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VISUALIZACIÓN GENERAL DE LAS CAPACIDADES DINÁMICAS: BASADO EN UN ANÁLISIS BIBLIOMÉTRICO

GENERAL VISUALIZATION OF DYNAMIC CAPABILITIES: BASED ON A BIBLIOMETRIC ANALYSIS

Bio. Cindy Paola Garay Suárez[*], PhD. Álvaro Santamaría Escobar[*], MSc. Jhon Pablo Martínez Benítez [*], Bio. Dani Daniel D´luis Flórez [*], Adm. Marisol Monterroza Guzmán [**]

[*] **Universidad de Sucre,** Facultad de Ciencias Económicas y Administrativas, Maestría en Administración de Empresas.
Sincelejo, Sucre, Colombia.
Tel.: +57 321 8900978.
E-mail:{cindy.garay, alvaro.santamaria, jhon.martinez, dany.dluis}@unisucre.edu.co
[**] **Universidad de Sucre,** Oficina de Aseguramiento de la Calidad Académica, Sincelejo, Sucre, Colombia.
Tel.: +57 323 3975343, +57 310 4048615.
E-mail: marisolmonterrozag@hotmail.com

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Abstract: The scientific production related to dynamic capacities is analyzed through the bibliometric analysis carried out from documents retrieved from the SCOPUS database corresponding to the period 2017-2020, implementing a quantitative methodology of co-words and in the representation of the relationships between words or terms through bibliometric maps using the VOSviewer software. The completion of the improved study resulted in visualizations of thematic structures in the research areas of dynamic capacities, allowing the identification of nine (9) clusters that define the main research currents. The maps reveal that, in the period analyzed, there is a consolidated macro-line of research, which includes studies on dynamic capacity, adaptability, integration, reconfiguration, strategy, strategic planning, teamwork, transformation, absorption capacity, adaptability, capacity innovation, financial performance, new product development, organizational culture, productivity, resilience, flexibility strategy, among others; However, globally, especially in Latin America, there is an incipient investigation regarding specific Dynamic Capacities; in this case those related to the management of human talent. Likewise, a consolidated research axis has been identified in management sciences. A future construction of bibliometric maps is proposed, with other databases in a comparative way that allow analyzing the CDs from their constituent elements, as well as their evolution

Keywords: dynamic capabilities, bibliometrics, cluster

Resumen: Se analiza la producción científica relacionada con capacidades dinámica mediante el análisis bibliométrico realizado a partir de documentos recuperados de la base de datos SCOPUS correspondientes al período 2017- 2020, implementando una metodología cuantitativa de similitudes y representación de relaciones entre términos o palabras mediante mapas bibliométricos usando el software VOSviewer. La realización del estudio logró como resultado las visualizaciones de estructuras temáticas en las áreas de investigación de capacidades dinámica, permitiendo la identificación nueve (9) clusters que definen las principales corrientes de investigación. Los mapas revelan para el período analizado, una existencia de macrolínea de investigación robusta, que encierra trabajos sobre capacidad dinámica, adaptabilidad, integración, reconfiguración, estrategia, planeación estratégica, trabajo en equipo, transformación, capacidad de: absorción, adaptación, innovación; rendimiento financiero, desarrollo de nuevos productos, cultura organizacional, productividad, resiliencia, estrategia de flexibilidad, entre otros; sin embargo a nivel global, en especial en Latinoamérica, se muestra una incipiente investigación respecto a Capacidades Dinámicas específicas; en este caso las relacionadas con la gestión del talento humano. Asimismo, se identificó un eje de investigación consolidado en las ciencias de gestión. Se propone a futuro construir mapas bibliométricos, con otras bases de datos de forma comparativa que permitan analizar las capacidades dinámicas, sus elementos constituyentes y su evolución.

Palabras Clave: dynamic capabilities, bibliometrics, cluster

1. INTRODUCTION

The exploration and characterization of scientific findings from authors, citations, journals and lines of research are some key points in the different types of research, necessary to visualize the panorama of scientific development in a disciplinary field through the information collected in specialized databases. At this stage, it is possible to understand the evolution and structure in the area of knowledge of interest, thus finding a clear path when constructing new knowledge.

In this sense, the progress of scientific production on the topic of dynamic capabilities (DCs) is studied, as well as the relationship between the dynamic capabilities of absorption, organizational learning, adaptation and innovation, with the Strategic Management of Human Talent and the impact of these on business performance; the above in support of the refinement of the theoretical and methodological basis of a case study (Figure 1).

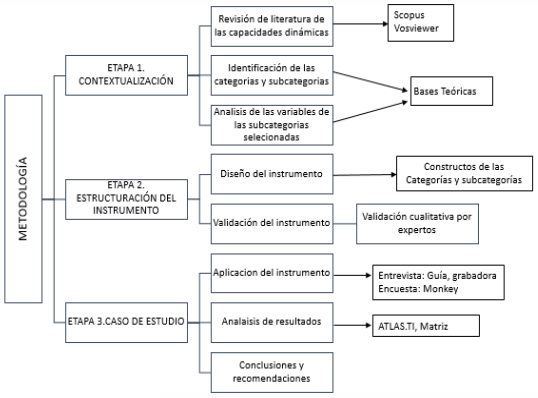

Fig.1. Methodological Route
Source: Prepared by the authors, 2022

Additionally, this work is based on what was presented by Moreno and Guerrero (2019), in which they propose the elaboration of bibliometric maps, based on databases such as Scopus, to study dynamic capacities from their constituent elements and evolution in different periods; as well as their understanding from different areas of knowledge and the relationship between them (Moreno et al. 2019).

It should be noted that, since the publication of the theoretical precursors of dynamic capabilities, Teece, Pisano & Shuen (1997), a series of perspectives have emerged, which support or

criticize these positions, which has enriched the concept of dynamic capabilities.
That said, when addressing the definition of dynamic capabilities, Teece (2014) points out that "they involve the activities of the highest strategic level that allow the company to direct its ordinary activities towards superior performance to respond and adapt to highly competitive environments based on innovation, prices and quality in goods and services." "The formation of these capabilities is defined through a set of activities that promote the processes of adaptation, change and integration of the organization" (Aguilar and Yepes, 2006).

For their part, Zahra et al. (2006) emphasize that dynamic capabilities in a company help change its day-to-day operations. In this same idea, Winter (2003) explains that "dynamic capabilities operate to expand, modify or create ordinary skills in the long term." These skills that the organization possesses are materialized in its leaders,They facilitate and manage the process of innovation, creation, change or reconfiguration of their resources and capabilities, and include the development of the strategic activities necessary for the organization to achieve an adequate level of adaptation to dynamic and environmental changes, which allows it to function to obtain advantages over time and sustainable competitive advantages.Organizations must not only learn, absorb and internalize the knowledge and changes that occur in the external environment, but must also induce and encourage changes and innovations in the environment through accumulated knowledge.

However, within organizations, these recurring capabilities can become an obstacle; sometimes internal barriers arise., which prevents the organization from making changes to create new and more essential capabilities. This is why it is required that within theIn organizations, these enabling and driving capabilities are dynamic and long-term, allowing changes to emerge, which in turn lead to new practices, systems and procedures.

The study of dynamic capabilities covers a wide range of topics relevant to organizations, such as: executive and strategic management, human resource management, technological processes and innovation, organizational learning and knowledge management, leadership, entrepreneurship and business creation, competitiveness and organizational performance, research areas such as marketing, business internationalization, organizational networks and organizational design (Zapata and Zapata, 2018, p.2)

Some authors claim that HR of the future must emphasize an external/internal approach, which is essential to develop its ability to add value to organizations. Connecting Human Talent Management with the business context, in which the company operates, and with external stakeholders is vital. This approach goes beyond previous efforts to add value within the organization, and aims to meet the expectations of external stakeholders, including customers, investors, and the community (Ulrich and Dulebohnb, 2015).

For the above reasons, a school of thought has emerged in organizational theory that takes a more dynamic view of a firm's capabilities, understanding the term "dynamic" to expose an organization's ability to update and change capabilities, skills, business models, and resources to adapt to a constantly changing environment (Pavlou & El Sawy, 2011), which can drive the innovation process by building, integrating, and reconfiguring existing capabilities and resources (Helfat, 1997; Helfat & Peteraf, 2003; Davies & Brady, 2016).

All of this can be turned into innovation, and to increase competitiveness in this way, companies need to integrate interconnections in different areas and interactions with surrounding members of the business innovation ecosystem (Mendoza, 2016).

A recent common example in the globalized context, applied to the attention and materialization of the concept of organizational dynamic capabilities, is the ability or skill of organizations to face the environment, in this case to respond to difficult situations generated by the Covid-19 pandemic. The crisis, caused by shocks that simultaneously affected supply and demand and mutually reinforced each other, had several significant negative effects on the productive structure, including massive closures of companies, especially micro, small and medium-sized enterprises (MSMEs) (ECLAC, 2022).

As a result, it was noted that companies that managed to sustain themselves and continue successfully in this type of environment were those that demonstrated the ability to respond quickly and flexibly, often focusing on product innovation. This enabled companies to respond to changing

external conditions and also anticipate the evolution of the environment, allowing for the future viability of the organization. Despite the difficult times, some companies have grown stronger rather than experiencing declining sales and financial difficulties.

These companies may be a minority, but what they have in common is innovation, adaptability and business resilience, which are key aspects that have allowed them to be sustainable and successful in responding to the crisis. Many have specifically used technology as an integral part of their innovation processes.

In summary, dynamic capabilities involve the renewal and reconfiguration of an organization's internal resources and capabilities, as well as the development of external capabilities, while requiring timely responses, including the management and organizational processes necessary to implement strategies, innovate and adapt to a changing environment.

Therefore, the object of this work is structured in such a way that it allows us to analyze the evolution of research in the approach to dynamic capabilities in a globalized context. In this sense, it seeks to help establish a theoretical framework for the study of dynamic capabilities for the achievement of organizational goals. Everything depends on the availability and characteristics of the capabilities of human talent.

2. MATERIALS AND METHODS

A quantitative approach was used based on the analysis of similarities and visualization of relationships between terms and words using bibliometric graphs. Qualitative analyses were performed on the resulting maps to identify the thematic and semantic structures of the scientific fields we intend to study.

For the construction of bibliometric maps, based on the quantitative approach, it is divided into several steps (Börner et al. 2003): a first step of information collection, a second step of selection of analysis units, a third step that includes calculation of co-occurrence frequency and similarity index of information units and finally a fourth step to find and visualize the corresponding analysis units on a 2D map. The VOSviewer software was used for data processing (Van Eck NJ, Waltman L. 20210), a bibliometric network visualization tool developed at the Center for Research in Science and Technology (CWTS), available on its website at http://www.vosviewer.com/.

For this study, the material used was extracted from the multidisciplinary database Scopus (2022), which uniquely combines a comprehensive, data-rich database of citations and abstracts with related scientific literature across multiple disciplines, relevant and authoritative research that is easily accessible, identifies experts, and provides access to trusted data, indicators, and analytical tools (Scopus file, 2022).

The search strategy used initially included the term dynamic capacity to manage human talent, however, the result of this exercise deviates from the main objective regarding the key words. The four (4) clusters returned are focused on topics of controlled studies in humans and study methods on load capacity, dynamic analysis, optimization, quality of service, inspiratory capacity, comparative study, nuclear magnetic resonance and magnetic resonance imaging, among others. For the above reasons, it was decided to consult the Scopus database for the term dynamic capacity.

To synthesize the responses, the possible graphical representations were pre-classified and analyzed to find possible intersections of interest for related terms, keywords, co-term networks and clusters.

Keywords were selected from the retrieved files, from the academic production of the indexed volumes of dynamic capacity in Scopus. The entries contain two types of keywords: a) Author Keywords (AKW), supplied by the author; and b) KeyWords Plus (KW+), provided by SSCI, considering the frequency of words in the reference title of the cited article. (Garfield E, Sher IH.1993).

KW+ were chosen in this work. These automatically derived units of analysis better show the dynamics of the scientific field because they are more modern, high-quality and specific terms than author keywords or those from other controlled vocabularies. For the representativeness of the sample of thematic groups, only KW+ with a frequency of ≥5 times (KW+ that appeared at least 5 times in the retrieved scientific results) were selected.

3. DATA INTERPRETATION AND ANALYSIS

The VOSviewer software has a function to group words according to their relationships, creating connections between subsets of words, which is done using a clustering algorithm, we used a resolution parameter with a value of 5 and generated nine thematic groups, in which the degree of similarity of the KW+ was evidenced (Moreno, et al. 2019).

After verifying and confirming the semantic similarity of the KW+ that make up the groups, each of the resulting topics was manually assigned a name. In total, 2,000 documents corresponding to the entire period 2017-2020 were retrieved. The resulting thematic groups are visualized with bibliometric maps and labeled bibliometric density maps (Figures 2 and 4).

Developing bibliometric maps according to Moreno et al. (2019), the interaction between KW+ is used. The creation of a map includes the following considerations:

1. The analyzed KW+ are grouped and represented on the maps.
2. The size of the cluster is determined by the number of KW+ in the cluster, the frequency of occurrences and its weight or similarity index.
3. The groups are each represented by a different color.
4. There is not a constant number of associated KW+ in the clusters and if the KW+ has a low similarity index it may appear reduced in size or as a watermark.
5. The central location on the map of the clusters or groups indicate greater interrelations between the keywords that compose them, while those located on the margins or edges indicate lesser interrelations between the KW+.
6. The magnitude of the KW+ mark is proportional to its frequency.
7. The group must be integrated with KW+ ≥5, and words that do not meet that range are shown separately on the map.

VOSviewer provided 964 keywords with a threshold of ≥5 co-occurrences per document, of which only the 20 with the highest link strength are shown in Table 1, observing that dynamic capabilities was the one with the most citations, being 947, followed by enterprise resource management with 339, and the dynamic capability keyword with 207 occurrences which is in third place of searched words. Regarding the link strength of the main keywords of this study, it can be determined that the link strength of the first word in Table 1 is 3802, the link strength of the second word is 2590 and the link strength of the third word is 786.

The above shows that the term dynamic capacity in the singular, the citations and the link strengths are lower compared to the keywords in the plural, this leads to a theoretical reference of dynamic capabilities that integrates various concepts and components of the CD models in the literature, such as the capacity for innovation and the capacity for adaptation.

Table 1: List of keywords by appearance importance and link strength

Keyword	Occurrences (Occurrences)	Total bond strength (Total Link Strength)
Dynamic capabilities	947	3804
Enterprise resource management	339	2590
Dynamic capability	207	786
Industrial management	115	963
Innovation	162	846
Competition	90	765
Competitive advantage	103	613
Sustainable development	70	519
Information systems	58	459
sustainability	62	348
Knowledge management	54	344
Commerce	38	338
Information use	34	309
Decision making	42	307
Firm performance	63	271
Asynchronous generators	27	266
Resource-based view	53	256
Digital transformation	37	255
Supply chains	28	251
Article	35	249

Source: Prepared by the authors based on the VOSviewer 2022 program

Labeled bibliometric maps are obtained as a result of calculating the frequency of the concordance and similarity indices between KW+, the software runs the normalized measure called association strength, with which the clusters are generated, which determines their size. Each group is characterized by a random color. This resulted in nine (9) thematic groups that identified key trends in the study of dynamic capabilities (Figure 2).

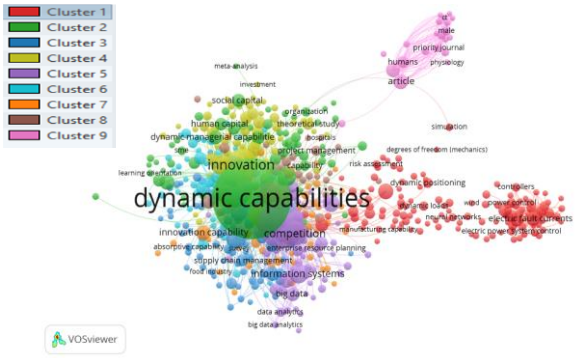

Figure 2. Clusters resulting from the Network of keywords in scientific publications on Dynamic Capacity.
Source: Generated in the VOSviewer program from the Scopus database (2022)

• Cluster 1 (red). There are 123 articles in this group and the KW+ with the highest similarity index are: dynamic capacity, dynamic capabilities, artificial intelligence, analytical capacity, dynamic evaluation, efficiency, dynamic models, among others.

• Cluster 2 (green). This cluster grouped 71 items, with the most relevant indexed keywords such as: adaptability, capacity model, covid-19, dynamic capacity, integration, reconfiguration, strategy, strategic planning, teamwork, transformation, among others.

• Cluster 3 (blue): 68 items included in this group, the KW+ with the greatest weight were: absorption capacity, adaptation, adaptability, innovation capacity, financial performance, development of new products, organizational culture, productivity, resilience, flexibility strategy among others.

• Cluster 4 (yellow). This cluster grouped 65 items, with KW+ such as: ambidexterity, business, exploration, exploitation, green dynamic capacity, innovation, product innovation, among others.

• Cluster 5 (purple). This cluster grouped 57 items, with KW+ such as: Big data, competition, data analysis, empirical studies, marketing capacity, operational capabilities, among others.

• Cluster 6 (sky blue). This cluster included 56 items, such as: business model, digitalization, disruptive innovation, digital transformation, capacity development, stakeholders, among others.

• Cluster 7 (orange). This cluster includes 46 elements, such as: absorption capacity, business strategy, reconfiguration capacity, learning capacity, among others.

• Cluster 8 (coffee). This cluster grouped 28 items, KW+ were identified as: case study, capabilities, sales, public sector, business performance, competitive advantage, among others.

• Cluster 9 (pink). This cluster grouped 21 items, KW+ were identified as: future studies, reproducibility, qualitative research, physiology, among others.

In cluster 9, the set of keywords thrown up are far from the field of study that is intended to be carried out.

Figure 3 shows the keyword network again, but from a timeline perspective that reflects the development of research on dynamic capabilities, the data obtained from the WOS database show the results of research for the period 2019-2020. Some of the study topics visualized in this figure have been discovered in recent years: dynamic capability, competition, absorptive capacity, dynamic innovation capability; each of these terms shows how this line of research continues to permeate the different foundations in contemporary times and the current state of dynamic capability worldwide.

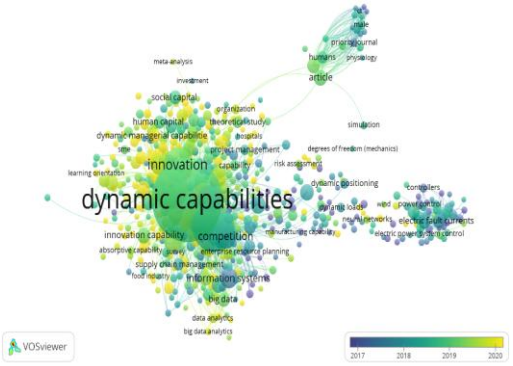

Fig. 3. Contemporaneity and current state of dynamic capacity at a global level.
Source: Generated in the VOSviewer program from the Scopus database (2022)

In the density map (Figure 4), the VOSviewer program shows the intensity of work that each of the keywords has according to the number of times it appears in the documents examined. The colors indicate which are the most used keywords, red indicates the keywords with the greatest intensity and blue the least researched keywords, thus exposing the information so that the most

important topics can be clearly seen on the map (Fergnani, 2019; Van Eck and Waltman, 2010).

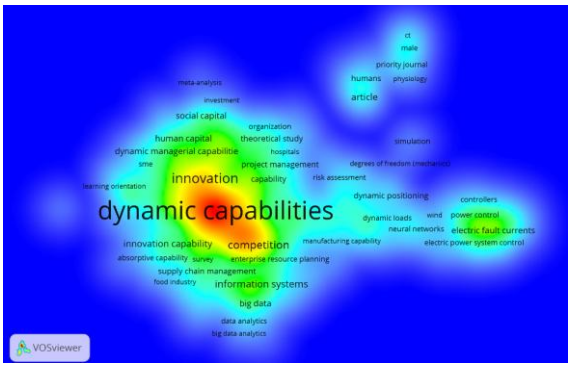

Fig. 4. Keyword density in scientific publications on Dynamic Capacity
Source: Generated in the VOSviewer program from the Scopus database (2022)

At another level of analysis, it is important to highlight the countries with the most research on this topic, these are: China, the United States (with the highest density), Italy, France, Taiwan, South Africa, Japan, Australia, Spain, Brazil, Croatia, among others (Figure 5). From Latin America, Colombia, Chile and Peru are located, which are concentrated in the blue color, which allows us to infer that there is little research on the subject.

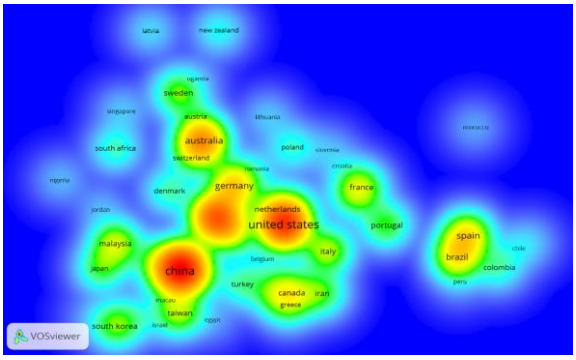

Fig. 5. Density of countries with scientific publications on Dynamic Capacity
Source: Generated in the VOSviewer program from the SCOPUS database (2022)

The last map referred to in this paper (Figure 6) represents the main group; from this map it is important to analyze how the DCs are closely related to their theoretical predecessors, and how innovation, organizational learning, absorption and adaptation are part of this perspective at a strategic level in response to the constant changes in the environment.

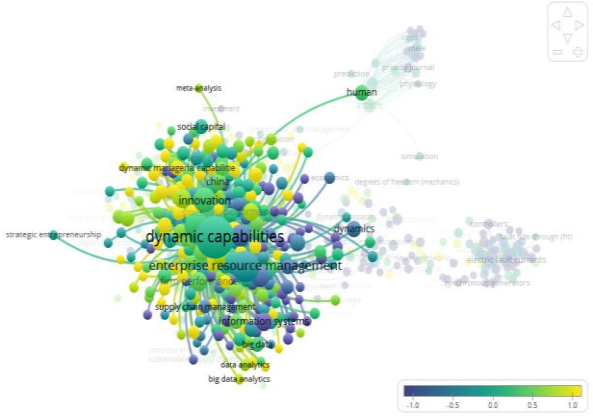

Fig. 6. Cluster of dynamic capabilities CDs
Source: Generated in the VOSviewer program from the SCOPUS database (2022)

4. CONCLUSIONS

Through the visualization results obtained, it is possible to have an understanding of the structure related to the topic of the research directions of the most important dynamic capabilities 2017-2020. From the visualization of labeled bibliometric maps, several conclusions can be drawn. First, the map shows in the analysis window, a solid macro line of research, which covers the works on dynamic capacity, adaptability, integration, reconfiguration, strategy, strategic planning, teamwork, transformation, adaptation capacity, absorption capacity, innovation capacity, financial performance, development of new products, organizational culture, productivity, resilience, flexibility strategy, among others; however, at a global level, research in some Dynamic Capabilities is still incipient, especially in Latin America; this is the case of the dynamic capacity of financial management and those related to human talent management.

From the results analyzed in the bibliometric density map, it was clearly observed that the keywords located in the central part of the map are the most relevant. The color of the clouds represents the strength of the relationship of the keywords in each area of the map. Likewise, the areas in which the most weighted keywords are grouped with the highest frequency of similarities were identified. Therefore, the allegory of density is useful in visualizing the panorama of the most important keywords according to the research trends represented. Therefore, a relevant research front depends on the number of topics within that group and the density of these topics.

A number of closely related phrases can be identified, a relationship that shows how dynamic capabilities are becoming an integral line of research in management science. This line is part of the development of an organization's strategy due to changes in the environment or globalization.

In the future, it is proposed to build bibliometric maps, using other databases in a comparative manner, in order to analyze the perspective of dynamic capabilities both in their constituent elements and in their evolution. This allows for an understanding of how research has developed in the different fields of knowledge, as well as the network of relationships between them.

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