Detection of the Lines of Research in Favor of the Implementation and Development of Organizational Culture of Innovation through a Bibliometric Analysis

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ABSTRACT: This paper analyzes the lines of research derived from the implementation and development of the organizational culture of innovation in order to identify the trends followed within this field of study. In doing so, we identified potential and recent-interest trends that could contribute both to the development of this scientific field and to the search of companies for competitive advantages. The most productive authors, journals and countries were also identified, thus offering a solid basis for future research. The methodology consisted of the analysis of bibliometric indicators from scientific articles in Scopus database published between 1980 and 2000. The Web of Science was not considered since the results obtained in both databases were similar. Among the relevant findings related to administration, in publishing terms, the United States is the most productive country, followed by the United Kingdom and Australia. The analysis of topological data between keywords and science areas shows that the analyzed sample focuses on inter- and multidisciplinary studies, and that most theories and basic frameworks were created between 1980 and 2000. These findings provide a basic framework for qualitative and quantitative research that could be applied by experts in the field of management.

KEYWORDS: Organizational culture, organizational culture of innovation, innovation, bibliometrics.

IDENTIFICACIÓN DE LAS LÍNEAS DE INVESTIGACIÓN A FAVOR DE LA IMPLEMENTACIÓN Y EL DESARROLLO DE LA CULTURA ORGANIZACIONAL DE INNOVACIÓN: UN ANÁLISIS BIBLIOMÉTRICO

RESUMEN: este trabajo analiza las líneas de investigación derivadas de la implementación y el desarrollo de la cultura organizacional de la innovación con el objetivo de identificar tendencias en este campo de estudio. Así, fue posible reconocer tendencias potenciales y de reciente interés que podrían contribuir tanto al desarrollo del mencionado campo científico como a la búsqueda de ventajas competitivas por parte de las organizaciones. Junto con lo anterior, se identificaron los autores, las revistas y los países con mayor producción científica en torno al tema, ofreciendo así una base sólida para futuras investigaciones. Metodológicamente, se llevó a cabo un análisis de indicadores bibliométricos de artículos científicos indexados en Scopus y publicados en el período 1980-2000. La base de datos Web of Science no fue considerada debido a que los resultados obtenidos en esta fueron similares a los registrados en Scopus. Entre los hallazgos claves relacionados con el área de administración, en términos de producción de artículos, Estados Unidos es el país con mayor participación, seguido de Reino Unido y Australia. El análisis topológico de datos entre palabras claves y áreas científicas evidencia que la muestra analizada se centra en estudios inter y multidisciplinarios, y que la mayoría de las teorías y los marcos de referencia fueron propuestos entre 1980 y 2000. Estos resultados proporcionan un marco básico para la realización de investigaciones cualitativas y cuantitativas que podría ser aplicado por expertos en el campo de la gestión.

PALABRAS CLAVE: cultura organizacional, cultura organizacional de innovación, innovación, bibliometría.

IDENTIFICAÇÃO DAS LINHAS DE PESQUISA A FAVOR DA IMPLEMENTAÇÃO E DESENVOLVIMENTO DA CULTURA ORGANIZACIONAL DE INOVAÇÃO: ANÁLISE BIBLIOMÉTRICA

RESUMO: este trabalho analisa as linhas de pesquisa derivadas da implementação e desenvolvimento da cultura organizacional da inovação com o objetivo de identificar tendências nesse campo de estudo. Assim, foi possível reconhecer tendências potenciais e de recente interesse que poderiam contribuir tanto para desenvolver o mencionado campo científico quanto para buscar vantagens competitivas por parte das organizações. Além disso, são identificados autores, revistas e países com maior produção científica sobre o tema, o que oferece uma base sólida para futuras pesquisas. Metodologicamente, foi realizada uma análise de índices bibliométricos de artigos científicos indexados na Scopus e publicados no período 1980-2000. A base de dados Web of Science não foi considerada devido a que os resultados obtidos nela foram semelhantes aos registrados na Scopus. Entre os achados principais relacionados com a área de Administração, em termos de produção de artigos, os Estados Unidos da América contam com maior participação, seguidos do Reino Unido e da Austrália. A análise topológica de dados entre palavras-chave e áreas científicas evidencia que a amostra analisada se foca em estudos inter e multidisciplinares, e que a maioria das teorias e referenciais foi proposta entre 1980 e 2000. Esses resultados proporcionam um referencial básico para realizar pesquisas qualitativas e quantitativas que poderia ser aplicado por especialistas no campo da gestão.

PALAVRAS-CHAVE: cultura organizacional, cultura organizacional de inovação, bibliometria.

DÉTECTION DES AXES DE RECHERCHE EN FAVEUR DE LA MISE EN ŒUVRE ET DU DÉVELOPPEMENT D'UNE CULTURE ORGANISATIONNELLE DE L'INNOVATION AU MOYEN D'UNE ANALYSE BIBLIOMÉTRIQUE

RÉSUMÉ : Cet article analyse les lignes de recherche dérivées de la mise en œuvre et du développement de la culture organisationnelle de l'innovation afin d'identifier les tendances suivies dans ce domaine d'étude. Ce faisant, nous avons identifié des tendances potentielles et d'intérêt récent qui pourraient contribuer à la fois au développement de ce domaine scientifique et à la recherche d'avantages concurrentiels pour les entreprises. Les auteurs, les revues et les pays les plus productifs ont également été identifiés, offrant ainsi une base solide pour de futures recherches. La méthodologie a consisté à analyser les indicateurs bibliométriques des articles scientifiques de la base de données Scopus publiés entre 1980 et 2000. La Web of Science n'a pas été prise en compte car les résultats obtenus dans les deux bases de données étaient similaires. Parmi les résultats pertinents liés à l'administration, en termes de publication, les États-Unis sont le pays le plus productif, suivis du Royaume-Uni et de l'Australie. L'analyse des données topologiques entre les mots-clés et les domaines scientifiques montre que l'échantillon analysé se concentre sur des études inter- et multidisciplinaires, et que la plupart des théories et des cadres de base ont été créés entre 1980 et 2000. Ces résultats fournissent un cadre de base pour la recherche qualitative et quantitative qui pourrait être appliqué par les experts dans le domaine de la gestion.

MOTS-CLÉ : Culture organisationnelle, culture organisationnelle de l'innovation, innovation, bibliométrie.

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Introduction

Nowadays, the organizational culture of innovation (OCI) is essential for developing competitive advantages (Morcillo, 2012; Pineda *et al.*, 2018). The literature review in this field shows an extensive understanding from diverse areas of knowledge, such as psychology, industrial engineering, business administration, information systems, social sciences, and political science, among others, addressing these disciplines directly and specifically (Tejeda *et al.*, 2014). Likewise, the dissemination of this knowledge has been possible through publications in various journals.

All this makes it complex to identify and select relevant and essential information in any OCI research, being this situation one of the major limitations in the area (Tejeda *et al.*, 2015). Consequently, it is essential to conduct an analysis to assist the development of this field, identifying the lines of research pursued in search of the implementation and development of OCI. Both OCI and organizational culture (OC) relate to allow establishing the scarcely explored and potential subjects that guide researchers in related fields and topics and, at the same time, assessing the importance and influence they may exert in the journals where their works are published. This, in order to achieve a complete perspective and lay a solid foundation for future research, as a similar area of research has not been addressed.

Based on the above, bibliometrics becomes a tool for evaluating scientific research, as it allows examining significant amounts of data on a given topic from different perspectives (Glänzel, 2014), which increases the probability of recognizing new contributions and identifying preferences through the application of quantitative techniques that increase the importance of the analysis provided by bibliographic review studies (Coombes & Nicholson, 2013). For this reason, in this research work, various bibliometric techniques have been applied.

Literature review

OCI is considered one of the most important bases of the strategy for the development of competitive advantages in the short, medium, and long term (Naranjo *et al.*, 2016), so companies need to promote one type of OCI that incorporates the existing elements of their OC and, at the same time, promotes new values, habits, customs, and knowledge among its members, improving existing approaches (Morcillo, 2012).

Therefore, by focusing on their OC towards innovation, companies can achieve success (Shahnaei & Sang, 2015; Souto, 2015). Successful companies are mainly characterized by being flexible and having organizational cultures that change at the pace of the environment (Schein, 1996), creating opportunities faster than their competitors do (Denison & Mishra, 1995).

Research work on OCI began with Roger Harrison, in 1978, who proposed ways to solve conflicts within organizations. However, it was not until 1980 that research in this field began to take off. Important contributions were found by analyzing the OCI concept, such as that by Mambrini and Medina (2011), who state that OCI is based on the generation, acceptance, and implementation of original ideas (Apekey *et al.*, 2011; Moreno *et al.*, 2011). Therefore, participation and interaction between a company's staff and external agents are essential (Schein, 1996), since innovation can come both from within and from outside the company (Twati & Gammack, 2006).

In addition to the above, Harrison (1978) states that the basic principles of OCI are the drivers behind the generation of ideas and the facilitators for their implementation, based on the tolerance and acceptance of risks (Ghanem & Mokhtar, 2015; Sheng & Sun, 2007; Velasco & Zamanillo, 2008) to generate value through the development of innovations.

Consequently, trust plays a key role since it allows the development of activities without fear of sanction (Pizarro *et al.*, 2011; Schein, 1996) and is seen as an area of opportunity that helps the worker to grow in experiences and to develop knowledge from possible adverse outcomes. Likewise, trust encourages individuals to increase their commitment towards change (Bartel & Garud, 2009; Linke & Zerfass, 2011), initiative (Kanter, 1985), and the spirit of improvement (Cramm *et al.*, 2013; Kono, 1982; Riivari *et al.*, 2012).

Among other contributions, we should remark Abbey and Dickson's proposal (1983), who sustain that OCI should be characterized by autonomy (Naranjo *et al.*, 2016; Shahnaei & Sang, 2015), information flow, creativity (Azar & Drogendijk, 2016; Galende, 2006; Sheng & Sun 2007), and rewards (Apekey *et al.*, 2011; Yinghong *et al.*, 2013), coupled with the creation of a suitable environment for its development (Kono, 1982).

It is also important to note that the perception of a competent and committed management (Morcillo, 2012; Schneider *et al.*, 1994) added to the reward (Abbey & Dickson 1983; Russell, 1989) and recognition (Laforet, 2011; Shrivastava & Souder, 1987) is essential in developing this type of culture. In this regard, Steele and Murray (2004) state that OCI is mobile, informal, dynamic, and competitive, fosters ingenuity and constant adaptation, minimizing resistance to change (Bartel & Garud, 2009) and increasing acceptance. Both success (Abbey & Dickson, 1983; Unger *et al.*,

2015; Weiss & Delbecq, 1987) and a personal failure, at the same time, communicate among a company's members the strength to face conflicts and the ability to analyze positively between what was already planned and the actual results obtained (Kanter, 1985; Schneider *et al.*, 1994).

Several authors support that OCI develops within an internal environment sustained by values (Carvalho *et al.*, 2013; García *et al.*, 2014; Ghanem & Mokhtar, 2015; Hussain & Terziovski, 2016) that are shared by the members of an organization (Naranjo *et al.*, 2012) based on emerged attitudes and behaviors that stimulate cooperation (McGinnis & Verney, 1987), thus favoring the growth of innovation according to the company's characteristics.

Schein (1996) states that an innovative organization can control its environment and adapt to changes and management. Workers are proactive, can adapt quickly to developments, break traditions, plan for the near future, feel confident in exposing their ideas, get involved in decision-making (Ghanem & Mokhtar, 2015; Naranjo *et al.*, 2016; Schein, 1996), focus on continuous improvement (Brooke, 2008; Mambrini & Medina, 2011), and, thereby, create value (Inkpen & Tsang, 2005; Tsai & Ghoshal, 1998).

In other matters, Adler and Kwon (2002) claim that OCI is to understand the strategic value of knowledge and information, as well as their internal and external exchange (Donate & Guadamillas, 2011; Naranjo & Calderon, 2015), in a process that facilitates the cooperation developed under collective activities.

Individual work is also essential. For it to take place, there must be some flexibility in a company (Morcillo, 2012); that is, to allow workers to explore diverse ways of conducting their work activities. OCI also values curiosity (O'Reilly, 1989) and promotes responsibility in activities (Laforet, 2011), giving the worker some degree of empowerment (Duygulu, 2015; Moreno *et al.*, 2011; Olegovich & Viktorovna, 2014) to develop their activities with the freedom to propose improvements in their areas of work, thus seeking to increase their performance.

It is also necessary to integrate within this analysis the contributions of Galende (2006), who argued that in for OCI the most important asset is the structural capital and the ability of companies to innovate, where innovation becomes the central axis for the development of competitive strategies (Arancibia *et al.*, 2015; Gumusluoglu & Arzu, 2009).

For Laforet (2011), in an OCI, employees can express their opinions to their colleagues (Göran, 2008; Brooke, 2008) and there is tolerance for disagreement (El Harbi *et al.*, 2014; Schneider *et al.*, 1994; Zien & Buckler, 1997). It is worth noting that in this type of culture time is given importance to the development of creativity (El Harbi *et al.*, 2014; Moreno *et al.*, 2011) and there is a high degree of commitment from all staff (Mambrini & Medina, 2011; Naranjo *et al.*, 2012; Park *et al.*, 2016), which generates job satisfaction (Camarero & Garrido, 2008).

Brooke (2008) defines OCI as a multidimensional context that includes innovative behavior, which influences the market, and takes value orientation as the basis for the commitment of staff towards innovation, which can be attained through self-discipline (Cramm *et al.*, 2013; Jonlee, 1996) and perseverance (Bonvin & Orton, 2009; Göran, 2008). Supporting this theory, Duréndez *et al.* (2011) affirm that OCI is a culture that encourages innovation and behaviors that highlight the search for solutions focused on the generation of value and a market-oriented perspective (Naranjo *et al.*, 2016).

Therefore, the key for OCI is to break up with the cultural rigidity and the limited vision that does not agree with the activities of the current management, allowing creativity, autonomy, and risk-taking, which are difficult to promote when the company focuses on stability and control (Göran, 2008; Piansoongnern, 2016). However, a certain degree of control and rigidity for the advancement of work activities is needed (O'Reilly, 1989).

The analysis presented above concludes that OCI has become an essential requirement that ensures the competitiveness of organizations. Despite a diversity of studies focused on this phenomenon, there is no structured, coherent, and commonly accepted definition. However, it is possible to summarize OCI as a culture that promotes increased innovation through shared values, convictions, customs, norms, and methods, which settles the development of new ideas that become an active part of the company's strategy for achieving competitiveness and permanent differentiation in the market.

Research method

Bibliometric analysis helps us recognize the theoretical roots of a given field of study to identify and understand future research trends. Hence, this work analyzes different scientific articles published in research journals (Houston & Delevan, 1990) since there are scarce bibliometric studies in the studied field. Consequently, we conducted an in-depth review of OCI-related works, including the countries with more research studies in this field, as well as authors, journals, and keywords.

Sample and methodology

To achieve the stated objective, we examined the bibliometric records of scientific articles addressing OCI that were published from 1980 to 2018 and are indexed in Scopus database. We decided not to add sources such as doctoral thesis, monographs, book chapters, proceedings, summaries of communications, articles of a professional nature, and reviews, since they might offer a limited extension of the topic they address (Lan & Anders, 2000). Therefore, this research has focused on the specific analysis of journals as a reliable source of knowledge and quality indicators of scientific production (Hernández & Maquilón, 2010).

The collection of the scientific articles included in the sample was obtained using the keywords "organizational culture" and "organizational culture of innovation" and the search formulas "organizational culture and innovation," "organizational culture or culture of innovation and organizational culture."

The technique used is content analysis, since it allows the objective, systematic and quantitative description of the manifest content of communications (Berelson, 1952), paying attention to the title, summary, and keywords of each article. For many of them, the introduction was read to determine the objective of the research and the factors that integrate the present analysis.

The procedure applied focused on the stated objective, seeking that results were susceptible to verification. The product of this task is a database composed of 1,430 articles that correspond to different areas of knowledge, such as management sciences (20.32%), economic sciences (31.59%), communication sciences (6.71%), engineering (14.41%), earth sciences (1.17%), political sciences (0.68%), social sciences (4.43%), computer science (1.66%), education sciences (4.80%), medical sciences (7.94%), science of law (0.18%), marketing (3.63%), and tourism (2.46%).

With the strong intention of reaching the objective set out above, we tried to answer the following research questions:

I. What are the research lines followed for the development and implementation of OCI? This was answered by analyzing the keywords and the main topics addressed in the sample of articles under study.

II. What impact and relevance does the selected analysis window have on the development of OCI? Through this we examined the journals, countries with the higher ratings of publication, and the authors with more scientific production and interaction to develop the research works and publication of results in this field.

On the other hand, information management was performed in Microsoft Excel, generating a database composed by a series of columns gathering the following data: author's name, year of publication, title, journal of publication, objective, main topic, cooperation relationship, geographical location, methodology used, relevant content analyzed, keywords, area of knowledge, and results.

To provide a graphic representation of the most common keywords, as well as the cooperation between countries, we used the VOSviewer software and the RStudio software to analyze the existence of monodisciplinary, multi-disciplinarity or interdisciplinarity of the analysis window.

Results

Lines of research

The lines of research allow covering processes, practices and perspectives of analysis with emphasis on creativity in the field of study. These lines also determine the main topic and keywords of the article, which can be directed to different areas of science.

Keywords

Keywords determine the direction of the research. Hence, it is essential to analyze this input since keywords also influence the lines of research followed. The analysis of the sample integrated by 1,430 scientific articles shows that the most frequently used keyword is innovation, followed by OC, culture of innovation, and administrative innovation, while the less widely used are creativity, incremental innovation, trust, and job satisfaction (figure 1).

The incidence of disciplinary, interdisciplinary, and multidisciplinary work is shown by the correlation analysis between keywords, considering that disciplinarity is mono-discipline and represents a specialization in isolation (Max-Neef, 2005). In turn, interdisciplinarity focuses on the dynamics generated from the simultaneous action of several levels of reality, as the coexistent inquiry work from different disciplines, towards the unfolding of the same problem (Osborne, 2015). Finally, multidisciplinary working relationship is the cooperation —that could well be mutual and cumulative, but not interactive— focused on a specific topic (Pulkkinen, 2015).

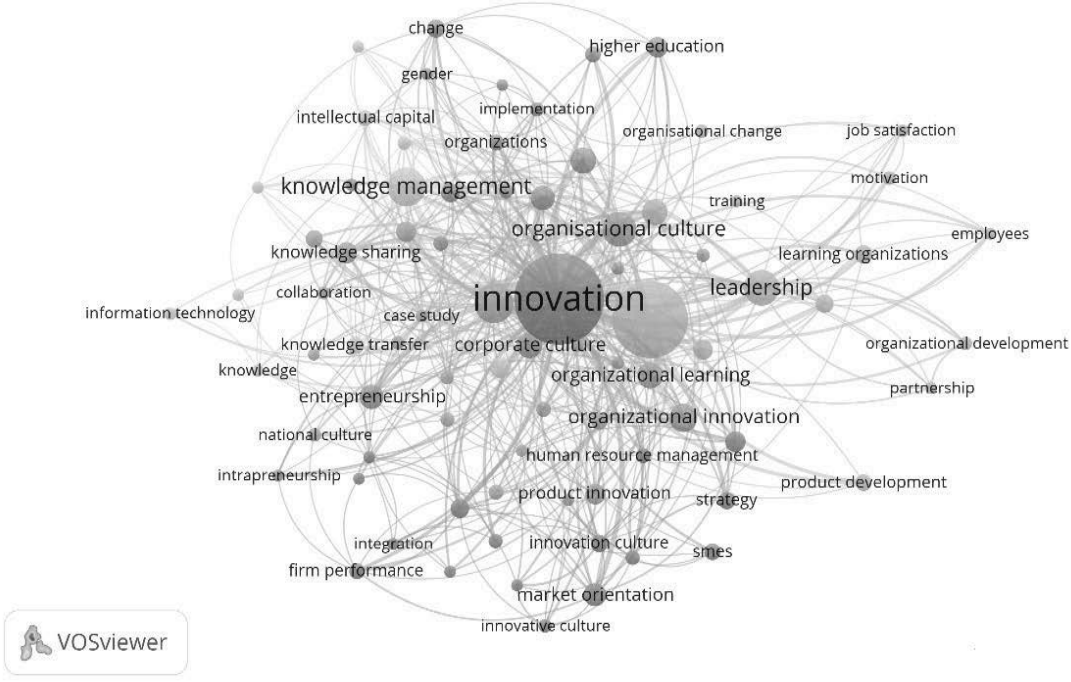

Figure 1. Most frequently used keywords in the sample studied. Source: authors, based on the database generated by Scopus.

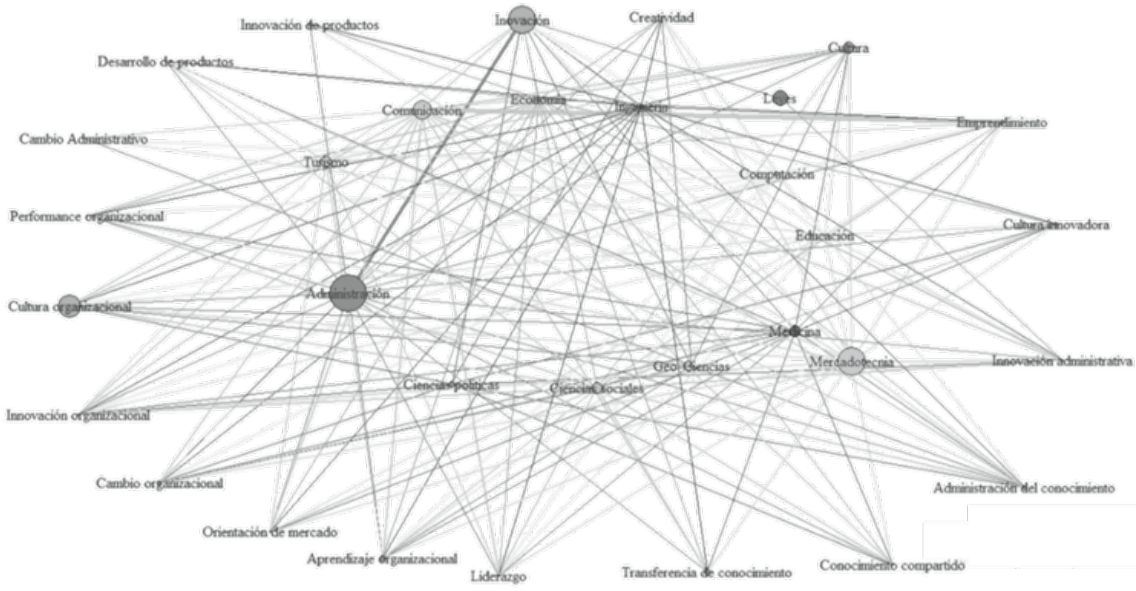

Figure 2. Topological analysis of data. Relationship between keywords and areas of science. Source: authors through the Igraph supplement for RStudio version 3.5.0.

To know the relationship between keywords and the various areas of science found in this framework of analysis, and thus determine their degree of discipline, interdisciplinarity, or multi-disciplinarity, a topological analysis of data was applied through the RStudio software version 3.5.0 and the application of its Igraph plug-in (figure 2).

The results show that the keyword "innovation" has a strong relationship (100%) with the thirteen areas of knowledge identified in the sample under study. On the contrary, law field shows an extremely low nexus with the keywords since it is only bind to innovation and administrative innovation.

Knowledge management obtained a result of 92.3%; organizational learning (84.6%), it can be seen that it is not related to political sciences; on the other hand, organizational innovation (84.6%), is not linked to earth sciences, likewise we can see that co is not related to tourism. It is important to note that none of the keywords mentioned above have any connection with the area of law.

The keyword "culture" obtained 76.9% of relation with the areas of science, not showing any connection with political science and computer science. With the same percentage of bind, the keyword "entrepreneurialism" lacks a relationship with earth sciences and political sciences, a percentage that is also present in the keywords "leadership" and "organizational change." As in the previous block, the keywords described here do not show any connection with law discipline. Conversely, the keywords less related to the areas of science are "product innovation" (30.8%), "administrative change" (30.8%), "product development" (53.8%), "knowledge transfer" (53.8%), and "shared knowledge" (53.8 %).

Based on the above, we can conclude that the keywords in the analyzed articles are not focused on mono-disciplines, since they relate, at least, to three areas of science. Therefore, we can state that the keywords in the studied articles correspond to either inter- or multidisciplinary jobs. Regarding the publications in the analysis time window (1980-2018), we can determine the percentage of articles that show monodisciplinary, interdisciplinary, and multidisciplinary incidence in the development of their research (table 1).

Table 1.
Incidence percentage.

Incidence	Number of disciplines per paper	Number papers	Share (%)
Multidisciplinary	4	10	1
Interdisciplinary	3	48	3
Interdisciplinary	2	144	10
Monodisciplinary	1	1,228	86
	Total	1,430	100

Source: authors.

Main topics

Within the analyzed bibliography, we found the application of knowledge from different areas of science with different perspectives, all in favor of the development and implementation of OCI, which generates multiple topics. Hence, it is essential to analyze each of them to show the current projection in this area of study.

Administration

Administration is among the main topics identified, focusing on the introduction of new structures in the organization, the implementation of innovative strategies to improve business performance by reducing administrative costs, coordinating activities, and applying knowledge to improve the efficiency of the company through the elimination of barriers that hinder the development of new ideas and innovations.

Amongst the essential contributions in this area, we can mention that of Kono (1982), who focused on analyzing the particularities of Japanese administration, placing a higher emphasis on the strategic level of administrative practices in an attempt to determine the characteristics that lead to success. Wu *et al.* (2002) analyzed these particularities empirically, seeking the relationship between management styles and the development of innovation. This line of research is followed by Hsu *et al.* (2008) and resumed by Unger *et al.* (2015) and Madero and Barboza (2015).

Another vital contribution in this line was provided by Park *et al.* (2016), who examined the effect of participatory management in conjunction with OCI in organizational transformation. On the other hand, Wong and Chin (2007) highlight the value of innovation management within companies as promoters of success factors that can serve as a framework for business transformation.

Egbu (2004) examined the importance of knowledge management and intellectual capital developed within companies as a critical factor towards successful innovations. In this regard, Yepes *et al.* (2016) implemented a management system that favors the absorption of knowledge for supporting the creation of competitive advantages, while Standing and Kiniti (2011) focused on the use of wikis as a strategy for obtaining and generating knowledge for the development of innovation.

Human resources are a vital part of management in companies. As such, Townend (2008) analyzed these key assets as contributors for the promotion of OCI, while Fu *et al.* (2015) determine them as catalyst in the development of organizational innovation. García *et al.* (2014) suggest flexibility and commitment as a mediating model between human resources, policies, and the level of organizational innovation. Within this context, Leong and Anderson (2012) demonstrated that OCI depends on management because it evolves through employee's motivation, while Linke and Zerfass (2011) state that it is by adequate internal communication. In this regard, Larsen *et al.* (1991) indicated that the growth of managerial skills works as a catalyst for generating knowledge in workers through shared experiences.

In other administrative issues, Duréndez *et al.* (2011) studied management control systems and their effects on the cultural transformation of companies, as facing the constant changes of the market require the transformation of the traditional paradigm of administrative innovation for a new one: total management innovation. Thus, we can also mention McAdam and Galloway's work (2005) focused on organizational objectives. These authors stated that enterprise resource planning must be incorporated into the agenda of the OCI development process, otherwise (Schweitzer, 2016), they may be impacted.

Additionally, the research study by Aldas *et al.* (2005) shows that similar companies developed in the same sector do not necessarily manifest the same level of interest in OCI development, which differentiates firms' level of motivation towards innovation (Cramm *et al.*, 2013; Santos & Álvarez, 2007). Furthermore, within administrative practices as development inhibitors of this type of culture, Russell (1989) analyzed how the formalization of an organizational system inhibits the importance of OC in small companies as a catalyst for innovation development.

Types of culture in the development of innovation

Currently, CO is considered one of the key factors in the generation of innovative behavior among the members of an organization (Naranjo *et al.*, 2012). In this regard, the most widely accepted model is that of "competing values" by Cameron and Quinn (1999), which is the basis of numerous research studies, as it defines four types of culture, namely: i) clan, ii) adhocratic, iii) hierarchical, and iv) rational.

Naranjo *et al.* (2012), in addition to analyzing the types of culture that favor innovation the most, conducted an in-depth study to determine the specific features of each typology and their effects on innovation development. Based on the classification proposed by Cameron and Quinn (1999), Naranjo *et al.* (2012) found vital contributions in the proposal of Schein (1988), who analyzed the

type of OC that facilitates the development of innovation. On the other hand, Naranjo *et al.* (2016) added to this research the type of culture that hinders innovation, while Naqshbandi *et al.* (2015) examined the types of culture that could slow down innovation activities, either incoming (technologies and absorption of knowledge) or outgoing (towards the market).

In other matters, Bouncken *et al.* (2015) explored the effects of multiculturalism in the development of creativity and innovation in companies, whereas Azar and Drogendijk (2016) focused on the study of the relationship between cultural distance, both perceived and objective, and innovation development. Similarly, we found research works that study the implementation of an adequate OC for the development and application of total quality management, since this approach is related to increased innovation (Irani *et al.*, 2004).

Cultural barriers

Cultural barriers are one of the factors that commonly restrict the cultural mix or interrelation of individuals or groups, being racial, ethnic, language, and customs differences, along with particular conceptions of reality, some of the features that prevent companies to proactively address the challenges posed by external environment factors and, therefore, the development of innovation (Johnson, 2008). In other words, the national culture is bound up to organizational learning focused on increasing innovation (Senker, 1996).

The different approaches found on this regard are the following:

- Identification of cultural barriers that hinder both the production and distribution of knowledge.
- Analysis of existing cultural barriers at the relationship between management and organizational innovation.
- Analysis of the influence exerted by a country's culture on the development of innovation within organizations.
- Analysis of cultural differences as the basis for understanding barriers for innovation development.

Relationship between organizational culture and innovation

One aspect of special interest is the relationship between OC and innovation. OC is currently considered one of the most stimulating factors for an innovative behavior, since influencing employees' behavior could foster continuous improvements (Irani & Sharp, 1997), which could lead them to accept innovation as a fundamental value in the organization and commit to it (Naranjo *et al.*, 2012). Among the different approaches from the literature analysis in this regard, we could mention:

- Relationship between OC and innovation development.
- Relationship between culture and national subcultures and innovation.
- Characteristics that integrate OCI and its construction process.
- OC determinants that facilitate innovation.
- Influence of distinct types of innovation in OC development.
- Influence of OC over innovative behavior.
- Analysis of the cultural attitudes of managers as essential to the level of organizational innovation.

OCI under the dynamic capabilities approach

Innovation occurs through the application of knowledge generated within the company (Forrest, 1991) or coming from outside, as a result of relationships with suppliers, competitors, customers, and intermediaries, among others (Porter, 2010). This situation boosts the development of competitive advantages within companies, whose success is grounded on firms' dynamic capacities (Ibarra & Suárez, 2002; Leskovar & Bastic, 2007), such as knowledge absorption (Mortara & Minshall, 2011) and learning capabilities. Consequently, these capacities are essential for innovation development (Lemon & Sahota, 2004) and strongly related to innovation capacity (Santos & Álvarez, 2007). Some approaches obtained from the literature review on the subject are:

- Analysis of the systematic thinking capacity used in the assimilation of knowledge that explains changes in a social system.
- The effect of the capacity of knowledge accumulation in organizational innovation.
- The impact of the basis of knowledge as a resource for innovative activity in companies.
- Analysis of the interrelationships between learning and OCI.
- Harnessing innovation capacity through the organizational structure.
- Management practices that promote innovation capacity and its contribution to the company.

- Relationship between ethics and innovation capacity in organizations.
- Relationship between knowledge absorption ability and the capacity for innovation in OCI development.

Measurement models proposed in the literature for OCI development

In this section, we will find research lines that propose models with different objectives. However, all of them are related to the creation of OCI. The types of models correspond to:

- Models to increase innovation based on the impact of the organizational learning culture.
- Models of the factors that integrate OC and influence the development of creativity and innovation.
- Theoretical models to identify dimensions of innovation and evaluate the capacity and impact of employees on innovative performance.
- Models for the appropriate use of efforts in favor of the increase of organizational innovation.
- Innovation promotion models focused on individualism as an entity that affects innovation strategies in the organization.
- Models for the development of innovation and organizational transformation.
- Explanatory models of the implementing organizational innovation process.

Instruments for measuring OC's innovation level

In the current globalized world, companies are required to develop innovative strategies that allow them to remain competitive and operate efficiently in the market. For this reason, it is key to motivate companies to permanently innovate through their OC and acknowledge their innovation levels as a starting point for establishing strategies for the continuous development of innovation.

Within the research corpus studied, several measurement instruments based on various approaches were identified. Despite this, all of them pursue the same objective:

- Instruments to build and measure the orientation of OC towards innovation.
- Instruments that apply and validate a set of indicators through a deductive and inductive perspective.
- Instruments to identify the strengths and weaknesses that allow generating actions to strengthening OCI.
- Instruments for measuring the organizational innovation capacity and its multiple dimensions from a cultural-strategic perspective in the multifaceted formative scale.

Focus on the characteristics of OCI

Concerning the characteristics of OCI, research studies have focused on describing the strategy of mature companies to maintain an entrepreneurial behavior (Hindle & Yencken, 2004) and an innovative spirit among their employees (Zien & Buckler, 1997), as well as the personal characteristics that lead them to be like-minded and, therefore, entrepreneurial (Menzel *et al.*, 2007). Regarding this topic, there are multiple aspects addressed in the literature, since each author studying the subject allocates importance to one more than others. However, in general, it has been possible to establish the main approaches of the sample object of study, namely:

- Analysis of a set of characteristics considered essential in the development of organizational innovation and its interdependence in the various stages of innovation processes.
- Analysis of the factors and drivers for OCI development.
- Analysis of the activities developed within the company in favor of innovation and their relationship with the characteristics of OC.
- Analysis of the capacities and factors that affect organizational innovation and organizational learning for innovation development and business transformation.
- Study and analysis of shared knowledge fundamental in OCI development.
- Analysis of the level of adaptation to change by companies as a trigger for innovation development.
- Analysis of the behavioral characteristics —defined by territorial regions— as determinants of the innovation level of companies.

As a synthesis, and for analytical purposes, table 2 presents the different topics and the most important contributions of scholars on the subject.

Table 2.
Topics of study around OCI identified in the literature.

Topic	Line of research
Administration	- Learning styles - Human resources - Control systems policy - Organizational objective
Types of OC	- In favor - Inhibitors - Accelerators - Retardants
Cultural barriers	- Multiculturality - Cultural mix - Cultural differences
Relationship between OC and innovation	- OC and innovation development - Subcultures - Types of innovation in OC development - Organizational culture and innovative behavior
Dynamic capabilities	- Systematic thinking - Absorption of knowledge - Innovation capacity - Knowledge accumulation capacity
Development models of OC	- Increased innovation - Organizational transformation - Implementation - Dimensions of innovation
Measuring innovation level of OCI	- Orientation towards innovation - Identification of strengths and weaknesses - Innovation capacity
Characteristics of OCI	- Strategic - Basic - Formative - Definitory - Inhibitors - Accelerators - Integrators

Source: authors.

Impact and relevance

The impact is an indicator of the relevance and influence of a journal or a group of documents (Li *et al.*, 2014). This analysis integrates the following variables: i) author(s), ii) journal, and iii) place of studies and cooperation relationship between countries.

Author

The number of authors who have contributed to the different research works produced in the subject under study is presented in table 3, showing that 54.48% of the works were made in collaboration between two and three authors, while 31.19% were individually developed research works. Lower percentages (9.09% or less) are found in collaborative networks of four or more authors, reaching up to 11 authors, that together result in 14%, indicating that there is a low rate of collaboration, as 85.67% of the sample examined has up to three co-authors.

Table 3.
Distribution of the number of authors per article.

Authors per article	No. of articles	Share (%)
1	446	31.19
2	459	32.10
3	320	22.38
4	130	9.09
5	41	2.87
6	17	1.19
7	8	0.56
8	4	0.28
9	3	0.21
10	1	0.07
11	1	0.07
Total	1,430	100

Source: authors.

The previous findings can be verified by calculating the co-authorship index, that is, the average number of authors per article, which results in 2.26 authors/work; being this indicative of a low collaboration rate (López *et al.*, 2010).

Based on the contributions of Lotka (1926), a production of ten articles per author is considered a high productivity rate. However, only O'Reilly is close to achieving such a mention, with nine research works, representing 0.035% of this frame of analysis; 0.14% of the sample is made up by authors with six contributions (Alänge, Austin, Khan, and Singh), and with the same result the authors with five (Etzkowitz, Fletcher, Kanter, and Korot). Finally, within the category of medium producers, it is observed that the 0.31% has four contributions (Barnes, Černe, Ekboir, Jugend, Matzler, Southey, Verhoest, Xu, and Zhou). Among occasional producers, 1.39% of the authors have published three research papers, 7.33% have published two, and 90.65% one (table 4).

Publication journal

Although there are journals specialized in innovation, not all of them specifically address the issue of OCI. Hence, this bibliometric analysis has identified a wide variety of journals publishing works in this field of study.

Table 4.
Article production by authors.

Article production	Authors
9	1
6	4
5	4
4	9
3	40
2	211
1	2,608

Source: authors.

It is important to highlight that 95% of the 600 journals obtained in the present window of analysis have between one and four articles addressing OCI. Therefore, we considered the thirty most influential journals in the subject of study of this research work, which represent 5% of the total sample and correspond to those publishing 5 or more works on OCI. The number of publications in each of these journals is shown in figure 3. In addition, the number of articles published per year shows the importance and evolution of OCI over time (figure 4).

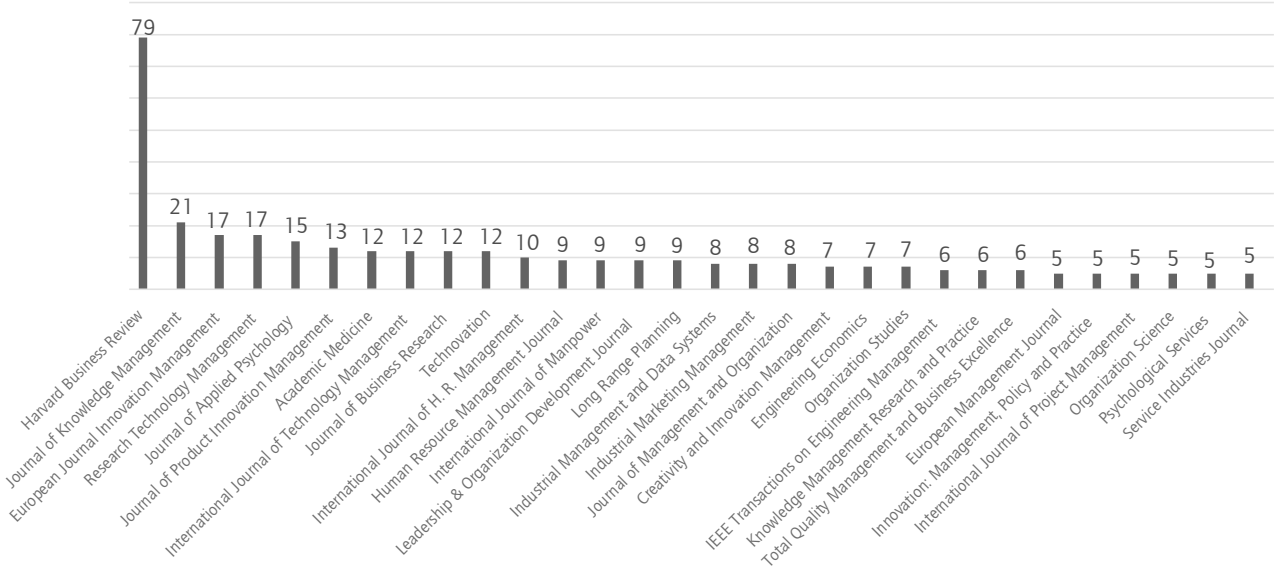

Figure 3. Innovation-related production by publication source. Source: authors.

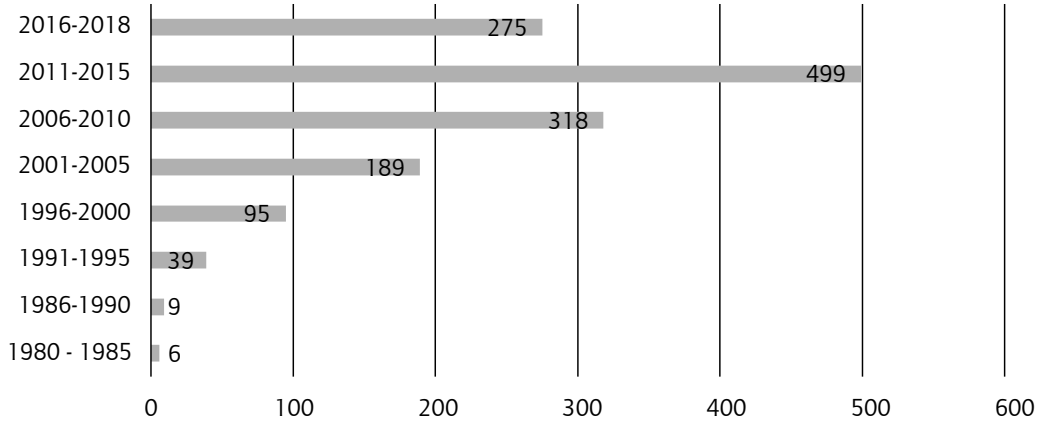

Figure 4. Article production in specific periods. Source: authors.

Place of studies and cooperation relationship between countries

The first research work in this area of study was developed in the United States, later detonating in the 1980s to other countries (Schein, 1988; Russell, 1989). Figure 5 shows both the countries of origin and the cooperation relationship between them in terms of the production of scientific articles. As observed, the United States is identified as one of the largest producers and focal points for collaboration. Similarly, in countries such as Australia, France, Finland, Germany, and China, cooperative relationships and the level of scientific production show the importance allocated to OCI.

Final considerations and conclusions

Discussion

Through a literature review and analysis, via the application of bibliometric techniques, this paper presents a broad analysis of relevant information to assist in the distinction of the lines of research —both past and present— in the constant search for the development and implementation of OCI.

The presented bibliometric analysis confirms that OCI has not been studied from a specific perspective, but there is rather a diversity of scientific disciplines addressing the topic, as well as the interactions between these fields of knowledge when studying OCI in search for its proper implementation and development. Grounded on these findings, we could establish that OCI-related research is not monodisciplinary in nature.

From the perspective of OCI development, related areas of science address the same topics, although obtaining different results. Likewise, it has been possible to understand how the concept of OCI is useful to understand the relevance of deploying dynamic capabilities in the development of innovation, since learning can come from both outside and inside the company.

In general, our results show that innovation is related to all areas of science, as a crucial factor for the development of OCI.

Theoretical implications

It has been possible to verify the performance of bibliometric indicators when applying them as a practical and objective method in the analysis of large volumes of information and for the specific extraction of data, which can be reproduced and used, thus providing reliability in the analysis of statistical studies. In this case, the use of bibliometric indicators allowed obtaining the lines of research followed by different areas of knowledge in favor of the implementation of OCI as an organizational development strategy in the constant search for competitive advantages.

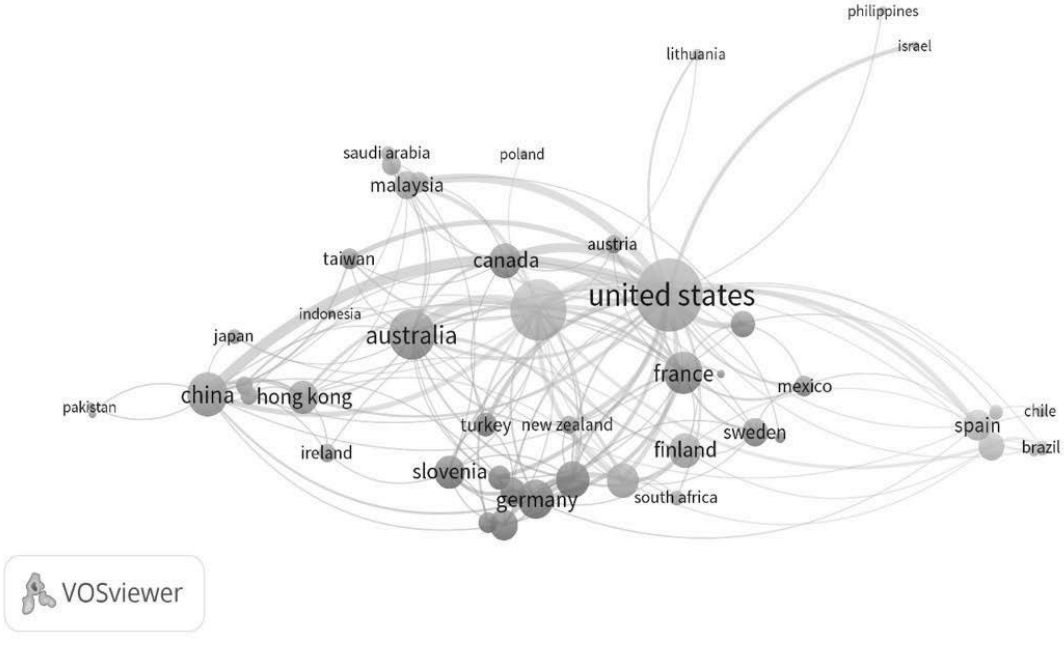

Figure 5. Cooperation relationships among countries. Source: authors.

Furthermore, numerous studies recognize the influence of OC as one of the main factors to foster the ability of organizations to innovate. That is why OCI has become an imperative entity of development within companies, since it promotes sustained innovation and generates competitive advantages, regardless of the business sector.

Among the contributions of this research to the related literature, we could first mention the multiple analysis made to OCI concepts contributed by various researchers over time. This shows that values, team spirit, and trust between workers and senior management are vital in the implementation of this essential culture, as these attributes encourage workers to be proactive and deliver their creativity to increase the level of the company's distinction.

Secondly, it was demonstrated that the analyzed articles have derived from different research areas of science, so they can be considered as not mono-disciplinary works. Through the topological data analysis implemented, the keywords, and the areas of science, it is possible to confirm that these inputs correspond to inter-or-multidisciplinary works, since at least three disciplines related to the keywords obtained are involved.

Additionally, favoring the most effective implementation of OCI, we have been able to detect the main lines of research followed by the different areas of science covered in this research work, starting with management, which is the discipline researchers mainly focus on the constant search for the implementation and development of this type of culture.

Studying the ideal OC is another essential line of research, as it could contribute to the spread or building up of the capacity for innovation, the analysis of cultural barriers, and the study of the relationship between OC and innovation —which has triggered this type of culture— and of dynamic capabilities, through which OC aims to grasp external knowledge and apply it for the development of new products or services, thus capitalizing the acquired knowledge.

Based on the results obtained from the keywords and their relationship with different areas of science, we can state that the principal research trends in favor of the development of OCI are innovation, organizational culture, the culture of innovation, and administrative innovation.

The methodological technique developed for this work shows low participation of co-authorship, resulting in a general index of 2.26 authors/work. Nevertheless, cooperation between researchers from different countries is constantly growing, as we observe a prominent level of scientific collaboration between countries that denotes maturity and professionalism by the analyzed subject matter, due to the development of a principal co-authorship link where authors connect through collaboration in the preparation of scientific research articles.

In conclusion, through the application of bibliometric techniques, it is possible to approach specific research topics by employing empirical analyzes applied to diverse statistical and programming techniques for the management and representation of the obtained data. Then, the importance of the implementation of OCI as a catalyst and central piece for the development of competitive advantages in companies has been confirmed.

Disclosures

Authors declare no institutional or personal conflicts of interest.

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