



Voices from within. To what extent can internal crowdsourcing drive a change in organizational culture?

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1. Introduction

The business environment in which companies compete, regardless of their size, activity, or nationality, has become increasingly turbulent and even hostile due to technological and other unexpected changes that affect the economy and society. Many new technologies, such as big data, cloud computing, artificial intelligence (AI), blockchain, internet-of-things (IoT), and robotics (Iansiti & Lakhani, 2020; Ng & Wakenshaw, 2017; Tapscott & Tapscott, 2016), are disruptive (revolutionary), generic (global), cross-cutting (crossing sectoral boundaries), and have had an accelerated diffusion. Unpredictable events, such as the COVID-19 pandemic, have had a substantial impact on the economy as a whole and across sectors. Therefore, change in organizations is pervasive because of the degree and speed of change in the external environment.

Given these realities, companies may struggle to generate a lasting competitive advantage. The resource-based view (RBV) of firms has contributed extensively to the generation of sustainable competitive advantage (Barney, 1991; Wernerfelt, 1984). In particular, the RBV emphasizes that the ability of an organization to innovate has become one of the most important capabilities needed to generate a sustainable competitive advantage. Most of the scholarly literature argues that the ability to innovate, or lack thereof, has indeed contributed to the success or failure of organizations from all sectors and industries (Dobni, 2008; Martins & Terblanche, 2003). Perel (2005, 15) pointed out that the most successful way to deal with difficulties associated with an uncertain future and economic turbulence is “to make innovation an integral part of the firm’s organization and management DNA”.

According to Petrakis, Kostis, & Valsamis (2015) organizational culture lies at the heart of organizational innovation. However, the current organizational culture and the demands of innovation may lead to an internally conflictive situation (Martins & Terblanche, 2003). To avoid this potential internal misalignment, Rao & Weintraub (2013) suggest that organizational leaders should intentionally create a culture of innovation within their organizations; how to effect such a change is

the key question (Cameron & Quinn, 2006).

Over the last 15 years, although researchers have studied open innovation (OI) and internal crowdsourcing (IC) initiatives, as a type of OI, from multiple perspectives, such as benefiting from external knowledge and experience to generate ideas and solve problems (Brabham, 2013; Howe, 2006), or emphasizing the importance of the business model as the key aspect for capturing value from innovation (Boudreau & Lakhani, 2009; Chesbrough, 2003; Singh, Gupta, Busso, & Kamboj, 2021; Tucci, Afuah, & Viscusi, 2018), little is known about the impact they may have on the organizational culture (Scupola & Nicolajsen, 2021).

It is quite remarkable that, given the key role of an innovative corporate culture’s influence on an organization’s survival (Hartmann, 2006; Kostis, Kafka, & Petrakis, 2018), the dearth of empirical studies on the influence of IC on the development of an innovation culture is significant.

Accordingly, we are interested in exploring to what extent IC initiatives can help to develop an innovation culture in large organizations. More specifically, we explored within which of the factors of Rao & Weintraub’s (2013) innovative corporate culture framework there is an impact due to the implementation of an IC initiative.

We analyzed and compared data we obtained from three large organizations: (i) Madrid City Hall, a public institution; (ii) Sabadell Bank, a financial entity; and (iii) Endesa, a private company. These organizations’ activities differ and reflect the cross-sectional nature of our approach.

The paper is structured as follows. Drawing upon extant literature, we describe Rao & Weintraub’s (2013) innovation culture framework, which we used to assess the impact of IC initiatives on each of the framework’s dimensions and factors, and the characteristics of crowdsourcing with a special focus on IC. We formulated hypotheses that guided the development of our research methodology. In the methodology section, we explain the method used, the data collection performed, as well as the three variants of the model obtained and their

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<https://doi.org/10.1016/j.jbusres.2022.113618>

Received 10 June 2022; Received in revised form 22 December 2022; Accepted 26 December 2022

Available online 31 December 2022

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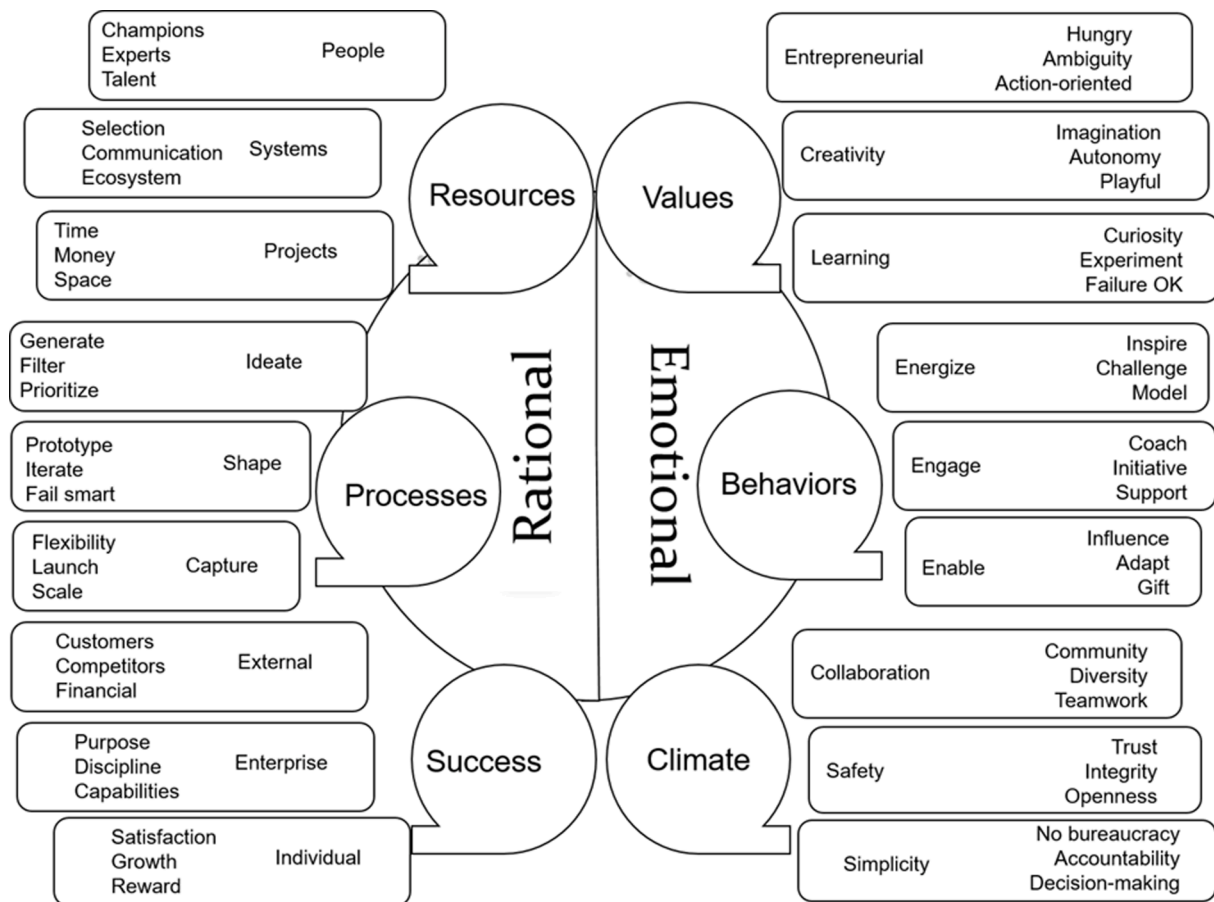


Fig. 1. Conceptual framework components of the innovation culture selected. *Notes:* This figure shows the 18 factors of Rao & Weintraub. Adapted from Rao & Weintraub (2013).

interpretation. In this section, we worked with the 18 factors of the Rao & Weintraub model and, given the sample sizes obtained, we first carried out an 18 exploratory factor analysis. Next, SmartPLS version 3.2.8 was used to test the first five hypotheses formulated in the three companies selected. To conclude, a multigroup analysis was also performed with SmartPLS to test the sixth hypothesis. In the last section, we present our results, discuss our findings and limitations, and provide suggestions for future research. It was concluded that the model designed is suitable for measuring and assessing the effects that IC initiatives can have on the fostering of an innovative culture in large organizations, operating in both the public and private sectors.

2. Theoretical background

2.1. Innovation culture

Although the literature on innovation culture has a long history, the term is complex and lacks a single definition. Cameron & Quinn (2006, 44–45) wrote that “as a source of innovation, culture is characterized by its level of adaptability, flexibility, creativity, coexistence with the uncertainty and ambiguity of information, lack of centralized power and well-established chains of command, emphasis on individuality, risk, and anticipation.” For Dobni (2008, 540), innovation culture is “a multidimensional construct that includes the intention to innovate, the infrastructure to support innovation, the necessary behavior at the operational level to facilitate an orientation towards value, the market, and the environment to implement innovation.”

Although there is no single definition, innovation culture has common features, including creativity, entrepreneurial spirit, freedom/

autonomy, risk-taking, teamwork, decentralized decision-making and participation of all employees in the organization, flexibility, and continuous learning.

Researchers have proposed different models to diagnose, measure, and evaluate culture (Naranjo-Valencia & Calderón-Hernández, 2015). These models consider that culture can be analyzed as a variable that, when interacting with other variables (leadership, sustainability, competitive advantages), favors the adaptation of organizations to their environment, thus making culture a competitive factor (Smircich, 1983). Two major trends stand out: models that analyze culture from its most observable features, such as those proposed by Aiman-Smith, Goodrich, Roberts, & Scinta (2005), Dobni (2008), Morcillo (2007), Naranjo-Valencia & Calderón-Hernández (2015), O'Reilly, Chatman, & Caldwell (1991), and Rao & Weintraub (2013), and models that integrate these traits into cultural typologies, such as those proposed by Cameron & Quinn (2006) and Fey & Denison (2003).

2.1.1. Determinants of an innovation culture

For this research, we define an innovation culture in a multidimensional context. To determine which components of an innovation culture evolved directly from implementing an IC initiative, we used Rao & Weintraub's (2013) framework as a reference. We made this choice based on three factors: our extensive literature review; the conclusions that Danks (2015) obtained during her assessment of which framework was the most appropriate to measure an innovation culture within organizations; and the significant fact that the Spanish Association for Quality chose Rao & Weintraub's framework to determine the Innovation Culture Index (ICI) in Spain (AEC, 2014).

Rao & Weintraub's conceptual framework considers that an

Table 1

Differential aspects between intra-corporate/internal crowdsourcing and corporate/external crowdsourcing.

Comparison criterion	Intra-corporate/Internal	Corporate/External
Objective group	Employees. Voluntary participation.	Public domain. Voluntary participation.
Professional responsibility and formal relationship	Known In general, it does not involve personnel from a crowdsourcing platform provider that mediates between the organization and the participants.	Unknown In general, it involves personnel from a crowdsourcing platform provider that mediates between the organization and the participants (e.g., Ideas4all, InnoCentive, etc.)
Type of task/problem to solve	Simple and complex. They may include highly critical contextual mission problems that require extensive experience, and which otherwise would not be publishable.	Simple tasks predominate, although they can also be used for complex problems by requesting offers on specialized platforms (e.g., YourEncore, NineSigma, etc.).
Suitability	Mainly for large and international companies.	Also possible for small and medium-sized companies.
Governance	Culture and change management are important aspects. A mix of immediate and long-term incentivization is needed.	Community engineering and management are important. Immediate incentivization is needed (e.g., one-off payment)
Opportunities	Intellectual property rights are not a central concern. Assigning a verified crowd to business-critical and confidential tasks. Use free working capacity. Take advantage of internal talent.	Intellectual property rights are a central concern. Reduction of personnel and equipment costs. Shorten product development and service delivery times. Being able to count on a larger pool of collaborators, beyond own employees.
Risks	Possibility of reaching a critical number of participants in a crowdsourcing initiative due to the limited size and heterogeneity of the internal crowd. Jeopardizing traditional formal work settings.	Unwanted crowdsourcing activities of a crowd that is not easy to control. Legal aspects related to intellectual property or privacy and data security issues. Difficulty in integrating external crowdsourcing activities within the predominant hierarchical organization or business processes (e.g., the not-invented-here syndrome (Hrudicka, Ishmael, & Pluskowski, 2011)), especially, the alignment of the top-bottom approach of the organization with the bottom-up approach of crowdsourcing.

Notes: Adapted from Hetmank (2014, 9) and Zuchowski et al. (2016, 180).

innovative culture rests on a foundation of six basic components (depicted in Fig. 1), divided into three rational blocks (*resources, processes, and success*) and three emotional blocks (*values, behaviors, and climate*). These six blocks are divided into 18 factors (three per block), and each factor is further subdivided into three items, adding up to 54 items in total. These items were measured on a Likert scale. As we move from those abstract building blocks towards more concrete elements, the innovative culture becomes more measurable and manageable—for example, the block of values involves the entrepreneurial factor, which can be further divided into hungry, ambiguity, and action-oriented.

According to Rao & Weintraub (2013, 29), “the building blocks are dynamically linked. For example, the *values* of the organization have an impact on people’s *behaviors*, on the *climate* of the workplace, and on how *success* is defined and measured.” To foster innovation, organizations have generally focused their attention on resources, processes, and success measures, and have typically paid less attention to people-oriented dimensions, such as values, behaviors, and the working environment, which are less tangible and are therefore more difficult to manage.

2.2. Crowdsourcing

With the introduction of the Internet and Web 2.0 applications (social networks, RSS, blogs, and wikis) (O’Reilly, 2007) that promote communication between thousands of users to create and share information collaboratively, organizations now take advantage of the collective productivity and intelligence¹ (Lévy, 1997) of the “crowd” to complete or even gradually transform their internal processes and structures (McAfee, 2009). This phenomenon, known as crowdsourcing (Howe, 2006), has gained popularity over the past decade because it offers companies many advantages. Two significant crowdsourcing advantages are workforce scalability and the large number of participants with diverse knowledge and experiences that can offer a variety of new ideas and quick solutions, which in turn often lead to substantial cost savings, innovations, and additional publicity for any company (Afuah, 2018; Brabham, 2013).

Other authors highlight the diverse nature of crowdsourcing according to the criteria considered (Afuah & Tucci, 2012; Geiger, Seedorf, Schulze, Nickerson, & Schader, 2011; Schenk & Guittard, 2011), including crowd types, type of task to be performed, sector served, and functional characteristics. One of the most generic taxonomies is the one that distinguishes external crowdsourcing (Simula & Ahola, 2014; Zuchowski, Posegga, Schlagwein, & Fischbach, 2016), or corporate crowdsourcing (Hetmank, 2014), made up of end users who do not belong to the organization that undertakes the initiative, from IC (Simula & Ahola, 2014; Zuchowski et al., 2016) or intra-corporate crowdsourcing (Hetmank, 2014; Villarroel & Reis, 2010), in which only employees of the organization participate. LEGO (Schlagwein & Bjørn-Andersen, 2014) and SAP (Leimeister, Huber, Bretschneider, & Krcmar, 2009) are two examples of well-documented business initiatives that use external crowdsourcing.

Two examples of IC are Swarovski, with its creation of the “i-flash community” for the generation and selection of ideas by its employees (Füller, Lenz, & Pirker, 2010), and the use of an enterprise social network (ESN) platform Yammer within Deloitte Australia as a space for crowdsourcing ideas and a place for finding expertise and solving problems (Riemer & Scifleet, 2012). Table 1 illustrates a set of differential aspects for distinguishing both types of crowdsourcing.

2.2.1. Internal crowdsourcing

In recent years, scholars have observed the attention organizations have given internal or intra-corporate crowdsourcing as evidenced by specific studies still in the preliminary phase, and which are only published in the proceedings of congresses (Bullinger & Moeslein, 2010; Hetmank, 2014; Pedersen et al., 2013; Sharma, 2010; Villarroel & Reis, 2010; Zogaj & Bretschneider, 2014). Villarroel and Reis (2010, 2) define intra-corporate crowdsourcing as “a distributed organizational model used by the companies to extend the problem-solving capacity to a broad and diverse group of self-selected participants beyond the internal formal boundaries of a multi-business enterprise; throughout business divisions, establishing bridges between geographic locations and leveling hierarchical structures.”

¹ “A form of distributed intelligence, constantly improved, coordinated in real time, and resulting in an effective mobilisation of skills.” (Lévy, 1997, 13).

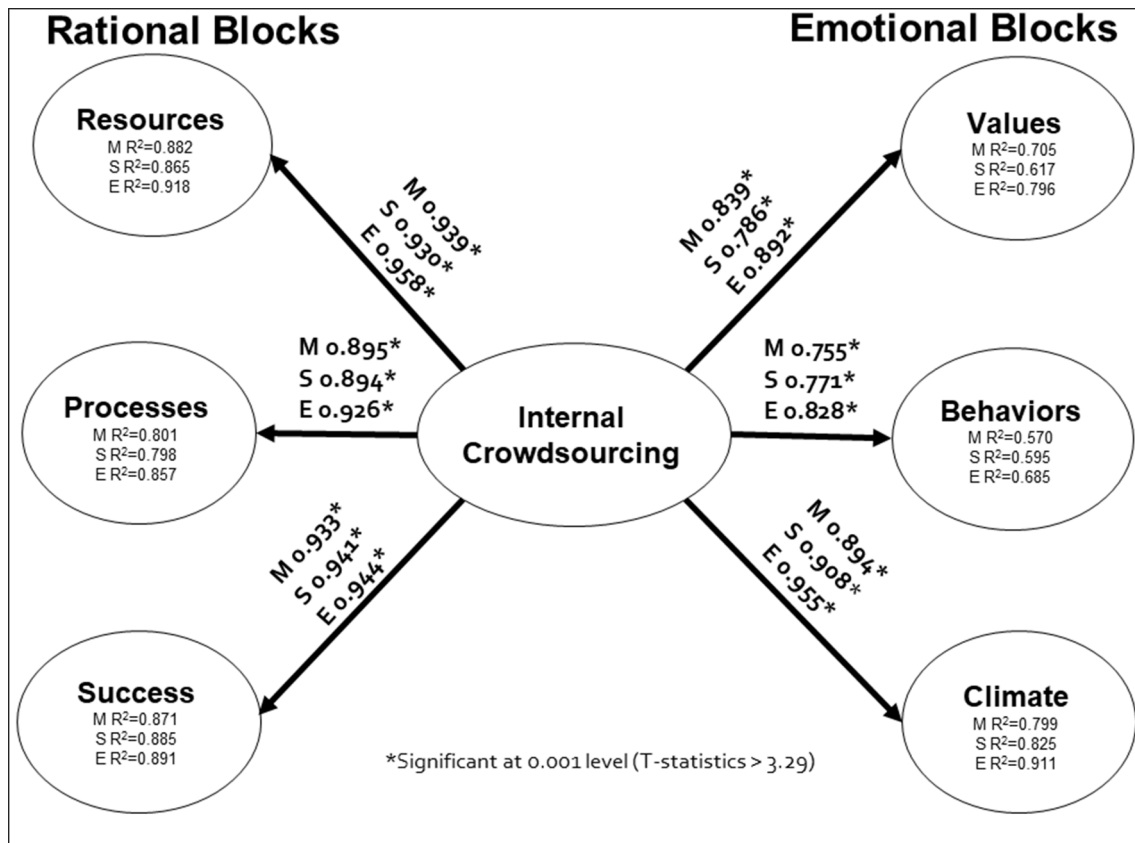


Fig. 2. Path coefficients of the three estimated models. *Notes:* This figure includes the path coefficients as well as the *t-values* obtained from the bootstrapping method in PLS and R². M = Madrid City Hall; S = Sabadell Bank; E = Endesa.

Zuchowski et al. (2016) found 74 studies in their literature review and concluded that IC had a series of distinctive properties (Table 1) relative to other types of crowdsourcing that explained the interest aroused. Zuchowski et al. (2016, 168) proposed the following definition: “Internal crowdsourcing is an (a) Information Technology (IT)-enabled (b) group activity based on an (c) open call for participation (d) in an enterprise.”

3. Hypotheses development

3.1. Innovation culture and internal crowdsourcing

For an organization to cope with the myriad of challenges it faces in today's business environment, employees need to be innovators (King & Wright, 2007). It is people rather than technology that are increasingly important, so leading organizations are seeing their employees as the true source of competitive advantage. The ability of leaders to unleash that human capital is one of the prerequisites for organizational survival as human capital is closely linked to innovation and performance (Singh et al., 2021).

Innovation, which entails a favorable predisposition to change and permanent adaptation, needs to be integrated into the organization at a strategic level and implemented throughout the organization through a culture model that allows effective management of constant change (Cornejo & Muñoz, 2009). In this sense, leaders are an essential element in promoting innovation within the organization (Mumford, Scott, Gaddis, & Strange, 2002; Hemlin, 2006), and are responsible for establishing and managing the strategic objectives of innovation as well as the activities of their organizations.

However, innovations often cause resistance among users who see how these innovations will change their behaviors and require them to

undergo a learning process (Amara, D'Este, Landry, & Doloreux, 2016). To address this issue, companies should create a climate that favors and accelerates employees' familiarization with such changes. An innovation culture framework should define values, convictions, and behavior patterns that help organizations generate and integrate the creation of innovation (Bueno & Morcillo, 2019).

The *climate* is the tenor of workplace life. An innovative climate is marked by simplicity, collaboration, and trust among employees (Rao & Weintraub, 2013), and it cultivates commitment and enthusiasm, challenges individuals to take risks within a safe environment, fosters learning, and encourages independent thinking.

According to Zuchowski et al. (2016), IC may be used for the management of corporate culture and change. In this sense, Füller et al. (2010), in their study of the Swarovski i-flash community case, describe IC as a good example of how such initiatives can be successfully integrated into the corporate structure, enhance the climate and improve the innovation process. The i-flash community has contributed to developing, some important dimensions of an innovation culture such as entrepreneurial spirit, attitude toward a failure and risk culture, and calls for experimentation. All of them are elements that characterize the *values* block of the innovation culture framework selected. As a result, we advance our hypotheses:

H1. IC positively influences the emotional blocks (values, behaviors, and climate) of the innovation culture framework.

H2. The impact of IC is greater on the values block than on the behaviors and climate blocks of the innovation culture framework.

In another relevant study, about how an organization may use IC initiatives to change its organizational culture, Scupola & Nicolajsen (2021) showed that the implementation of a crowdsourcing platform at an engineering consultancy firm had brought about some changes in the organization that illustrated the beginning of a change in the

organizational culture. Some of the results are directly linked to the innovation process and ideas generated (*processes* block), while others are related to a more general agenda of increased collaboration (*climate* block), knowledge-sharing, and empowerment (*behaviors* block), thus allowing the formation of new relationships and access to new knowledge for the employees.

A positive, direct effect of IC initiatives, recognized in the literature, is that it raises employees' awareness of the importance of innovation. These initiatives also facilitated structured processes that enabled all employees to participate, promoted intrinsic and extrinsic motivations, favored teamwork, and shared knowledge and interdepartmental collaboration (Campos-Blázquez, Morcillo, & Rubio-Andrada, 2020; Scupola & Nicolajsen, 2021). These aspects were more balanced in the rational blocks (resources, processes, and success).

The *resources* comprise three main factors: people, systems, and projects. Of these, people are the most critical, as they have a powerful impact on the organization's *values* and *climate*.

In general terms, *success*, which reinforces the *values*, *behaviors*, and *processes* of organizations, in turn conditions many subsequent decisions—that is to say, what actions will be rewarded, which individuals will be hired, and which projects will get the green light for their implementation. Hence, we predict that:

H3. IC positively influences the rational blocks (resources, processes, and success) of the innovation culture framework.

H4. The impact of IC is greater on the processes block than on the resources and success blocks of the innovation culture framework.

H5. The impact of IC is greater on the emotional blocks than on the rational blocks of the innovation culture framework.

Finally, we tried to check whether the proposed model (Fig. 2), based on the second level of relationships (the 18 factors), would be valid in large organizations in any industry in the public and private sector. Therefore, we hypothesize that:

H6. The designed model does not indicate significant differences between organizations.

4. Method

4.1. Data and sample

Firstly, from the perspective of the phenomenon studied, the unit of analysis considered was large organizations with a presence in Spain that had implemented an IC initiative.

After defining the unit of analysis, the companies were then selected according to their similarity in terms of being based in Spain, having more than 250 employees (large organizations) and having implemented at least one IC initiative. In fact, we screened 12 companies to participate in this research, but after assessing the opportunity for learning, the behavioral richness and the appropriate willingness on the part of their managers to face the commitments required for this research, we decided to use three samples of primary data obtained from three organizations from different sectors: Madrid City Hall (M), Sabadell Bank (S) and Endesa (E).

These three companies matched especially well with our criteria, as at the same time, we looked for divergences between them from a sectoral perspective, both from the point of view of the activity and the variety of organization, public and private companies, service and industrial companies and, above all, different contextual and internal characteristics between the companies studied. This conceptual analytical sampling allowed us, in this way, to purposely introduce a certain level of variety into the research.

We designed a questionnaire based on Rao & Weintraub's (2013) innovation culture framework to empirically test what items, factors, and dimensions evolved as a direct influence of each initiative. Using a Likert-type response scale with degrees of influence that ranged from 1 (*without influence*) to 5 (*very positive influence*), the questionnaire (see Table A1) enabled us to analyze the influence of each initiative on each

Table 2

Basic profiles of the three organizations' internal crowdsourcing initiatives.

Characteristics	Madrid City Hall	Sabadell Bank	Endesa
Home office	Madrid	Alicante	Madrid
Number of employees*	28,872	25,945	10,500
Year of the first initiative	2014	2009	2006
Total number of initiatives*	1	54	6
Number of annual initiatives	There was no continuity**	Between 6 and 8	1
Type of initiative	Search for continuous improvements and disruptive innovations	Search for continuous improvements and disruptive innovations	Search for incremental innovations
Scope of the initiative	All employees	All employees at the national geographical level (in Spain)	Depended on the type of challenge

Notes: *Data from December 30, 2016. **Change of municipal government (elections in 2015).

of the 54 elements corresponding to the 18 factors and the six dimensions of the selected innovation culture framework. Table 2 presents the basic profiles of the three organizations' use of IC.

To facilitate the application of the questionnaire and obtain more efficient data, we used the Eval & GO platform. Project managers at each organization sent the questionnaire to a non-statistical sample comprising employees who participated in the initiatives. Table 3 shows the names of the initiatives considered, the year in which they were undertaken, the dates on which the surveys were performed, the population size, the number of questionnaires initiated, and the number of valid observations obtained in each organization.

The means and standard deviations of the 54 questions are illustrated in Table A1 in Appendix A.

4.2. Data analysis: The exploratory approach

Given the sample sizes (see Table 3), and in order to perform a causal analysis with sufficient degrees of freedom, we decided to consider only Rao & Weintraub's innovative culture framework of 18 factors (Entrepreneurial, Creativity, Learning...). To determine the 18 factors, we performed 18 exploratory factor analyses using the maximum-likelihood method. We considered the three elements that constituted each factor, according to the framework illustrated in Fig. 1. The first eigenvalues were the variables assessed in each organization. The main results of these 18×3 exploratory factorial analyses (EFAs) showed that the first eigenvalues were related closely to the variances of the three elements they represented.

According to Jöreskog (1993), the general framework for testing structural equation models allows researchers to opt for modeling generator scenarios, which implies the rejection of a theoretical model based on poor fit. Consequently, we used SmartPLS version 3.2.8 (Ringle, Wende, & Becker, 2015) to test the five hypotheses due to the relatively small sample sizes obtained (Fornell & Bookstein, 1982). These sample sizes met the rule recommended by Barclay, Higgins, & Thompson (1995) regarding the sample sizes associated with the structural path coefficients and adapted well to the non-compliance of the multivariate normality of the data (Fornell & Cha, 1994).

We also determined a second-order construct (IC) in the three cases, using a reflective-reflective type hierarchical component model (HCM), with repeated indicators (Ringle, Sarstedt, & Straub, 2012), which Wold proposed in 1985 (Hair, Hult, Ringle, & Sarstedt, 2013). For the analysis and interpretation of our structural model for each organization, although we calculated the measurement and structural parameters

Table 3

Initiatives analyzed, dates of completion of the surveys, and the number of valid observations.

Organization	Name of the initiative and year	Dates	Population size	Questionnaires started	Answers completed
Madrid City Hall	Innovating Together (2014)	From 8th to 22nd April 2015	209	73	48
Sabadell Bank	Think Digital (2015)	From 13th to 27th April, and from 10th to 31st May 2016	248	156	128
Endesa	“Eidos Market” (2012)	From 4th to 17th April, and from 31st May to 14th June 2016	200	83	68

Table 4

Results of the first level measurement models.

		Madrid City Hall		Sabadell Bank		Endesa	
		Loading	CR AVE	Loading	CR AVE	Loading	CR AVE
Values	Entrepreneurial	0.940	CR = 0.970 AVE = 0.916	0.908	CR = 0.956 AVE = 0.878	0.947	CR = 0.965 AVE = 0.901
	Creativity	0.970		0.956		0.952	
	Learning	0.961		0.946		0.948	
Behaviors	Energize	0.970	CR = 0.981 AVE = 0.946	0.937	CR = 0.967 AVE = 0.907	0.943	CR = 0.962 AVE = 0.895
	Engage	0.968		0.964		0.958	
	Enable	0.980		0.956		0.936	
Climate	Collaboration	0.929	CR = 0.960 AVE = 0.889	0.946	CR = 0.962 AVE = 0.893	0.935	CR = 0.951 AVE = 0.866
	Safety	0.956		0.946		0.954	
	Simplicity	0.942		0.944		0.902	
Resources	Individuals	0.945	CR = 0.956 AVE = 0.878	0.910	CR = 0.951 AVE = 0.865	0.946	CR = 0.965 AVE = 0.902
	Systems	0.953		0.957		0.962	
	Projects	0.912		0.923		0.942	
Processes	Ideate	0.926	CR = 0.930 AVE = 0.815	0.936	CR = 0.958 AVE = 0.885	0.935	CR = 0.965 AVE = 0.902
	Shape	0.891		0.948		0.964	
	Capture	0.891		0.938		0.949	
Success	External	0.895	CR = 0.922 AVE = 0.798	0.920	CR = 0.942 AVE = 0.844	0.962	CR = 0.977 AVE = 0.935
	Enterprise	0.922		0.936		0.978	
	Individual	0.862		0.900		0.961	

Notes: CR = composite reliability; AVE = average variance extracted.

Table 5

Discriminant validity of constructs.

Organizations		Climate	Behaviors	Processes	Resources	Success	Values
Madrid City Hall	Climate	0.943					
	Behaviors	0.548	0.973				
	Processes	0.764	0.583	0.903			
	Resources	0.799	0.759	0.858	0.937		
	Success	0.798	0.623	0.845	0.832	0.893	
	Values	0.774	0.481	0.656	0.684	0.808	0.957
Sabadell Bank	Climate	0.931					
	Behaviors	0.600	0.952				
	Processes	0.807	0.570	0.941			
	Resources	0.798	0.714	0.844	0.930		
	Success	0.855	0.633	0.844	0.860	0.919	
	Values	0.669	0.563	0.578	0.633	0.713	0.937
Endesa	Climate	0.931					
	Behaviors	0.733	0.946				
	Processes	0.879	0.669	0.950			
	Resources	0.899	0.774	0.896	0.950		
	Success	0.891	0.723	0.873	0.889	0.967	
	Values	0.846	0.693	0.764	0.807	0.805	0.949

Notes: The square root of AVE is on diagonal.

simultaneously, we divided the process into two stages (Fornell & Yi, 1992): (1) assessment of the measurement model in each version (M, S, and E); and (2) separate assessments of the structural model for each organization.

5. Results

5.1. Assessment of the measurement model²

To assess whether our research model consistently measured the first-order constructs—that is, *values*, *behaviors*, *climate*, *resources*, *processes*, and *success*, the six basic components of the innovative culture

² All statistical results discussed in subsections 5.1. and 5.2. are summarized in Table A2 of Appendix A.

framework—by observable variables we used, we checked for convergent and discriminant validity, as shown in Table 4. Convergent validity assesses the internal consistency for a given block of indicators by considering the Composite Reliability (CR) level (Werts, Linn, & Jöreskog, 1974). The composite reliability is only applicable for reflective indicators (Chin, 1998) and, according to Nunnally (1967), should be greater than 0.7. Table 4 shows that all the first-order constructs from our model meet this requirement. In addition, all Cronbach's alpha reliability coefficients were greater than 0.8. Therefore, all constructs exhibited internal consistency.

We tested discriminant validity using the average variance extracted (AVE) (Fornell & Larcker, 1981), which is applicable only for reflective indicators (Barclay et al., 1995) and should be greater than 0.5 (Chin, 1998). All the constructs in the model fulfilled this requirement. In addition, researchers (Chin, 1998; Fornell & Larcker, 1981) suggest that a construct has a good discriminant validity if the square root of the AVE for each construct is greater than the correlation between the construct and any other construct in the model (Chin, 1998; Fornell & Larcker, 1981). As shown in Table 5, all the constructs estimated in our model meet this condition, as none of the elements in the matrix exceeded the respective diagonal element. Thus, we confirmed the discriminant validity of the estimated model.

Also, discriminant validity can be checked by the Heterotrait-Monotrait Ratio (HTMT) (Hair et al., 2013). If HTMT < 1, there is discriminant validity, as observed in the present study between the HTMT of almost all pairs of latent variables considered, even though some of them were close to the maximum value, as a result of having estimated the HCM of the reflective-reflective type with repeated indicators (Hair et al., 2013). Likewise, in the correlation matrix between the latent variables, each element of the main diagonal should be greater than the elements of its row and its column (Fornell & Larcker, 1981) to ensure discriminant validity, as we also observed in our proposed model in the three cases considered.

To summarize, with the evidence of convergent reliability and discriminant validity, the measurement of our model reflected a satisfactory result in the three cases analyzed.

5.2. Assessment of the structural model

As PLS is a variance-based technique, Chin (1998) suggests that we may assess the predictive capacity of our model by considering the R^2 for dependent latent variables, the f^2 that determines whether the influence of a particular latent variable has a significant impact on the dependent construct, and the Store-Geisser Q^2 (Geisser, 1975; Stone, 1974).

R^2 is extracted from the inner path model and is expected to reach 0.67 value for substantial significance, 0.33 for moderate level, and 0.19 for weak level (Chin, 1998). In the three cases in which we tested our model, the six dependent latent variables and one independent variable exhibited high values (Fig. 2), well above 0.67. Therefore, they were statistically significant, and the effects could be considered significant (Chin, 1998).

To assess our structural model, we studied the f^2 that determines whether the influence of a particular latent variable has a significant impact on the dependent construct. In this instance, all f^2 of the six dependent constructs were greater than 0.35 in the three organizations, and the predictors indicated large effects at the structural level (Cohen, 1988). After performing a re-sampling process (bootstrapping) for 4,000 samples, we observed that the t -statistics associated with the path coefficients were all much greater than 1.96, with critical probability values of 0.000; therefore, all of them were statistically significant.

We obtained the Stone-Geiser Q^2 by carrying out a blindfolding procedure. All the Q^2 values were greater than 0 (Chin, 1998; Wold, 1985) for the latent dependent variables, confirming that the predictive capacity of our model in the three cases is relevant.

Finally, we assessed the goodness-of-fit using the Standardized Root Mean Square (SRMR) composite factor model, which is defined as the

Table 6
Multigroup analysis (p -values).

Factor	Madrid City Hall Sabadell Bank	Madrid City Hall Endesa	Sabadell Bank Endesa
Resources	0.643	0.301	0.084
Processes	0.975	0.408	0.379
Success	0.687	0.625	0.849
Values	0.494	0.269	0.102
Behaviors	0.852	0.311	0.466
Climate	0.702	0.050	0.086

standardized difference between the observed and the predicted correlations. As suggested by Hu & Bentler (1999), it should be below 0.08 as a criterion for determining goodness-of-fit. In our cases, they were 0.11 in the case of M, 0.10 in B, and 0.07 in E. The latter case met the criterion.

The structural model of the three organizations was acceptable. Fig. 2 illustrates the estimated model in the three organizations, including the path coefficients as well as the t -values obtained from the bootstrapping method in PLS and R^2 .

5.3. Summary of results

According to the results described above, it can be concluded that hypotheses H1 and H3 were supported. In addition, the importance of the relationship was indicated by the adjustment coefficient—that is, the higher the value, the greater the ratio. The IC construct ratio was greater in the rational blocks (*resources*, *processes*, and *success*) than in the emotional blocks (*values*, *behaviors*, and *climate*). Therefore, we determined that IC initiatives directly and positively influenced the rational blocks more than the emotional blocks. Consequently, H5 was rejected.

Notably, the influence of IC initiatives was positive and greater in the *climate* block within the emotional part in the three organizations with adjustment coefficients of 0.894, 0.908, and 0.955, respectively. Therefore, IC initiatives can directly and positively influence the climate block compared to the other two blocks of the emotional part of our model. However, apart from the greater weight of the *climate* block over the other two of the emotional part of the model, it is also true that the values block has a greater impact than the behavior block. Consequently, H2 can be considered to be at least partially rejected.

Our study indicates that IC initiatives had high and similar values in the three blocks of the rational part, although there was a greater positive influence in the *resources* block for Madrid City Hall and Endesa, with coefficients of 0.939 and 0.958, respectively, and in the *success* block for Sabadell Bank, with a coefficient of 0.941. As a consequence, H4 was rejected.

The results of the measurement and structural model in the three cases we assessed did not result in the rejection of our model. We determined it is an adequate model to measure and analyze IC initiatives in large organizations.

To test H6, it was necessary to make multigroup comparisons using SmartPLS, considering a parametric approach and equivalent variances. Once performed, as observed in Table 6, which shows the p -values, we concluded that it cannot be denied that the path coefficients were equal in the three organizations since all p -values were greater than 0.05. As a result, our model remains the same regardless of the type of organization in which it is applied. In this sense, H6 could not be rejected either. We can affirm that the model we designed to measure the influence of IC on innovation culture is valid for any type of organization.

6. Discussion and conclusions

Over the past 15 years, researchers have studied open innovation processes extensively (Chesbrough, 2003; Sloane, 2011). Few studies, however, provide specific empirical evidence on the use of crowd-sourcing and their derived processes as a dynamic element of an

innovation culture within organizations. To our knowledge, this is the first empirical study to assess how IC initiatives influence the development of an innovation culture in large organizations. We used three samples of primary data obtained from three organizations that have undertaken IC: Madrid City Hall, Sabadell Bank, and Endesa. We selected Rao & Weintraub's (2013) framework to design a model to assess the impact the implementation of IC initiatives could have on the development of an innovation culture in large organizations. We tested six hypotheses, which emerged from the literature review, to ascertain the causal relationships that exist between the different established latent constructs.

6.1. Implication for theory and practice

Rarely have IC initiatives (Simula & Ahola, 2014; Villarroel & Reis, 2010) been related to an organization's goal of developing or improving an innovation culture. Our study results indicated a positive relationship between these two constructs—IC initiatives and innovation culture—especially with the rational blocks (*resources*, *processes*, and *success*) from Rao & Weintraub's innovation culture framework. This finding reinforces observations in the literature (Füller et al., 2010; Scupola & Nicolajsen, 2021). To foster innovation, organizations have generally focused on *resources*, *processes*, and the measurement of *success*, and given less attention to people-oriented dimensions, such as *values*, *behaviors*, and the work environment (Chan, Shaffer, & Snape, 2004; Hoe, 2011). Many managers understand that people's *values*, *behaviors*, and working environments are intangible and hard to manage (Rao & Weintraub, 2013). The complex “human aspect” can shape an innovation culture and create sustainable advantages.

Within the blocks of the emotional part of the framework (*values*, *behaviors*, and *climate*), we found evidence that the impact of IC initiatives was greater in the *climate* block. We can explain this finding by considering that one of the most important motivations that justifies the implementation of IC initiatives is facilitating the participation of all employees in the initial phases of the innovation process to obtain more and better business ideas through collective intelligence (Simula & Ahola, 2014). In organizations, these types of initiatives are usually framed within broader intrapreneurship programs (Campos-Blázquez, 2019), which were represented within the *values* block of Rao & Weintraub's framework. The importance of climate also establishes a chronological order: first, the social factor must be favorable (encouraging group learning); from there the ideas will start to emerge (with their corresponding evaluations and selections), paving the way for innovation.

That said, we must position IC within an innovation culture type that promotes flexibility, creativity, the ability to coexist with uncertainty, confidence, tolerance to error, to obtain new learning that is incorporated into the development of new products (Santos-Vijande, González-Mieres, & López-Sánchez, 2013). To be more precise, IC initiatives allow all employees to participate in the development of the innovation process from the beginning, disproving the archetype that only research centers and innovation departments engage in innovation (Benbya & Van Alstune, 2011).

At the same time, an IC initiative provides an environment for collaboration and creates a favorable climate for communication between departments, thereby fostering employees' commitment to the organization (Gumusluoglu & Ilsev, 2009) and encouraging employees to act as true agents of innovation.

Concerning the blocks of the rational part, we observed that the impact was high and had a similar value for the three blocks, although there was a greater positive influence in the *resources* block for Madrid City Hall and Endesa, and in the *success* block for Sabadell Bank. This similarity between Endesa and Madrid City Hall could have resulted from the fact that Endesa performs its activities in a regulated sector, in which it is difficult to associate economic performance with the capacity for innovation, and that the perception of Endesa's employees could be

similar to those of Madrid City Hall's public employees. In contrast, Sabadell Bank's ability to innovate is crucial for obtaining competitive advantages in the banking market.

Furthermore, this result may have to do with the intrinsic management model of each company, based on the resources and capabilities controlled by the organization, the combination of which defines what the company knows how to do particularly well. Aspects such as knowing how to exercise leadership, create relational capital, make decisions, coordinate through a communication plan (Linke & Zerfass, 2011), foster creativity, and stimulate the capacity to adapt and communicate, are all skills and abilities that will favor results (Cameron, 2008).

As mentioned before, these findings confirmed previous qualitative results obtained by Füller et al. (2010) in their study of the Swarovski i-flash community case and those of Scupola & Nicolajsen (2021) in their analysis carried out in an engineering consultancy firm, and further supported the important role of IC initiatives for the management of corporate culture and change (Zuchowski et al., 2016).

The model we designed was appropriate for assessing the effects and consequences of IC initiatives in large organizations, and we determined these impacts would be similar in any large organization. Our model is suitable for measuring and analyzing the effects IC initiatives can have on the development of an innovative culture in large organizations, operating in any industry in the private or public sector. Therefore, our model can be used as a reference.

6.2. Conclusions, limitations, and direction for future research

This research contributes to theory in three major ways.

Firstly, through a quantitative analysis, it demonstrates how IC initiatives can become an ongoing flexible system to build an innovation culture within companies.

Secondly, IC provides a common vehicle for the emergence of hidden employee talent, for intrapreneurs to be identified and their creativity leveraged in solving real organizational challenges, and it also creates a favorable climate for communication between departments, thus fostering the commitment of most of the employees, and encouraging them to act as true innovation agents.

Thirdly, and finally, this study emphasizes the need for organizations to have an open corporate culture that leverages employees to drive innovation, as people have ideas that can arise anywhere and at any time.

Furthermore, it provides some insights for practitioners, especially, for business managers who are looking to encourage an open mentality, design flexible organizational structures that are receptive, adapt to change, and capitalize on their organizations' greatest asset—their employees. To achieve these aims, they ought to implement an IC initiative as a pathway. The reason for this is that it entails the opportunity of taking an “evolutive shortcut” for organizations faced with the need to adapt themselves to an ever-changing environment.

For those interested in more in-depth information, a detailed explanation of the key analytical and decision-making components required to lead the design and rollout of IC initiatives can be found in some other recent academic works such as those of Pedersen et al. (2013), Zuchowski et al. (2016), and Campos-Blázquez et al. (2020).

However, like any other study in the management science discipline, our study has limitations. Thus, for statistical generalization purposes, although the choice of three companies enabled us to analyze IC initiatives, there were limitations such as the selection of the sample, the geographical scope, and the time involved in conducting longitudinal research.

Therefore, undoubtedly the most promising area for future research in order to confirm the results of this study and to expand upon it would be to do further research in other organizations not only under similar conditions (other large organizations in Spain), but also different contexts (multinationals in different sectors and in different countries) and

Table A1

Descriptive results of the influence of the internal crowdsourcing initiatives in the development of an innovation culture.

Code	Statement associated with each item	Madrid City Hall		Sabadell Bank		Endesa	
		Me.	S.D.	Me.	S.D.	Me.	S.D.
V1	In the desire to explore opportunities and to create new things	3.25	1.23	3.62	1.10	3.03	1.29
V2	In the possibility of admitting different interpretations when pursuing new opportunities (tolerance for ambiguity)	2.96	1.30	3.45	1.06	3.01	1.24
V3	In avoiding analysis paralysis when we identify new opportunities by exhibiting a bias toward action	2.85	1.34	3.40	1.12	2.85	1.19
V4	In encouraging new ways of thinking and solutions from diverse perspectives	3.40	1.38	3.81	1.07	3.24	1.19
V5	In providing the freedom to pursue new opportunities	3.33	1.26	3.48	1.10	3.18	1.35
V6	In being spontaneous and not afraid to laugh at ourselves	3.23	1.39	3.57	1.11	3.34	1.23
V7	At asking questions in the pursuit of the unknown	3.27	1.36	3.67	1.06	3.16	1.31
V8	In constantly experimenting in our innovation efforts	3.42	1.29	3.66	1.05	3.26	1.31
V9	In not being afraid to fail, and to treat failure as a learning opportunity	3.25	1.45	3.50	1.15	3.22	1.29
V10	In the way our leaders inspire us with a vision for the future and articulation of opportunities for the organization	1.90	1.19	2.80	1.12	2.29	1.13
V11	In the way our leaders challenge us to think and act entrepreneurially	1.85	1.11	2.96	1.21	2.41	1.21
V12	In the way our leaders model the right innovation behaviors for others to follow	1.83	1.08	2.67	1.06	2.26	1.09
V13	In which our leaders devote time to coach and provide feedback about our innovation efforts	1.83	1.14	2.63	1.18	2.31	1.12
V14	In our organization, people at all levels proactively take initiative to innovate	2.69	1.34	3.40	1.12	2.91	1.28
V15	In which our leaders provide support to project team members during both success and failures	2.29	0.99	2.47	1.24	2.73	1.16
V16	In which our leaders use appropriate influence strategies to help us navigate around organizational obstacles	1.96	1.20	2.70	1.09	2.49	1.17
V17	In which our leaders are able to modify and change the course of action when needed	1.94	1.17	2.75	1.14	2.47	1.23

Table A1 (continued)

Code	Statement associated with each item	Madrid City Hall		Sabadell Bank		Endesa	
		Me.	S.D.	Me.	S.D.	Me.	S.D.
V18	In which our leaders persist in following opportunities even in the face of adversity	1.96	1.20	2.86	1.16	2.56	1.29
V19	In creating a community that speaks a common language about innovation	2.29	1.18	3.30	1.05	2.93	1.23
V20	To appreciate, respect, and leverage the differences that exist within our community	2.73	1.40	3.34	1.14	2.84	1.24
V21	In working better as a team to capture opportunities	2.67	1.33	3.27	1.23	2.85	1.31
V22	In being more consistent in actually doing the things that we say we value	2.92	1.27	3.34	1.20	3.01	1.24
V23	To be able to question decisions and actions that are inconsistent with our values	2.54	1.18	3.09	1.22	2.76	1.25
V24	To be able to freely voice our opinions, even about unconventional or controversial ideas	2.92	1.29	3.23	1.25	3.09	1.18
V25	In minimizing rules, policies, bureaucracy, and rigidity to simplify our workplace	2.48	1.24	3.05	1.41	2.60	1.37
V26	In which people take responsibility for their own actions and avoid blaming others	2.21	1.30	3.02	1.21	2.57	1.32
V27	In which people know exactly how to get started and move initiatives through the organization	3.06	1.36	3.52	1.16	3.19	1.32
V28	In having committed leaders who are willing to be champions of innovation	1.96	1.09	3.00	1.16	2.72	1.35
V29	In having access to innovation experts who can support our projects	2.44	1.37	3.05	1.20	2.63	1.27
V30	In identifying and developing internal talent to succeed in our innovation projects	3.06	1.42	3.22	1.26	2.85	1.42
V31	Having the right recruiting and hiring systems in place to support a culture of innovation	2.21	1.32	2.64	1.23	2.34	1.32
V32	In having good collaboration tools to support our innovation efforts	2.54	1.25	3.19	1.18	2.76	1.26
V33	In leveraging our relationships with suppliers and vendors to pursue innovation	2.10	1.24	2.93	1.20	2.37	1.34
V34	In giving people dedicated time to pursue new opportunities	2.58	1.25	2.73	1.25	2.94	1.30
V35	In having dedicated finances to pursue new opportunities	2.19	1.23	2.86	1.31	2.63	1.43
V36	In having dedicated physical and/or virtual	2.56	1.41	3.23	1.35	3.00	1.41

(continued on next page)

Table A1 (continued)

Code	Statement associated with each item	Madrid City Hall		Sabadell Bank		Endesa	
		Me.	S.D.	Me.	S.D.	Me.	S.D.
V37	space to pursue new opportunities In systematically generate ideas from a vast and diverse set of sources	2.79	1.44	3.47	1.22	3.24	1.32
V38	In methodically filtering and refining ideas to identify the most promising opportunities	2.81	1.21	3.38	1.19	2.99	1.41
V39	In selecting opportunities based on a clearly articulated risk portfolio	2.77	1.22	3.30	1.16	2.90	1.35
V40	In moving promising opportunities quickly into prototyping	3.02	1.28	3.23	1.29	2.82	1.34
V41	In having effective feedback loops between our organization and the voice of the customer	2.60	1.20	3.05	1.32	2.53	1.23
V42	In stopping quickly projects based on predefined failure criteria	2.29	1.25	2.93	1.13	2.57	1.25
V43	In having processes tailored to be flexible and context-based rather than control-and bureaucracy-based	2.42	1.27	2.91	1.18	2.57	1.33
V44	In going quickly to market with the most promising opportunities	2.81	1.23	3.27	1.15	2.85	1.36
V45	In allocating rapidly resources to scale initiatives that show market promise	2.83	1.36	3.23	1.24	2.90	1.41
V46	In which our customers think of us as an innovative organization	2.73	1.33	3.53	1.17	2.85	1.26
V47	In that our innovation performance is much better than other firms in our industry	2.58	1.33	3.43	1.21	2.82	1.26
V48	In that our innovation efforts have led us to better financial performance than others in our industry	2.33	1.34	3.37	1.16	2.62	1.26
V49	In treating innovation as a long-term strategy rather than a short-term fix	2.79	1.37	3.80	1.12	3.07	1.37
V50	In having a deliberate, comprehensive and disciplined approach to innovation	2.83	1.36	3.61	1.21	3.00	1.32
V51	In that our innovation projects have helped our organization develop new capabilities that we did not have three years ago	2.71	1.37	3.52	1.11	2.81	1.42
V52	In that I am satisfied with my level of participation in our innovation initiatives	3.13	1.36	3.64	1.16	2.90	1.35
V53	In stretching and building deliberately our people's competencies by their participation in new initiatives	3.21	1.38	3.35	1.25	2.96	1.32

Table A1 (continued)

Code	Statement associated with each item	Madrid City Hall		Sabadell Bank		Endesa	
		Me.	S.D.	Me.	S.D.	Me.	S.D.
V54	In rewarding people for participating in potentially risky opportunities, irrespective of the outcome	2.69	1.49	3.20	1.28	2.71	1.32

Notes: Me: mean; SD: standard deviation.

Table A2

Summary table of the different models.

Statistical test	Madrid City Hall	Sabadell Bank	Endesa	Recommended value
Composite Reliability	min = 0.92 max = 0.98	min = 0.94 max = 0.97	min = 0.95 max = 0.98	>0.70
Cronbach's alpha	min = 0.87 max = 0.97	min = 0.91 max = 0.97	min = 0.92 max = 0.98	>0.70
Average Variance Extracted (AVE)	min = 0.67 max = 0.95	min = 0.67 max = 0.91	min = 0.76 max = 0.94	>0.50
Heterotrait-Monotrait Ratio (HTMT)	min = 0.50 max = 0.99	min = 0.60 max = 0.99	min = 0.70 max = 0.99	<0.90
R²	min = 0.57 max = 0.88	min = 0.60 max = 0.89	min = 0.69 max = 0.92	>0.25
f²	min = 1.32 max = 7.50	min = 1.47 max = 7.70	min = 2.18 max = 11.18	>0.35
path coefficients' t-statistics (bootstrapping 4,000 samples)	min = 13.29 max = 56.79	min = 15.54 max = 87.30	min = 17.01 max = 98.35	>1.96
Stone-Geiser Q²	min = 0.38 max = 0.79	min = 0.51 max = 0.71	min = 0.57 max = 0.79	>0.00
Standardized Root Mean Square (SRMR)	0.11	0.10	0.07	<0.08

sizes (small and medium-sized enterprises), etc., to achieve more global knowledge about IC initiatives and their impact on the development of an innovation culture.

CRediT authorship contribution statement

Juan Ramón Campos-Blázquez: Supervision, Project administration, Investigation, Writing – original draft, Writing – review & editing, Methodology, Formal analysis, Conceptualization. **Luis Rubio-Andrada:** Writing – original draft, Validation, Methodology, Data curation. **María Soledad Celemin-Pedroche:** Validation, Supervision, Data curation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence

the work reported in this paper.

Acknowledgements

We greatly appreciate the contributions of all those professionals from Madrid City Hall, Sabadell Bank, and Endesa, who have participated so actively in this research. All errors and omissions remain ours.

Appendix A

See Tables A1 and A2.

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