

Journal of Turkish Science Education

<http://www.tused.org>

© ISSN: 1304-6020

Intellectual Capital and Competitive Advantages in Higher Education Institutions: An Overview Based on Bibliometric Analysis

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ABSTRACT

In a knowledge economy, the generation of competitive advantages in Higher Education Institutions (HEIs) is based on intangible assets of Intellectual Capital (IC) such as quality in teaching, research, innovation, image, reputation and relationship with stakeholders. This knowledge area has aroused the interest of HEIs managers and the government. Several studies have been carried out to analyze how IC contributes to the generation of competitive advantages in different contexts. However, few studies have been applied to HEIs. The study aims to fill this gap by providing a knowledge map and evaluating the performance of scientific productions about IC contribution to the generation of competitive advantages in HEIs. Also, we want to establish the scientific evolution of the specialized literature by conducting a bibliometric meta-analysis. We analyzed 104 publications retrieved from the Scopus database. Indicators of productivity (Pareto Law, Lotka Law and Price's Law), quality (Impact, h-index), structure (Co-occurrence and cluster) and historical (Trends, Lexis Diagram) were analyzed. The results propose economic and market valuation for intangible assets in HEIs. Finally, three clusters emerged: competitiveness management; knowledge management and IC; and institutional positioning and relationship with stakeholders.

ARTICLE INFORMATION

Received:

21.05.2021

Accepted:

11.04.2022

KEYWORDS:

Bibliometric, competitive advantage, Higher Education Institutions, intellectual capital.

To cite this article: Marulanda-Grisales, N. & Vera-Acevedo, L.D. (2022). Intellectual capital and competitive advantages in higher education institutions: an overview based on bibliometric analysis. *Journal of Turkish Science Education*, 19(2), 525-544.

Introduction

The execution of mission activities in Higher Education Institutions (HEIs) implies the use of a series of assets that can be tangible or intangible. Knowledge is among intangible assets, it is reflected through intellectual capital (IC) and becomes the basis for the creation of competitive advantage (Villegas, Hernández, & Salazar, 2017; Yaseen, Dajani, & Hasan, 2016). The intangible assets of IC include skills, brand, service quality, human resources quality, software, supportive infrastructure, quantity and quality of information processed, access to credit, generation of alliances, capacity for dialogue, trust, reputation (Ali et al., 2021; Peirano, 2014); consumer retention, teamwork with suppliers, routines and organizational culture (Jayabalan et al., 2021). From this perspective, the above assets are part of three main components: human capital, structural capital, and relational capital (Boj, Rodríguez-Rodríguez, & Alfaro-Saiz, 2014; Bueno et al., 2016; Leitner et al., 2014; MERITUM, 2002; Zhang, Qi, & Guo, 2017).

Human capital is understood as the set of knowledge, skills and experiences that cannot be separated from their owner, and it becomes a central driver of organizational performance and value creation for companies (Bueno et al., 2016; MERITUM, 2002; Bontis & Mention, 2013; Quintero-Quintero et al., 2021). Structural capital refers to intangible resources and activities that allow knowledge to be formalized and preserved within organizations, such as culture, structure, processes, intellectual property, and information systems (Boj et al., 2014; Bueno et al., 2016; Jayabalan et al., 2021; Leitner et al., 2014). For its part, relational capital allows to absorb, exploit and explore new knowledge from the environment to obtain and sustain positions of competitive advantage. It includes assets such as reliability and image (Kumar, 2020; Mehralian et al., 2013).

There is a growing interest in applying IC management in HEIs management (Leitner et al., 2014; Machorro et al., 2016; Secundo et al., 2017). IC in HEIs is important because its inputs, processes, and results are intangible assets related to knowledge. HEIs also have the responsibility of contributing with their CI to the development and implementation of technical knowledge in the community (Limonés-Meráz et al., 2021). The measurement and management of these intangible assets affects the performance of HEIs, clients, staff and the community in general (Machorro et al., 2016). Therefore, to carry out the evaluation of the IC in a university, it is recommended to review each Institution of Higher Education Strategic Plans (Secundo et al., 2017).

HEIs today are operating in a highly competitive environment characterized by new demands and aspirations of various stakeholders, such as an adequate use of public resources and the implementation of a new paradigm of research production characterized by interdisciplinarity, application of knowledge, and intensification of the relationship between industry and academia (Veltri, Mastroleo, & Schaffhauser-Linzatti, 2014). Taking into account that IC management in HEIs is based on the fact that the production and dissemination of knowledge can contribute to its performance and competitive advantage (Galleguillos-Cortés, Silva-Muna, & Becerra-Muñoz, 2018), the generation of competitive advantages in HEIs can be given through image, brand, knowledge transfer and efficiency in operations (Hu, Hou, & Chien, 2019); quality of service and student satisfaction (Panda et al., 2019); and University Social Responsibility that allows increasing student loyalty, enrollment, and retention rates (El-Kassar, Makki, & Gonzalez-Perez, 2019).

Thus, assessing which assets are essential for a HEI in a way that improves performance and competitiveness becomes relevant (Anggraini, Abdul-Hamid, & Azlina, 2018); also, grouping skills, resources and assets into capacities that allow it to quickly adapt to market opportunities and demands (Mahdi, Nassar, & Almsafir, 2019); this process becomes a key factor in creating competitive advantages at HEIs (Britto et al, 2019).

Based on the above, the purpose of this research is to analyze and compare academic production trends about the contribution of IC to the generation of competitive advantages in HEIs. HEIs are exposed to pressure from various stakeholders to achieve excellence in performance and competitiveness. Therefore, HEIs must identify those factors that affect their competitiveness. Under the knowledge economy, IC has become the main source of competitive advantage for HEIs (Martínez-Campillo & Fernández-Santos, 2020). In order to achieve competitiveness in the global educational market, HEIs require transformations in management approaches at the national and institutional level by including aspects of marketing, branding, modernization of the educational process, internationalization of research, improvement of physical infrastructure and organization of leisure spaces for international students (Kholiavko et al., 2020). The above elements are intangible assets of intellectual capital. It is necessary to identify the relationship between IC and its contribution to the generation of competitive advantages by analyzing the content of the publications in the study field.

We used as a methodology data processing or meta-analysis (Yang & Meng, 2019). Meta-analysis provides an overview of trends and guidelines for future research (Campos et al., 2020). Also, Meta-analysis determines the existence of relationships and networks in a specific area of study from the review of scientific papers (Wiese & Steinmann, 2020), subsequently, a bibliometric analysis will be carried out in order to show research trends and relevance of academic publications (Ben-Daya

et al., 2019). Bibliometric analyzes are effective ways of evaluating and monitoring dynamic changes in research topics in a given field of study (Lacka, Chan & Wang, 2020) through graphic visualization of networks, productivity and impact for publications.

Several studies have been carried out to analyze how IC contributes to the generation of competitive advantages in different contexts. These contexts include SMEs (Jardon & Martos, 2014); technology-based companies (Bueno et al., 2016); and government enterprises (Ali et al., 2020). However, there are some barriers to analyzing the relationship between CI and competitive advantages in HEIs (de Matos Pedro et al., 2020; Tjahjadi et al., 2019). The CI in HEIs is considered as a complex system (Akpinar & Ozer-Caylan, 2021). This system involves a large number of intangible assets, stakeholders, policies and planning strategies in HEIs (Barforoush et al., 2020). This behavior limits the identification, measurement, evaluation, and decision-making on intangible knowledge assets in HEIs (Jonkers & Eftekhari Shahrودي, 2021).

The present study aims to fill this gap by providing a knowledge map about perspectives, trends, citation patterns, and publication structure about IC contribution to the generation of competitive advantages in HEIs. The study provides different points of view and future research directions about the importance of IC management policies in HEIs; value creation and competitiveness through knowledge transfer and innovation; and consolidation of collaborative networks with stakeholders in HEIs.

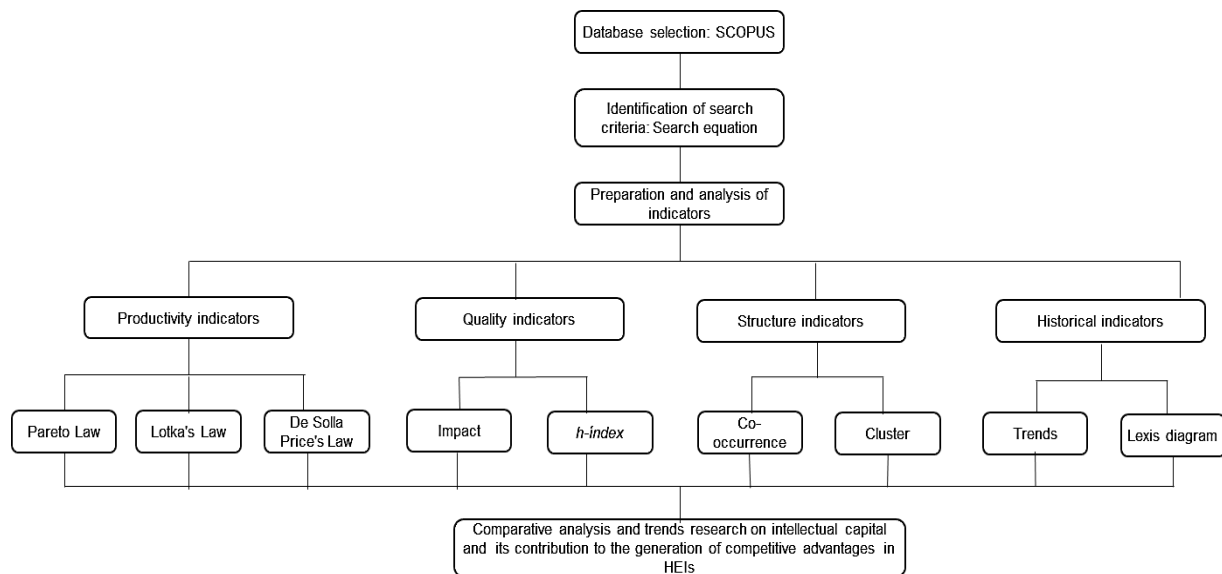
In this way, the first part of the document deals with the methodological design used; subsequently, research results based on indicators of productivity, quality, and structure are presented; finally, research trends and conclusions on intellectual capital and its contribution to generating competitive advantages in HEIs will be shown.

Methodology

Meta-analysis becomes an alternative to evaluate the growth and behavior of academic production (Jia, Hou, Wang, O'Connor & Luo, 2020). Meta-analysis is used to answer two questions: How common, robust and used is a research topic? and Which research trend has been effective? (Nakagawa et al., 2019). Bibliometric analysis is a technique for applying meta-analysis to know the state of the art of international scientific production. Bibliometric methods allow researchers to base their findings on aggregated bibliographic data on structure, social networks, and current interests in a specific study field (Zupic & Čater, 2015).

In turn, bibliometric analyzes allow identifying the flow and research trends in a study field. Bibliometry is a method that includes statistical analysis of published articles and their citations to measure their impact (Meditati et al., 2018). Bibliometric studies evaluate scientific production and have the potential to increase rigor and mitigate researcher bias in literature review processes. Also, this kind of studies allow to synthesize past research and compare academic production in a specific area of knowledge using indicators (Li, Lei & Cheng, 2020). Bibliometric analyzes use bibliographic information from online databases, which allows a scientific study and comprehensive vision of the area of scientific interest (Secinaro et al., 2020), furthermore, the increase in access to bibliographic information has increased the number of bibliometric reviews in different research areas.

To perform the bibliometric analysis (See Figure 1.), the Scopus database was selected as the main source of information to extract academic publications related to the contribution of IC to the generation of competitive advantages in HEIs. Scopus is recognized by experts as one of the best, most rigorous and most comprehensive bibliometric databases and repository of academic documents (Araújo et al., 2020; Fornacciari et al., 2017). The first paper on the subject was published in 1992. For this reason, information was collected between 1992 – 2020.

Figure 1*Methodological Design*

Based on the research purpose, the following search equation was developed:

Equation 1. Search equation for academic publications

TITLE-ABS-KEY(("competitiv* advantage" W/5 "higher education institution") OR ("competitiv* advantage" W/5 universit*) OR ("competitiv* advantage" W/5 "education") OR ("competitiv* advantage" W/5 "college*") OR (competitiveness W/5 "higher education institution") OR (competitiveness W/5 universit*) OR (competitiveness W/5 "education") OR (competitiveness W/5 "college*") OR ("core competenc*" W/5 "higher education institution") OR ("core competenc*" W/5 universit*) OR ("core competenc*" W/5 "education") OR ("core competenc*" W/5 "college*") OR ("core capabilit*" W/5 "higher education institution") OR ("core capabilit*" W/5 universit*) OR ("core capabilit*" W/5 "education") OR ("core capabilit*" W/5 "college*")) AND TITLE-ABS-KEY(("intellectual capital") OR ("intangible resourc*") OR ("intangible asset*") OR ("human capital") OR ("relational capital") OR ("social capital") OR ("structural capital") OR ("technological capital") OR ("organi?ational capital") OR ("innovation capital"))

Subsequently, a database was designed to analyze the necessary variables in the preparation, data recovery and elaboration of bibliometric indicators of productivity (Pareto Law, Lotka Law and Price's Law), quality (Impact, h-index), structure (Co-occurrence and cluster), and historical (Trends and Lexis Diagram). The academic publications on IC and its contribution to the generation of competitive advantages in HEIs available in Scopus up to May 2020 were taken as the analysis cut-off date.

Lotka's law expresses the relationship between authors and articles published in a study area over a given period (Lotka, 1926) (See Equation 2.). This law measures the contribution of information sources in the generation of academic publications (Abreu, Kimura, & Sobreiro, 2019; Kumar & Kushwaha, 2018; Da Silva et al., 2018).

Equation 2. Lotka's law

$$A_n = \frac{A_1}{n^2}$$

A_n = Number of academic papers corresponding to a certain number of authors; A_1 = Number of academic papers prepared by a single author; n^2 = Number of authors for whom Lotka's Law will be calculated.

Price's Law explain the exponential growth behavior for scientific production (De Solla Price, 1976; Kwiek, 2016; Yang & Meng, 2019), where publications increase with a regularity superior to other social processes and can be duplicated in periods of 10 to 15 years (See Equation 3.).

Equation 3. Price's Law

$$N = N_0 e^{bt}$$

N = Magnitude related to the size of science; N_0 = Magnitude in time $t = 0$; b = Constant relating the growth rate with the already acquired size of Science.

Pareto's law indicates 80% of total documents in a subject area are published by 20% of the authors of that area (Jisha & Selvaraju, 2020). Pareto's law allows describing the degree of contribution of each author to the total number of publications in the study area (Burghardt et al., 2020).

Regarding the quality indicators, the impact factor indicates the number of citations of a document, journal and universities (Ari et al., 2020) (See Equation 4.). The h-index allows analyzing the performance of researchers based on the quantity and quality of academic results (Lu et al., 2021). The h-index explains the relationship between the number of documents published by a researcher and the number of citations that these documents receive (Wynes et al., 2019). According to (Hirsch, 2005, p. 16569) "A scientist has h - index if h of his or her N_p papers have at least h citations each and the other ($N_p - h$) papers have fewer than $\leq h$ citations each".

Equation 4. Impact factor

$$I = \frac{C_j}{P_i}$$

I = Journal impact factor; C_j = Number of journal citations; P_j = Number of journal publications

The co-occurrence and cluster analysis was carried out using the VOSviewer 1.6.12 software. This analysis allows understanding the generation of networks or words' clusters by establishing the minimum number of occurrences of a keyword in a set of documents (Marcal et al., 2021). VOSviewer 1.6.12 allows creating a visual cluster map from the co-occurrences (Arias et al., 2021). We used a map based on bibliographic data; then we selected co-occurrence as type of analysis. Our unit of analysis was "keyword" and the minimum number of occurrences of a term were 3.

Finally, Lexis diagrams visualize common features as lines and mark additional elements such as key outcomes (Dahlin, 2020). Lexis diagram facilitates the visualization of information about the survival time of a study field (Stander et al., 2018). Lexis diagram shows information of three publications' generation, each generation is represented by a lifeline starting on the first publication date ($y = 0$) and growing up to publication generation's extinction, or extending to right border if publication generation is still active at data extraction. The 45-degree angle of the lifelines represents an equal time change along both axes in the Lexis diagram.

Results and Discussion

Bibliometric Productivity Indicators

Productivity indicators establish a connection between scientific agents and the products of their activity (Maltrás-Barba, 2003). Based on the count of publications, these indicators make it possible to characterize multiple aspects of research activity. Figure 2., shows the volume of publications on the interest subject. The erratic behavior in the volume of publications reveals the need to delve more deeply into it and address the identification of factors, models and strategies of intellectual capital that generate competitive advantages in HEIs. The previous situation allows establishing future research requirements such as development of new management models in HEIs (Miotto et al., 2020); simulation models and System Dynamics to address the relationship between intellectual capital, stakeholder requirements and competitiveness (Dieguez, 2019); economic and

market valuation for intangible assets in HEIs (Singh, Verma & Chaurasia, 2020); visualization and monitoring of intellectual capital through Technology Transfer Offices in HEIs (Secundo et al., 2019); and causality between categories of intellectual capital and generation of competitive advantages in HEIs (Indiyati, 2018).

Figure 2

Volume of Publications per Year

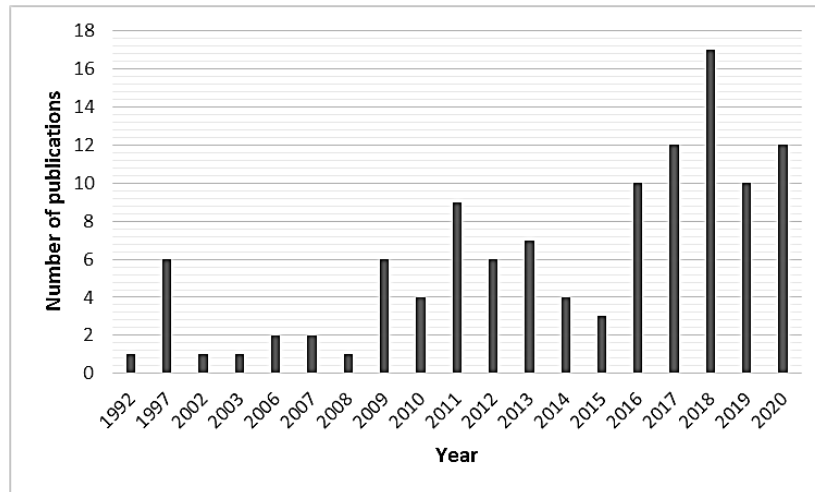
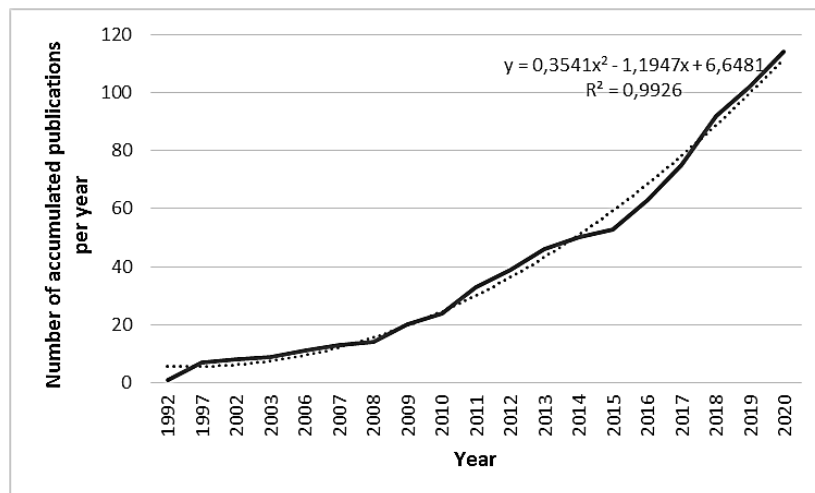


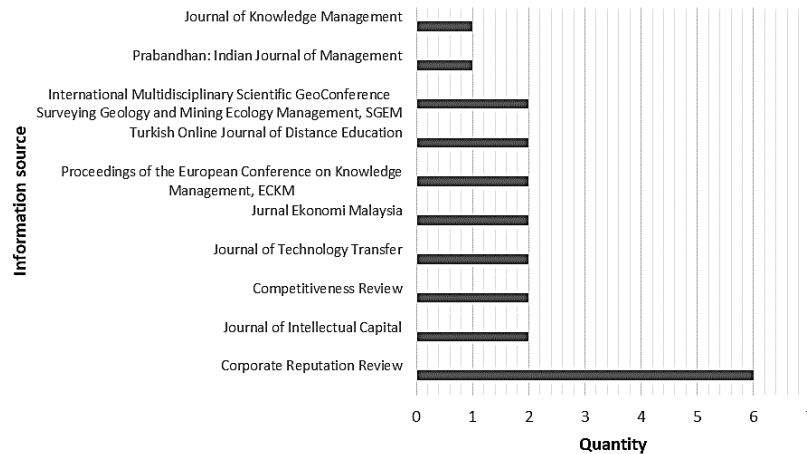
Figure 3, shows the accumulated proportion of publications on the subject of analysis. This figure exhibits a polynomial behavior of degree 2 that allows analyzing fluctuation, growth and decrease in the production of documents on IC and its contribution to the generation of competitive advantages in HEIs. Although sustained growth is observed in publications, this has not yet adapted to Price's Law.

Figure 3

Number of Accumulated Publications per Year

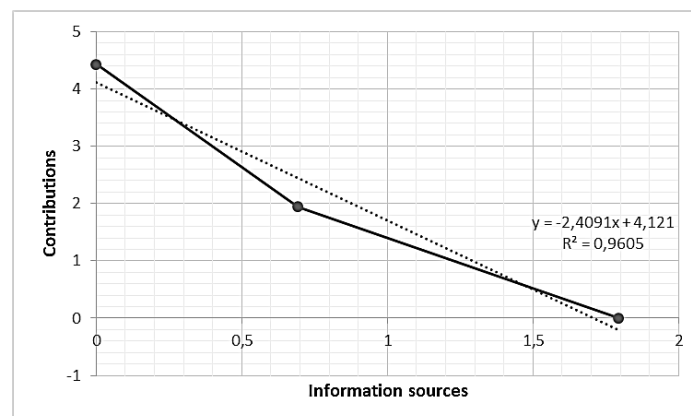


However, Figure 4. shows the first 10 information sources with the highest proportion of published documents on the research topic; the most representative source is *Corporate Reputation Review* (6 documents), this magazine publishes documents on the relationship between corporate reputation, strategic positioning, image identity, brand, valuation, and performance in different organizations.

Figure 4*Information Sources with the Largest Number of Publications in the Study Area*

Pareto Law was used as an alternative analysis for productivity in information sources; 20% of sources are expected to publish 80% of documents, however, it was found that 77.2% of the information sources publish 80% of the documents. When dividing the productivity of sources by quartiles, it was obtained that 15.2% of the sources publish 25% of the documents (Q1), 43.5% publish 50% (Q2), and finally 71.7 % of the sources publish 75% of the documents. Based on the above, there is no evidence of a source of information predominating significantly with respect to the number of publications on IC and its contribution to generating competitive advantages in HEIs.

The productivity of information sources can also be evaluated using Lotka's Law (See Figure 5). The information sources comply with Lotka's Law if the slope of the trend line approaches -2 and the determination coefficient approaches 1 (Rau, 2011); this is how the individual productivity of information sources complies with the law because the slope is -2.091 and the coefficient of determination is 0.9605.

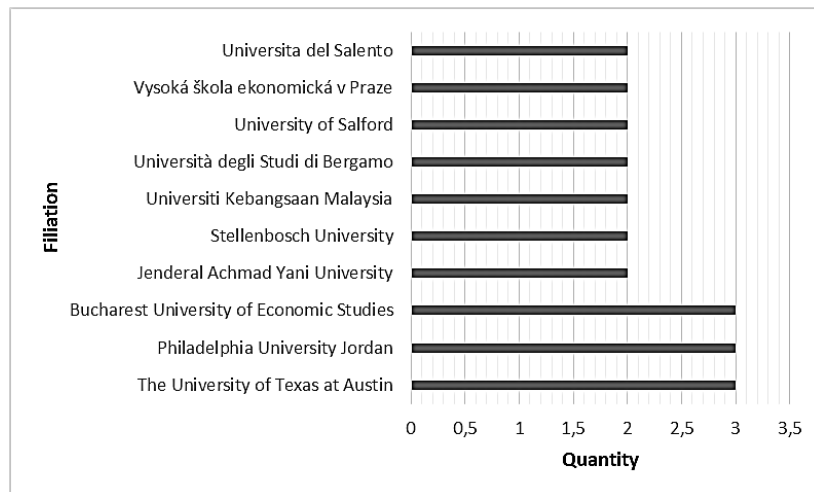
Figure 5*Lotka's Law on Journal Productivity*

The bibliometric indicator productivity by affiliation (See Figure 6.), indicates the number of publications in the study area produced by 139 institutions. Of these, 76.9% produced 80% of documents in breach of the Pareto Law. Regarding quartiles, 13.67% of institutions publish 25% of documents (Q1), 42.4% publish 50% (Q2), and 71.2% publish 75% (Q3). In this way, it is necessary to

increase academic networks that strengthen academic research and production on the subject of interest, since the institutions located in the first five places produce 14.28% of publications. Thus, the institutions with the highest number of publications are Bucharest University of Economic Studies, Philadelphia University Jordan, and The University of Texas at Austin, with 3 publications each.

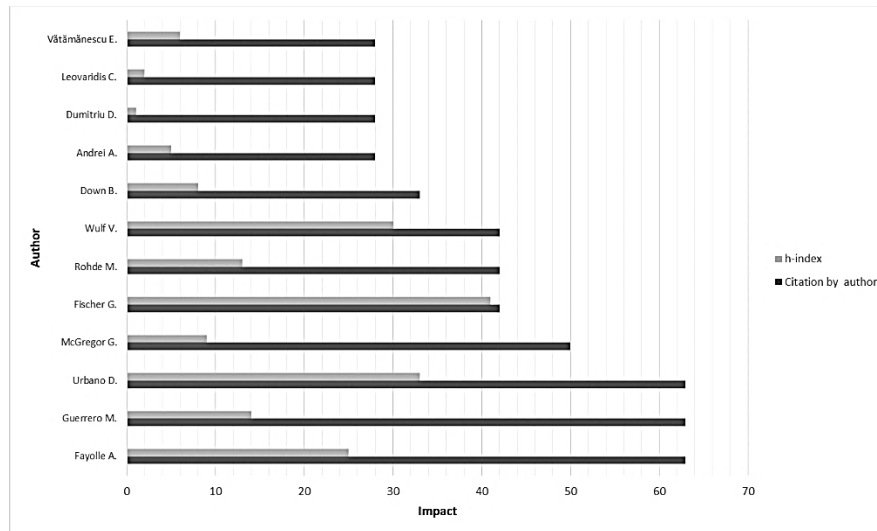
Figure 6

Productivity by Affiliation



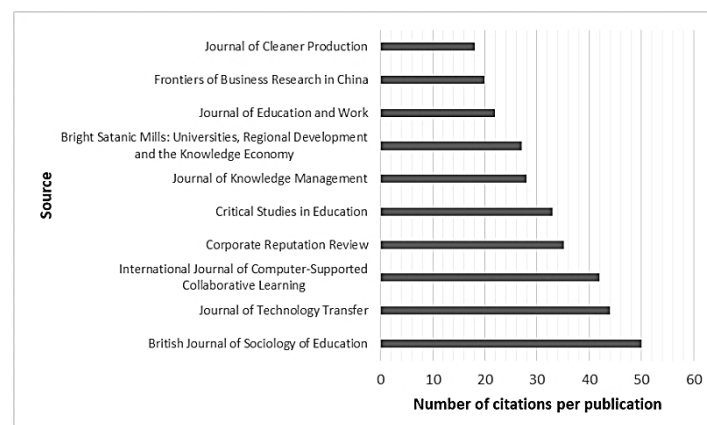
Bibliometric Quality Indicators

Quality indicators assess reputation, visibility and relevance for academic information sources and researchers (Osterloh & Frey, 2020; Velasco et al., 2012). It is possible to analyze the quality of the publications in a specific study area based on the impact factor by author or institutional affiliation, which allows differentiating the scientific value of the publications (Friess et al., 2020). The impact factor is one of several valid indicators for the evaluation of scientific journals, given its theoretical and statistical strength, in addition, it allows knowing applications, potentials and limitations; it is also a source of information that provides accurate and reliable data (Halevi & Moed, 2012). Similarly, there are other alternatives to evaluate the quality and impact of academic production, such as the *h-index* (Bar-Ilan, 2008; Li & Zhao, 2015; Sweileh, 2019). However, both indicators are time-dependent. This dependence can decrease visualization, transfer and citing of an academic paper. In this way, the author with the greatest impact is not always the most important author on study field. Figure 7., shows the 12 authors with the greatest impact on the research subject, general *h-index* for each of them. The authors with the greatest impact are Alain Fayolle, Maribel Guerrero and David Urbano with the document entitled "Entrepreneurial activity and regional competitiveness: evidence from European entrepreneurial universities".

Figure 7*Author's Impact*

It should also be mentioned that the Top 10 of most productive authors is not coordinated with the Top 10 of authors with the greatest impact; for example, Issa Mahmoud Shehabat is the most productive author with a total of 3 publications on the subject of study, however, he is ranked 82 in terms of impact with a total of 4 citations per publication. Therefore, it is important to develop alternatives that allow increasing the visibility of highly productive authors in the study area.

Regarding impact for information sources, the number of citations per publication in the study area is considered (See Figure 8.). The source of information with the highest number of citations per publication on IC and its contribution to the generation of competitive advantages in HEIs is the British Journal of Sociology of Education with a total of 50, the Journal of Technology Transfer appears as a second option with a total of 44 citations per publication, in third place is the International Journal of Computer-Supported Collaborative Learning with 42 citations per publication. Furthermore, it is important to analyze whether the sources with the greatest impact are the most productive. In the area of interest, the most productive source is *Corporate Reputation Review* and it ranks fourth in terms of impact (35.2 citations per publication). Similarly, the *Journal of Knowledge Management* is the second most productive source and the sixth with the greatest impact (28 citations per publication).

Figure 8*Journal Impact*

Bibliometric Structure Indicators

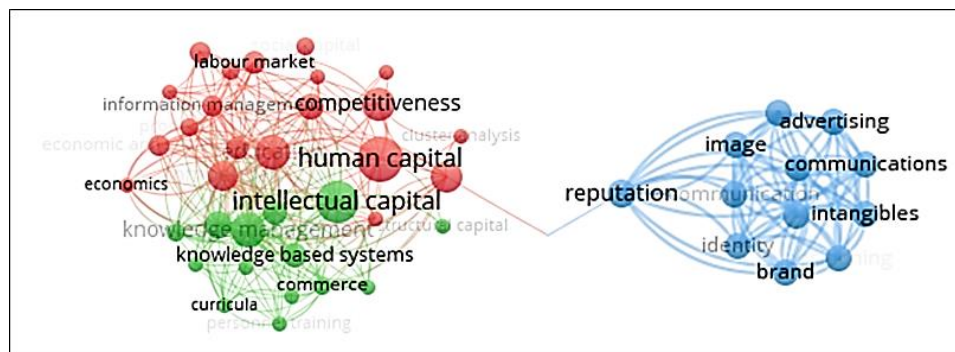
The structure indicators contribute to the recovery, visualization, analysis and representation of the relevance of stakeholders belonging to academic networks in various knowledge areas (Szkłarczyk et al., 2017; Tanaka & Sakata, 2016). Another alternative to analyze the structure of academic networks is the analysis of co-occurrence, this analysis shows the relationships generated between several keywords that coexist in different publication at the same time; the shorter the distance between two terms, the greater the number of co-occurrences (Redeker, Kessler, & Kipper, 2019).

Hence, Figure 9., shows the connection and clustering by co-occurrence of keywords among the 104 publications analyzed in the Scopus database. 482 keywords were obtained from the total of papers, 46 out of which met the requirement of at least three occurrences. 315 links showing the relationship between two keywords were generated. Thus, a Total Link Strength of 843 was created. The keywords with the highest intensity are linked to increased occurrence, in this way, the intensity for the most representative terms is the following: knowledge management (77), competitiveness (67), reputation (67), intellectual capital, advertising (66), brand (66), image (66), identity (66), intangibles (66), and stakeholders (66).

In addition, there are a total of 3 clusters that help define trends in IC research and its contribution to generating competitive advantages in HEIs: *Cluster 1 – Competitiveness management in HEIs* (43.5%); *cluster 2- Knowledge management and IC in HEIs* (30.4%); *Cluster 3 - Institutional positioning and relationship with stakeholders in HEIs* (26.01%).

Figure 9

Term's Co-Occurrence



Cluster 1 – Competitiveness Management in Heis

The publications belonging to this cluster extensively discuss the different alternatives to achieve competitiveness in HEIs. A common point is strengthening human capital (Singh, Verma & Chaurasia, 2019), this capital is essential to respond to new stakeholder demands based on individual learning and organizational performance. Other sources for creating competitive advantages in HEIs are entrepreneurship and technology transfer (Facey-Shaw et al., 2019); marketing, infrastructure and highly trained teachers (Gusta & Gusta, 2019); articulation between human, structural and relational capital through the third mission (Brusca, Labrador & Larran, 2018); teaching, employability, research, teaching, differentiation and strategic positioning (Saginova et al., 2018); and corporate culture, social responsibility and control mechanisms (Aleksandrova et al., 2018). However, to take advantage of the sources of competitiveness, it is necessary to modify strategic planning and management in HEIs.

Cluster 2 - Knowledge Management and IC in HEIs

The documents that make up this cluster evaluate the effect that knowledge management and IC management have on creating value and competitiveness for HEIs. These elements include strengthening core competencies in HEIs, especially those related to the quality of teaching staff (Chen, 2017); innovation, research and maturity of knowledge management systems (Tkachenko, Rogova & Karlik, 2017). The use of information and communication technologies such as a smartphone is also important (Putranta et al., 2021). It is clear that the core competencies in HEIs vary based on the market and community in which they operate. Also, competitiveness in HEIs depends on IC exploitation policies and practices in academic networks (Vătămănescu, Andrei, Dumitriu & Leovaridis, 2016). The IC is the central component of HEIs performance in the knowledge economy; IC allows creating value and competitiveness through knowledge transfer and innovation (Çavusoglu, 2014). The creation of value and competitiveness in HEIs based on IC requires the design of IC management tools and integration with institutional strategic objectives (Brusca, Labrador & Larran, 2018).

Cluster 3 - Institutional Positioning and Relationship with Stakeholders in HEIs

This cluster includes publications in which the incidence of stakeholders in IC management in HEIs is highlighted. Stakeholders at HEIs include government, family, students, teachers, companies and sponsors (Mariani, Carlesi & Scarfò, 2018) who need reliable information from HEIs. Particularly, internal and external stakeholders demand better HEIs results in terms of research, teaching, knowledge transfer, employability and community focus (Miotto et al., 2020). Another aspect to consider is the geographical proximity that facilitates knowledge transfer and strengthens the IC for HEIs and industry (Calcagnini, Favaretto, Giombini, Perugini & Rombaldoni, 2016), the interaction between HEIs and industry is closely related to IC, promoting collaboration, fostering innovation and creating competitive advantages (Bravo & Naquin, 2012). In addition, IC intangible asset management strategies such as identity, brand, and reputation strengthen long-term relationships with stakeholders (Maduro, Fernandes & Alves, 2018).

Historical Bibliometric Indicators

Figure 10., shows the evolution of research trends on IC and its contribution to the generation of competitive advantages in HEIs in the last 28 years. Thus, in the period between 1992 - 2000 publications focused on strengthening human capital formation and its contribution to economic growth in formal and informal work environments (Psacharopoulos, Arriagada & Velez, 1992). Furthermore, documents in this period highlighted the importance of intangible assets in creating sustained advantages and optimizing performance (Deephouse, 1997).

Figure 10

Evolution Trends in Research Study Area



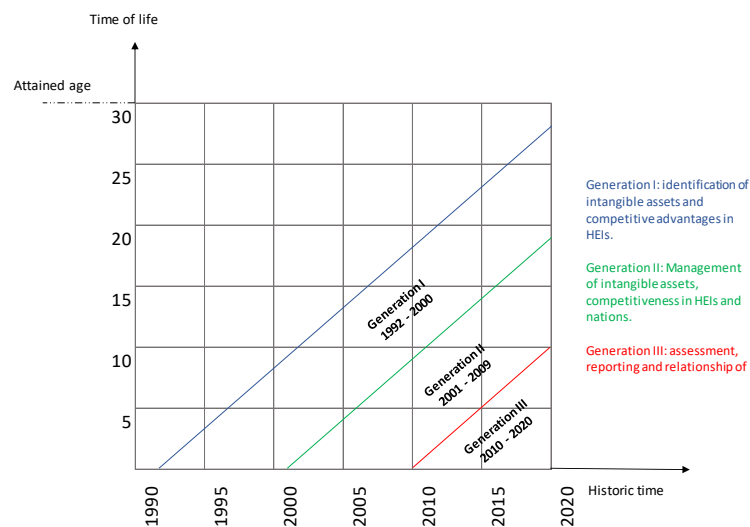
For the period from 2001 to 2009, aspects that include distinctive capabilities such as strategic intangible assets that generate competitive advantages in HEIs stand out (Foon, 2009); distinctive capabilities in HEIs can be functional, positional, cultural, or regulatory, they also highlight the need to renew educational policies that strengthen human capital and national competitiveness (McGregor, 2009). In a knowledge economy, the IC generated in HEIs expresses ideas, skills and expertise for wealth production in nations (Bejaković, 2006).

Finally, for the 2010-2020 period, published documents have focused on quality, management of stakeholder relations and leadership as sources of competitive advantages in HEIs; understanding HEIs as an organization sustainable in the long term (Yuniawan, Putri & Udin, 2017). The publications also highlight the use of reports, guides and indicators to assess the existing and potential intellectual capital in HEIs (Stukalova, Stukalova & Selyanskaya, 2016). Furthermore, given the high competition among HEIs, stakeholders demand transparency in the use of financial resources and better results in mission activities (Miotto et al., 2020).

Lexis Diagram is another alternative to analyze the historical evolution of publications in a specific area of study, it seeks to represent demographic phenomena in which the objects of study have a common characteristic (Dahlin, 2020), the common feature for this document is the lifespan of publications. In this way, the evolution of research trends on intellectual capital and its contribution to the generation of competitive advantages in HEIs can be grouped and identified based on the individualization of generations of publications (See Figure 11.). Generation I (1992-2000) includes all those documents that focus on the identification of intangible assets and sources of competitive advantage in HEIs. Generation II (2001-2009) focuses on the management of intangible assets and competitiveness for HEIs and nations. Finally, Generation III (2010-2020) involves assessment, reporting, relationship and leadership of HEIs based on IC.

Figure 11

Lexis Diagram



Conclusions

We used meta-analysis as a method that allows the researcher to analyze trends and relationships between multiple research results in a specific study field. There are five categories of meta-analysis: Simple text analysis; network analysis; data mining; semantics and bibliometric analysis. As shown throughout this paper, we selected meta-analysis in terms of bibliometric approaches as a tool to evaluate the quality of scientific production. The approaches are divided into three dimensions (a) descriptive or classical (Productivity indicators and structure indicators), b)

evaluative (Quality indicators), and c) historical (Historical indicators and trends). These dimensions show the growing interest in publications about IC assets that create differentiating characteristics and competitive advantages in HEIs. IC assets in HEIs include items such as quality in teaching, information systems, research, innovation, technology transfer, image, relationship with stakeholders, skills, brand, service quality, human resources quality, software, trust and reputation of the IES. Likewise, the publications in this study field can be grouped based on similarities, co-occurrences of keywords and cluster analysis.

The results of the paper show that quality indicators such as impact factor and h-index have theoretical and statistical solidity that allows us to know the quality of the information with accurate and reliable data. However, quality indicators by themselves do not allow a holistic view of academic production about the contribution of IC to the generation of competitive advantages in HEIs. Therefore, this analysis must be articulated with other indicators such as: productivity indicators (Pareto Law, Lotka's Law and Price's Law); structure indicators (Co-occurrence, cluster) and historical indicators (Trends and Lexis diagram).

Results show an increase in information sources, institutions and authors that generate publications on the selected topic. Furthermore, results show three clusters of interest for HEIs managers: competitiveness management, knowledge and IC management, and institutional positioning and relationship with stakeholders. Three generations that highlight the historical trajectory of the publications were also identified. The documents have focused on the adaptation of IC organizational management models, technology transfer and competitiveness, and IC management in HEIs. However, these models fall short because they do not characterize and efficiently value resources, capacities, and competences in HEIs. Hence, a latent need is to develop models of IC management and competitiveness in HEIs.

Regarding the contribution of research, it is observed that the main contribution is the identification of research trends in publications about the contribution of IC to generation of competitive advantages in HEIs. In a knowledge-based economy, IC management in HEIs is an opportunity for institutional improvement that requires further research and development as it involves major transformations in organizational structure, policies, plans, strategies, resource management, identification of differentiating assets and relationships established with different stakeholders. Based on the above, research trends in the selected study field are grouped based on structure indicators and historical indicators. Regarding structure indicators, the most representative topics are knowledge management and competitiveness in HEIs based on intangibles such as identity, brand, reputation and relationship with stakeholders. Historical indicators for the 1992 - 2000 period, highlight trends such as strengthening human capital formation and its contribution to economic growth, performance optimization and sustained competitive advantage. For the period from 2001 to 2009, trends include aspects such as distinctive capabilities and core competences in HEIs; changes in education policies and systems; relationship between competitiveness in HEIs and competitiveness in nations. Finally, for the 2010-2020 period, the trends are focused on the creation of guides, indicators and reports of IC as an alternative to evaluate the management of intangible assets in HEIs, where the most representative intangible assets are relationships with stakeholders; internationalization of HEIs and generation of academic networks.

As in other research, this study has certain barriers and limitations. First, we analyze the number of citations and h-index, but both impact indicators are time-dependent. This means that more citations and higher h-index values may be associated with earlier publication years. Likewise, the inclusion of recent papers reduces the number of publications, searches and citations, affecting impact indicators. Therefore, the creation of strategies that promote the articulation of actors and efficient dissemination of research results on IC contribution to the generation of competitive advantages in HEIs is required. Secondly, information collection was carried out using a single database, the use of other databases such as Web of Science, Nature, and Google Scholar can improve the understanding of the study objective, as long as duplicate publications are avoided. Finally, selected bibliometric indicators were used to analyze the evolution of academic publications on IC and

its contribution to generating competitive advantages in HEIs: productivity (Pareto Law, Lotka Law and Price's Law), quality (Impact, h-index) and structure (Co-occurrence and cluster).

It is suggested to consider other bibliometric indicators such as standardized citations, alt-metrics, collaboration patterns, generation of networks between researchers and publications. It is also recommended to use other databases such as Web of Science and Google Scholar in order to improve the results. Despite these limitations, we consider that our work becomes the basis for future research on IC and competitiveness in HEIs, such as the development of new management models in HEIs; economic and market valuation for intangible assets in HEIs; strengthening core competencies in HEIs and knowledge transfer policies. Another alternative for future research involves detailed analysis on topics, theories and methods related to the topic of interest in different knowledge disciplines different from administration, business and engineering.

Acknowledgments

We thank to Minas Faculty and Universidad Nacional de Colombia for providing information access, language help, writing assistance.

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