 2012).

In this line, to classify companies in the service sector based on their eco-innovative patterns, we employ corporate environmentalism orientation. Thus, from the strategic point of view, and consistent with Narver and Slater (1990) who introduced the concept of firms' strategic orientations that echo the strategic directions introduced by a firm, we argue that the various orientations in the manifestation of companies' strategic decisions suppose that companies put the emphasis on developing competencies, capabilities and organizational routines in tandem with their orientations (Brickson, 2005; Carballo-Penela & Castromán-Diz, 2015; Ferrell et al., 2010; Mallin et al., 2013; Zhou et al., 2005). It follows that the strength of strategic orientations encourages the development of the right organizational culture and the adaptation of capabilities to achieve a specific strategic orientation. Thus, companies with a clear corporate environmentalism orientation will develop capabilities and organizational routines to develop eco-innovation processes. Moreover, Demirel and Kesidou (2019) pointed out that carrying out eco-innovation activities equips companies with competencies in eco-innovation, which determines their future eco-innovation. As a result, the development of eco-innovation processes is characterized by 'creative accumulation', producing an internalization and penetration of eco-innovation in the firm, resulting in competencies for developing eco-innovation (Bossle et al., 2016; Jiang et al., 2020).

While we frame the synergies and complementarities between cooperation and eco-innovation from the dynamic capability lens, we claim that the source of dynamic capability underpinning interactive collaborative eco-innovation comes from the strength of environmental orientations. From the corporate environmentalism perspective, we hypothesize that a service organization will be more likely to adapt capabilities and involve in cooperation-enabled eco-innovation if it displays a greater environmental orientation. Therefore, greater corporate environmentalism orientation of the firm will mean greater internalization or penetration of the capabilities and competencies related to eco-innovation and greater probability for the development of eco-innovative projects, which will be reflected in more intensity and diversity of cooperation. Moreover, based on previous hypotheses, companies with a greater orientation or internalization of corporate environmentalism will be more likely to cooperate based on the bidirectional relationship of both processes. Hence, the following is proposed:

> **Hypothesis 2.** In the service sector, companies with a greater corporate environmentalism orientation have a higher probability of developing their eco-innovation activities based on establishing cooperation agreements for eco-innovation.

4 | METHOD

4.1 | Sample

In the empirical investigation, we employ the Community Innovation Survey for Spain (Spanish Technological Innovation Panel, PITEC) as a database.[2] This survey allows the monitoring of technological innovation activities of Spanish companies. PITEC collects all the innovation data of Spanish companies. It contains firm-level data and it provides

[2]The survey is conducted biannually by the National Statistics Institute (INE) and replicates the questionnaire used by the Community Innovation Survey (CIS) (PITEC, 2014).

TABLE 1 The distribution of the sample according to the sectoral classification (NACE Revision 2)

Sector	NACE	*N*	%
1. Construct	41, 42, 43	206	6.5
2. Commerce and retail trade	45, 46, 47	561	17.6
3. Transportation and storage	49, 50, 51, 52, 53	164	5.1
4. Accommodation and food service activities	55, 56	138	4.3
5. Telecommunications	61	35	1.1
6. Software and information consulting	62	414	13.0
7. Other IC activities	58, 59, 60, 63	139	4.4
8. Financial and insurance activities	64, 65, 66	136	4.3
9. Real estate	68	35	1.1
10. R&D activities	72	180	5.6
11. Other activities	69, 70, 71, 73, 74, 75	538	16.9
12. Administrative and support activities	77, 78, 79, 80, 81, 82	334	10.5
13. Education	85 (excl. 854)	24	0.8
14. Human health and social work activities	86, 87, 88	179	5.6
15. Arts, entertainment and recreation	90, 91, 92, 93	40	1.3
16. Other service activities	95, 96	69	2.2
Total		3546	100.0

Abbreviation: IC, Information and Communication; NACE, Nomenclature of Economic Activities; R&D, research and development.

TABLE 2 Description of the variables

Variable	Label	Type	Definition
Eco-innovation	*Eco-innovation*	Categorical	The level of innovative activity in a given year *t* oriented to (1) consume less energy (energy eco-innovation) and to (2) produce less environmental impact (environmental eco-innovation). The variable is constructed by summing the 1 to 4 index of the two individual items so that the variable ranges from 1 to 8.
Cooperation	*Cooperation*	Categorical	The amount of cooperation for innovation activities in a given year *t* that first conducted with other firms or organizations. The variable is created as a cumulative index resulting from adding the cooperation with different partners.
Eco-innovation and cooperation	*EC*	Categorical	Variable equal to 1 when a company develops eco-innovation with a cooperation agreement and equal to 2 if the company develops eco-innovation without a cooperation agreement
Environmental orientation	*Environmental orientation*	Categorical	The level of environmental orientation of a firm in a given year measured by its environmental objectives of (1) lower environmental impact and (2) compliance with regulatory requirements. The variable is constructed by summing the 1 to 4 index of the two individual items so that the variable ranges from 1 to 8.
Firms' size	*Size*	Continuous	Logarithm of the number of employees of a firm in given year *t*
Group	*Group*	Binary	A dummy variable equal to 1 if the firm belongs to a group
International scope	*International scope*	Categorical	A variable equal to 0 if the firm operates in the local market, 1 if in the EU market and 2 if it operates in international markets (United States, China, India and other countries)

information about the company (employment, sales, geographic market, industry sector, etc.) as well as detailed information regarding its innovation activity (innovation expenditures, different kinds of innovation output, cooperation, public financial support, barriers to innovation and so on). The unit of analysis is the firm, using two reference periods 2012 (t-1) and 2015 (t). The final sample consists of 3192 service companies. Table 1 displays the distribution of the sample according to the industry.

4.2 | Measures

Table 2 shows a summary of the variables, including a brief description as well as the labels employed in the empirical analysis. The first variable is *eco-innovation*. The survey (PITEC) measures the eco-innovation of the firm through two objectives related to the level of innovative activity oriented to consume less energy (energy eco-innovation) and to produce less environmental impact (environmental eco-innovation). Each of these objectives is measured as a Likert scale, where the value 1 corresponds to a null level of eco-innovation activities, 2 to a low level, 3 to an intermediate level and 4 to a high level. Moreover, to have a complete vision of how companies develop eco-innovation, we created a new variable (*eco-innovation*) as a result of the sum of the two variables, which better measures eco-innovation diversity and intensity in the firm. In line with Costantini et al. (2017), and Arranz et al. (2021), the eco-innovation was formed as a cumulative index of the two previous types of eco-innovation activities (*eco-innovation*), its resulting range being between 1 and 8. This method has advantages over other approaches such as factor analysis in that we have no loss of variance, it maintains the typology of the measuring scale and it allows us to measure eco-innovation in all its breadth, both in diversity and intensity. Methodologically, there are two requirements: first, a high level of correlation between variables (correlation: .813) and second, that the scales of the variables are consistent with each other. To analyse the robustness of the method used, we have compared this approach with the extraction of a new variable with factor analysis,[3] obtaining a high level of correlation between both variables (correlation: .990).

The second variable is *cooperation*. The database (PITEC) surveyed companies' cooperation propensity with the question: During the previous 3 years, did your company cooperate for innovation activities with other companies or organizations? This question is multi-item, establishing the distinction between different types of partners: (i) companies of the same group, (ii) clients, (iii) suppliers, (iv) competitors, (v) universities and (vi) research centres. In line with the previous variable, we create a new variable as a cumulative index (*cooperation*).

The third variable is a combination of the eco-innovation and the cooperation variable. Following the supermodularity approach of Mohnen and Röller (2005), we create a new variable that reflects the possible combinations of eco-innovation activities and cooperation. Thus, we create a categorical variable (*EC*) for the previous period (t-1), in which the first category corresponds to when the company develops cooperation with eco-innovation and the second category is when the company develops eco-innovation without a cooperation agreement.

The fourth variable is *environmental orientation*, referring to the firm's environmental orientation that results in adapting culture and capabilities to commit to a wide scope of eco-innovations. Following, for example, Tibbs (2012) and Kemp and Pearson (2008), environmental corporative management (ECM) is measured in a performance perspective by the environmental objectives included in the company, measuring their relevance in terms of: (i) lower environmental impact and (ii) compliance with environmental regulatory requirements. Each objective is measured on a scale of 1 to 4: 1 if the effect in question is not produced, 2 if the effect is reduced, 3 if it is intermediate and 4 if it is high. In line with the previous variable, we create a new variable as a cumulative index (*environmental orientation*).

4.2.1 | Control variables

As control variables, we used three features of the firm: *size*, *belonging to a group* and *firm international scope*.

Firm size. Previous empirical studies have found the firm size to be a determining factor in the development of technological innovations and eco-innovations (Miotti & Sachwald, 2003; Triguero et al., 2013). This variable is measured, as is standard in the literature, with the log of the total number of employees.

Group. Following the PITEC (2013) questionnaire, to control whether the firm belongs to a group, we included a dummy variable whose value is 0 if the company does not belong to a group and 1 if it does.

International scope. We control for the relevance of the international operations of the firm. The PITEC questionnaire distinguishes four different geographical markets: (1) local, (2) national, (3) European Union and (4) other countries. We created a variable to control for the location of the operations of the firm, whose value is 0 if the company operates in the local or national market, 1 if the company operates in the EU market and 2 if it operates in international markets (the USA, China, India and other countries).

4.2.2 | Statistical models

To test Hypotheses 1a and 1b, we employ ordinal logit. Table 3 analyses the relation between eco-innovation and cooperation in the service sector (Hypotheses 1a and 1b) using a dependent variable *eco-innovation*. Our baseline model (Model 1) includes only control variables (*Group*, *firm size* and *internationalization scope*).

Model 4 tests Hypothesis 1b, which posits that previous joint eco-innovation and cooperation is a driver to the subsequent

[3]The results of factor analysis showed a single factor which explains 90.644% of the explained variance (KMO: .500; sig.: .000) and a high extraction for each variable (0.906; 0.906).

TABLE 3 The relation between eco-innovation and cooperation in the services sector

Variables	Eco-innovation (*t*)			
	Model 1	Model 2	Model 3	Model 4
Cooperation (*t*)		.158***		
Cooperation ($t-1$)			.127***	
EC ($t-1$)				1.109***
Eco-innovation ($t-1$)				0[a]
Group (*t*)	.133*	.167**	.176**	.129*
Firm size (*t*)	.060*	.028*	.071*	.030*
Internationalization scope (*t*)	.470***	.359***	.368***	.376***
−2 Log likelihood	3048.146	7044.051	6465.780	4226.985
Chi-square	237.222	447.152	331.753	416.930
Sig.	.000	.000	.000	.000
Cox and Snell	.079	.144	.113	.140
Nagelkerke	.080	.145	.114	.141
McFadden	.016	.030	.023	.029

*$p < .010$.**$p < .005$.***$p < .001$.

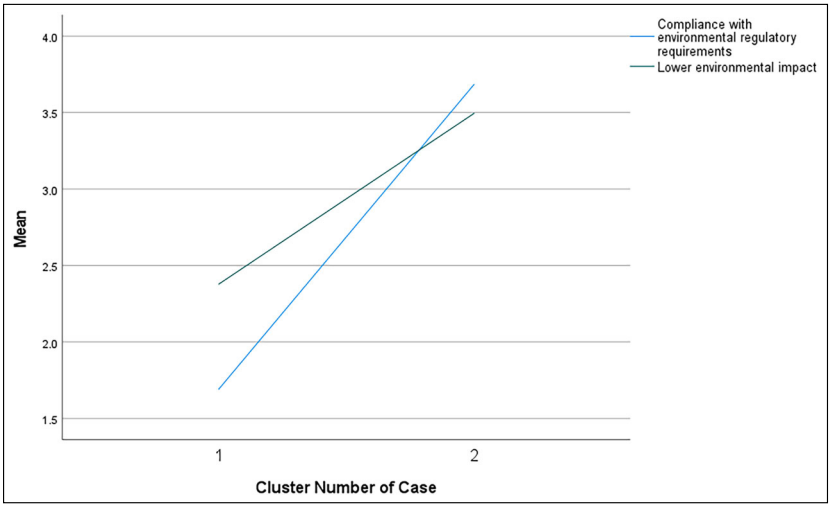

FIGURE 1 Relation between environmental orientation and cluster

development of eco-innovation. In this model, the dependent variable is *eco-innovation* in period t. For the independent variable, we use a categorical variable (*EC*) in the previous period (t-1), the first category being when the company develops cooperation with eco-innovation and the second category being when the company develops eco-innovation without a cooperation agreement. Thus, a positive and significant regression coefficient of the variable *EC* indicates that the probability of eco-innovating in the future is greater when companies have developed the previous eco-innovation together with cooperation agreements than if they have not developed previous cooperation agreements.

The second research question is about obtaining innovation patterns in the service sector. We first develop a K-mean cluster analysis of the sample using a classification variable corporate environmentalism orientation. In Table 5 and Figure 1, we see both the distribution of the number of companies in each cluster, as well as the behaviour of each cluster according to the classification variables. Cluster 2 corresponds to companies with greater environmental orientation.

Regarding Hypothesis 2, Table 7 presents the probability that each cluster will conduct eco-innovation activities. In Models 1 to 4, we analyse the two-cluster solution. The dependent variables are *eco-innovation* and *cooperation*, and the independent variable is categorical. Category 1 goes to Cluster 1 and Category 2 goes to Cluster 2, with Category 1 as a reference. Thus, if the regression coefficient is positive, the probability of eco-innovating and cooperating is greater when the companies belong to Cluster 2 (i.e., when they have greater environmental orientation) than to 1.

5 | ANALYSIS AND RESULTS

Before analysing the results, we performed various types of checks to verify the quality of our data. First, we checked the *robustness of the questionnaire and responses*, testing the common method variance (CMV) and common method bias (CMB), following the method of Podsakoff et al. (2003). This analysis revealed seven distinct latent

constructs that accounted for 70.023% of the variance. The first factor accounted for 21.663% of the variance, which is below the recommended limit of 50%. This result suggests there is no CMV and CMB. Second, we have checked the *robustness of the regression analysis*, analysing the non-existence of collinearity between independent variables. We have tested the robustness of all models through the variance inflation factor (VIF), obtaining all models' acceptable values. We can point out that there is no collinearity between the variables. We have also checked the non-existence of autocorrelation between dependent variables and residuals through the Durbin–Watson test, confirming the non-existence of autocorrelation.

Regarding Hypothesis 1a, which is related to prior cooperation as a facilitator of eco-innovation in the service sector, Table 3 (Model 3) shows the results. There is a positive effect (ß = .127; $p < .001$) of cooperation in eco-innovative development, thus confirming Hypothesis 1a. Regarding Hypothesis 1b, which shows the existence of a more synergistic or complementary effect between previous eco-innovation acting jointly with the cooperation agreements than eco-innovation acting individually, we see that Model 4 shows that this is corroborated. Eco-innovation together with cooperation in the previous period has a positive and significant coefficient (ß = 1.109; $p < .001$), in relation to the reference category, showing that joint action has a greater effect on subsequent eco-innovation than eco-innovation acting individually.

Table 7 presents the analysis of the patterns of behaviour of companies in the service sector in reference to their environmental orientation. In order to identify the cluster number and size, a K-mean cluster analysis was developed using the different environmental orientations of companies as classification variables. The results are presented in Table 4, having obtained a solution of two clusters. Thus, Cluster 1 is made up 688 companies, while Cluster 2 has 1131. Table 5 shows the distribution of the clusters in reference to the sector to which they belong, observing a heterogeneous distribution of each cluster in the various sectors. Additionally, we have checked the robustness of the two-cluster solution, performing an ANOVA analysis (see Table 6), considering the two environmental orientations as variables and the variable cluster as a control variable. The results show significant differences between the orientation variables and cluster membership, corroborating the suitability of the two-cluster solution.

Regarding the characteristics of each cluster in terms of orientation, Figure 1 shows important differences in terms of environmental

TABLE 4 Cluster number and size

Cluster	Frequency	Percentage
1	688	37.8%
2	1131	62.2%
Total	1819	100.0

TABLE 6 ANOVA

Variables	*F*	Sig.
Lower environmental impact	2874.542	.000
Compliance with environmental regulatory requirements	5061.865	.000

TABLE 5 The distribution of service sub-sector firms in each cluster

	Cluster			
Sectors	1		2	
1. Construct	64	58.7%	45	41.3%
2. Commerce and retail trade	105	39.8%	159	60.2%
3. Transportation and storage	31	40.3%	46	59.7%
4. Accommodation and food service activities	10	29.4%	24	70.6%
5. Telecommunications	18	69.2%	8	30.8%
6. Software and information consulting	82	24.6%	252	75.4%
7. Other IC activities	11	14.9%	63	85.1%
8. Financial and insurance activities	23	23.7%	74	76.3%
9. Real estate	3	42.9%	4	57.1%
10. R&D activities	108	60.0%	72	40.0%
11. Other activities	154	39.7%	234	60.3%
12. Administrative and support activities	27	38.0%	44	62.0%
13. Education	3	20.0%	12	80.0%
14. Human health and social work activities	33	35.1%	61	64.9%
15. Arts, entertainment and recreation	3	27.3%	8	72.7%
16. Other service activities	13	34.2%	25	65.8%
Total	688	37.8%	1131	62.2%

Abbreviation: IC, Information and Communication; R&D, research and development.

TABLE 7 The impact that each cluster makes on eco-innovations or cooperation

Variables	Eco-innovation (*t*)		Cooperation (*t*)		VIF
	Model 1	Model 2	Model 3	Model 4	
Cluster 1		0[a]		0[a]	1.010
Cluster 2		.633***		1.036***	
Group (*t*)	.133*	.012*	.207**	.120*	1.247
Firm size (*t*)	.060*	.389***	.064*	.138**	1.231
Internationalization scope (t)	.470**	.190***	.528***	.316***	1.025
−2 Log likelihood	3048.146	4307.671	1297.325	1770.603	
Chi-Square	237.222	161.358	215.447	206.559	
Sig.	.000	.000	.000	.000	
Cox and Snell	.079	.085	.065	.107	
Nagelkerke	.080	.085	.072	.110	
McFadden	.016	.013	.028	.032	

Abbreviation: VIF, variance inflation factor.
*p < .010.**p < .005.***p < .001.

orientation across clusters. Cluster 2 has a greater orientation to the environment, where the mean score for the both orientation variables of more than 3.5, while Cluster 1 does not reach an average score of 2. Regarding Hypothesis 2, Table 7 analyses the impact of each cluster on the development of eco-innovation and cooperation. In the solution of two clusters (Models 2 and 4), Cluster 2 is more likely to eco-innovate compared with Cluster 1 since the regression coefficient is positive (ß = .633; p < .001). We also see that Cluster 2, which is used as a reference in the regression analysis, has a greater probability of cooperating with respect to Cluster 1, which has a positive regression coefficient (ß = 1.036; p < .001). Therefore, Hypothesis 2 is confirmed.

6 | DISCUSSION AND CONCLUSION

This paper provides an integrated view of eco-innovation in service organizations for a better understanding of eco-innovation development. Moreover, our work extends the current literature on the eco-innovation and cooperation relationship (De Marchi, 2012), in particular, in the service sector (Brancati et al., 2018; Evangelista, 2000; Tether & Tajar, 2008; Trigo & Vence, 2012). First, we contribute to our understanding of the organizational antecedents of eco-innovation in the service sector by showing a possible cumulative causation mechanism for cooperation and eco-innovation. From a dynamic capability approach, we also argue that the improved performance of eco-innovation as a result of cooperation and the improved capabilities due to learning from cooperation and eco-innovation spur service firms to undertake more collaborative eco-innovation. Such cumulative causation between cooperation and eco-innovation also suggests that past experiences will be likely to enhance capabilities to support cooperation and eco-innovation in the future. We particularly demonstrate the effect of combinative cooperation and eco-innovation on the service firm's propensity to engage in collaborative eco-innovation. In this context, the study lengthens the reflection of cooperation to eco-innovate, noting the complementary relation of cooperation and the eco-innovation processes in the service sector. As a result, we provide a more nuanced view of the organizational antecedents of service eco-innovation in terms of the synergies and complementarities between cooperation and eco-innovation.

Second, the service innovation literature has conceptualized and confirmed the importance of dynamic capabilities in innovation in the service sector (e.g., Agarwal & Selen, 2009; Djellal & Gallouj, 2018; Janssen et al., 2016; Lütjen et al., 2019). However, the literature has been ambiguous about the sources of dynamic capabilities in eco-innovation in the service sector and has not been able to identify them the internal mechanisms that enable service firms to constantly integrate, reconfigure, renew and recreate capabilities to undertake cooperative eco-innovation. In the dynamic capabilities theory, more generally, some emphasize top managers as a source of dynamic capabilities (e.g., Felin et al., 2015), while some argue for individual employees' capacity to leverage interpersonal relationships as a source of dynamic capabilities (e.g., Salvato & Vassolo, 2018). Integrating the theory of dynamic capabilities with the perspective of strategic orientations, we argue that strategic orientations in general and environmental orientation in particular are a source of dynamic capabilities in service eco-innovation. We particularly argue that the strength of strategic orientations provides the needed direction, culture and processes to adapt capabilities to support cooperation and eco-innovation. We empirically demonstrate that strategic drift or orientation ambiguity weakens the service firm's motive and capabilities for collaborative eco-innovation. Accordingly, we contribute to the literature of dynamic capabilities for service eco-innovation by explaining the central role of environmental orientation in enabling collaborative eco-innovation.

Third, the paper contributes to the taxonomy of the service sector in reference to developing eco-innovation. As it has been pointed

out, the taxonomy of the service sector assumes that firms have the freedom capacity to choose their eco-innovation strategy. Our research confirms that firms eco-innovate based on their eco-innovation capabilities and environmental orientations. Firms with an active position in eco-innovation activities, derived from the internalization of eco-innovation capabilities in the company, display a greater strength and scope of eco-innovation in comparison with other firms in the same sector. Moreover, the greater internalization of eco-innovation capabilities in companies means an intensification in the use of cooperation agreements. These results are consistent with the characteristic of the service sector, where there is a high collaboration in the supply chain (Tether & Tajar, 2008).

Our work contributes with *theoretical implications* to the extension of innovation theory (Teece, 2010) and dynamic capabilities theory (Eisenhardt & Schoonhoven, 1996; Grant & Baden-Fuller, 2004) by aiming to understand eco-innovation in companies in the service sector. The first theoretical contribution is framed in the field of innovation theory, extending previous works that considered the existence of parallelism between innovation and eco-innovation (Carrillo-Hermosilla et al., 2009; De Marchi, 2012). Our paper defined eco-innovation as business innovation, considering the two perspectives of conceptualization of innovation: performance and capability. From a performance point of view, eco-innovation aims to develop products, processes and organizational innovations, with the specificity that these are compatible with the environment. From the point of view of capabilities in the company, eco-innovation verifies the properties of innovation, such as persistence, complementarity and dependence on resources. First, the results show that eco-innovation is persistent over time, consistent with studies on the persistence of technological innovations (Sapprasert & Clausen, 2012; Tavassoli & Karlsson, 2015). That is, eco-innovation is considered a process of creative accumulation, where the knowledge obtained from past eco-innovation supports new eco-innovations. Second, our analysis corroborates the complementarity property between capabilities, in line with Doran (2012) and Hullova et al. (2016), which pointed out that the interaction between capabilities arises as a consequence of the need to develop tasks and previous routines or the affinity between them. Thus, we see that not only does eco-innovation interact with cooperation, but synergistic effects are produced, as a consequence of the reinforcements between competencies and organizational routines. Last, eco-innovative development is dependent on resources, as it is shown that cooperation agreements are established with the aim of accessing resources, in line with RBV that indicates that resources should affect firms' capabilities through the development of competencies, the control of firms' activities and the creation of new organizational routines (Anzola-Román et al., 2018; Eisenhardt & Martin, 2000).

The second theoretical contribution is framed in the field of dynamic capabilities (Eisenhardt & Schoonhoven, 1996; Grant & Baden-Fuller, 2004). Classically, cooperation has been considered as the implementation of competencies, processes and organizational routines, with the aim of sharing resources and knowledge with partners (Grant & Baden-Fuller, 2004). This has been extensively corroborated in the literature of the service sector, where companies develop innovations in collaboration, especially with clients (Alam & Perry, 2002; Eisingerich et al., 2014). Along the same lines, we extend our understanding of the service sector, pointing out that the development of eco-innovation needs to interact with the capabilities of cooperation. First, our results show that not only is cooperation a facilitator of eco-innovation, but also that there is a mutual or complementary reinforcement between cooperation and eco-innovation in the development of eco-innovation. Second, our results show that a proactive environmental orientation intensifies the interaction between the capabilities of eco-innovation and cooperation. Companies developing innovation are reluctant to cooperate as a consequence of the conflict of opportunistic behaviour between partners. However, companies developing eco-innovation activities do not perceive these obstacles as a consequence of the social nature of eco-innovation, which can be freely shared and adopted. Moreover, unlike innovations that are market-oriented, eco-innovation requires broader levels of information and knowledge, many times not included in the specificity of companies, for which cooperation can make up for these shortcomings.

As a final conclusion, service eco-innovation is characterized by cooperation with partners. Cooperation allows service firms to access wider sources of eco-innovation, acquire complementary assets and manage the risk and uncertainty of eco-innovation. However, it remains unclear how the synergies and complementarities between cooperation and eco-innovation manifest themselves in service eco-innovation. Therefore, this study integrates the insights of the dynamic capabilities theory with the perspective of strategic orientations to provide an integrated view of cooperation and eco-innovation in service organizations. We argue that both cooperation and eco-innovation, once set in motion, could reinforce each other, suggesting that the relationship between cooperation and eco-innovation is reciprocal, complementary and sequential. We also argue that the strength of strategic orientations, particularly environmental orientation, will spur service firms to integrate and adapt capabilities to undertake more cooperative eco-innovation in order to deliver outcomes in tandem with their strategic objectives. Our results support our integrated view of cooperation and eco-innovation in service organizations.

CONFLICT OF INTEREST

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

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