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Exploring Human Capital Research Trends in Higher Education: A Bibliometric Analysis (1990-2022)

Skúmanie trendov výskumu ľudského kapitálu vo vysokoškolskom vzdelávaní: Bibliometrická analýza (1990-2022)

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Abstract: The main goal of this paper is to investigate bibliometric analysis using keywords, to identify top authors and documents in higher education research, and to uncover prevalent topics related to human capital as well as examine regional differences. The study analysed a total of 25,488 publications filtered according to specific criteria and identified 495 frequently used keywords. The popularity of concepts related to human capital and regional differences throughout research were confirmed by the literature review. The groundwork for this topic's research identified the most cited publications with Tommaso Agasisti being the most published author and Oded Galor as the most renowned author. The findings from current research trends highlight human capital as crucial for scholars and practitioners interested in the field of human and intellectual capital, helping them determine and direct their efforts into its development, along with emphasizing the regional differences throughout literature.

Key words: *Human capital, Co-word analysis, Bibliometric, Conceptual structure.*

JEL Classification: A10. B20.

Introduction

Institutions of higher education are essential in creating the human capital required for success in the contemporary world. The ability of these institutions to effectively improve the knowledge and skills of their employees and students has become a key metric of how well

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they use their resources to produce favourable outcomes for both individuals and society at large. Investments must be made in areas like faculty development, student-centered teaching and learning, efficient use of technology, and outcomes-based accountability to optimize human capital in higher education. The article also discusses recent research topics related to human capital in higher education.

In recent years, the concept of intellectual capital has gained significant attention, and it is to this concept that human capital is linked. Intellectual capital but also human capital refers to the intangible assets that organizations possess, such as knowledge, skills, and expertise, which contribute to their value and competitive advantage. The concept has been applied in a variety of fields including finance, management, accounting, and marketing, and has become a popular research topic in academic literature.

This paper contributes to the Human Capital (HC) literature in several ways. First, bibliometric research has focused primarily on authorship-based publication (see e.g. Andrikopoulos & Kostaris, 2017; Faraji et al., 2020; Kılıc et al., 2019). Although these studies provide useful insights, their ability to map the conceptual structure of the discipline is rather limited. Therefore, this study seeks to fill this gap through the analysis of common words and social networks. The second focus of this research is the quantitative evaluation of human capital research in higher education, based on the number of publications and their citations. The third point highlighted in this paper is the conceptual structure of Human Capital research in Europe. The fourth point is a comprehensive overview of the current state of human capital research in higher education through keywords in the period (1990-2022).

Through word analysis and the most recurrent keywords, this article reveals the current state of human capital research and highlights emerging themes and trends. Such findings could be beneficial to scholars and practitioners in the field of intellectual capital but also human capital in higher education.

1. Theoretical background

Higher education institutions' capacity to efficiently enhance the knowledge and skills of their staff members and students is referred to as their "human capital efficiency" (Serenko & Bontis, 2022). It serves as an indicator of how well higher education institutions use their resources to create positive results for both individual students and society at large (OECD, 2017).

Maximizing human capital in higher education is crucial for fostering both individual and social success. Higher education institutions can improve the efficiency and effectiveness of

human capital development, ultimately benefiting students, educators, and society, by making investments in faculty development, student-centered teaching and learning, effective use of technology, and outcomes-based accountability.

Generally, research on human capital in higher education focuses on understanding how education impacts human development and how workforce demands are evolving in our rapidly changing world. Human capital in the context of higher education refers to both the students who receive education and the teachers delivering it. Higher education institutions are considered essential in the human capital development because they give students the information and abilities required for succession in both their academic and personal lives. Higher education institutions also invest in their academic personnel by giving them chances for career advancement, research, and innovation (Burgess, 2016).

As the need for highly educated and competent people keeps growing, the idea of human capital in higher education has taken on more significance (Lozano et al., 2017). People need to have a wide range of skills and competencies to thrive in their chosen industries as the world grows increasingly complicated and interconnected. As a result, higher education institutions are crucial for the growth of human capital because they offer the instruction and training needed for people to reach their full potential (Barth et al., 2007).

Human capital has the potential to provide universities with a competitive edge, even though it is not a source of benefit in and of itself. As a result, we can consider it a distinct form of capital. Sustainable competitive advantages are the key to success (Burgess, 2016). These advantages are produced through developing competencies, but mostly by developing skills that are useful in the context of universities. Additionally, these benefits raise the likelihood of quick adaptation to potential threats in the future as well as to recently emerging opportunities (Bajzlíková et al., 2006).

Although the trend in publishing has increased significantly over the last ten years, there is still little discussion and research on the topic of "human capital" and "higher education". It is for this reason that this study has focused on four main research questions:

- What are the main themes that make up the structure of human capital research, based on the occurrence of keywords?
- What are the most cited authors, most publishing authors, and most cited documents in human capital research related to higher education?
- What are the most frequent and dominant topics in the connection between human capital and higher education?
- What is the conceptual structure of research in each region?

Researchers can use bibliometrics to identify the key subjects for their research focus by analysing the existing literature in their field (Grant et al., 2000; Vogel & Güttel, 2013). The network analysis technique known as "co-word analysis" (sometimes called "keyword co-occurrence analysis") is a used determine relationships between words (or concepts) that occur together in publications. Callon et al. (1983) provided the initial description of this technique.

This approach is frequently employed in the social sciences and humanities, particularly when examining the information in publications that are relevant to a given subject. It examines a variety of word characteristics, including their frequency of use in documents, their relationships with other words, their significance to the subject, and their meaning (Feng et al., 2017; Zupic & Cater, 2015).

"Co-word analysis" aims to locate important themes, ideas, and connections within a corpus of texts. According to Wang et al. (2013), this procedure can reveal connections across many subjects and disciplines as well as detect patterns and developments in each field.

2. Materials and methods

2.1. VOS Viewer

Callon et al. (1986) were the ones who first devised the well-known word analysis technique. Since then, word analysis has been used by academics to map the bibliometric structure of other subjects, such as creativity. Bibliometric analysis has lately gained prominence as a tool for scholars and librarians across several fields, allowing them to go through big collections of scientific articles and identify patterns and trends. One of the most popular tools for bibliometric analysis is VOSviewer software. The VOSviewer documentation (van Eck & Waltman, 2010) provides a detailed explanation of this powerful and flexible tool for producing and visualizing bibliometric maps of scientific literature. As authors explain, VOSviewer helps users navigate the complex world of scientific literature and comprehend the trends and patterns that characterize it. The software may be used to produce maps that depict the relationships among various academic fields, writers, organizations, and other components, to build and examine bibliometric diagrams of scientific publications.

A few of the techniques used by VOSviewer to produce economic maps are the word co-occurrence algorithm, the bibliographic coupling method, and the co-authorship algorithm (van Eck & Waltman, 2007). Once compiled, the bibliometric map can be modified to emphasize certain characteristics or links. The results of the bibliometric study must be understood as the final step in the use of VOSviewer. This requires analyzing the map for patterns and trends, and

then concluding the study environment from these results. Users could find clusters of related topics or disciplines, for example, or they might identify significant organizations or authors who are furthering a certain field of research.

2.2. Data

1. Six keywords were chosen after a thorough analysis of texts and papers on the subject, including human capital, intellectual capital, universities, efficiency, and effectiveness (Thanassoulis et al., 2008; Geraint & Jill, 2009; Ranjan & Singh, 2021). The topic "Effectiveness of human capital in higher education" is where these keywords are most frequently found in relation to each other in the Web of Science database the data needed for co-word analysis were drawn from the Web of Science platform, and were downloaded in .ris format. 180,188 papers were filtered because of the use of these keywords, however many of them did not come from related fields (such as energy and fuels, chemistry, physical chemistry, or chemical engineering), necessitating the setting of the filter to particular study areas.
2. Our research areas include Economics, Information Science and Library Science, Educational Research, Business, Education Scientific Disciplines, Social Sciences Interdisciplinary, Management Science, Business and Finance, Mathematical Methods, and Mathematics**.**

Table 1 Selected articles by Web of Science Categories

Web of Science Categories	Record Count	% of 25 488
Economics	11,377	44,63
Education Educational Research	6,200	24,33
Business	5,264	20,66
Management	4,491	17,62
Social Sciences Interdisciplinary	2,029	7,96
Business Finance	1,730	6,79
Information Science Library Science	1,072	4,21
Education Scientific Disciplines	709	2,78
Social Sciences Mathematical Methods	569	2,23
Mathematics	309	1,21
Mathematics Interdisciplinary Applications	216	0,85
Mathematics Applied	156	0,61

Source: own elaboration using WOSviewer.

After filtering only relevant scientific areas, we were left with a total of 34,701 articles. For this article, we used only publications in the English language, which reduced our sample by 3996 publications. The reason for choosing only the English language is that we consider it

the primary language for the publication of scientific works, as well as the possibility of using only English keywords for subsequent analysis. Further filtering of publications was based on the type of document, for our purposes, we used only articles, early access articles, proceeding papers, books, book chapters, and book rewinds.

As the last filtering, we used the year parameter and chose the period 1990–2022. This period was chosen based on the publications that dealt with this topic, and the popularity of this topic rose only after the 1990s, when the human capital, higher education, and its associated effectiveness attracted attention. All filters applied, our sample consisted of a total of 25,488 publications.

3. Results and discussion

Overall, the trend of published documents between 1990 and 2022 was a fully upward trend, and from 2005, this trend began to grow rapidly until 2020. Subsequently, after this period there was a slight decrease in publications on this topic, but there is no evidence of the persistence of this trend. As can be seen in Figure 1,2020 was the most prolific year in the number of publications in the mail with 1967 publications in this field. Subsequently, we observe a decreasing trend, not limited to the literature pertaining to the topics examined in our study. This broader trend is often contextualized within the scope of the pandemic.

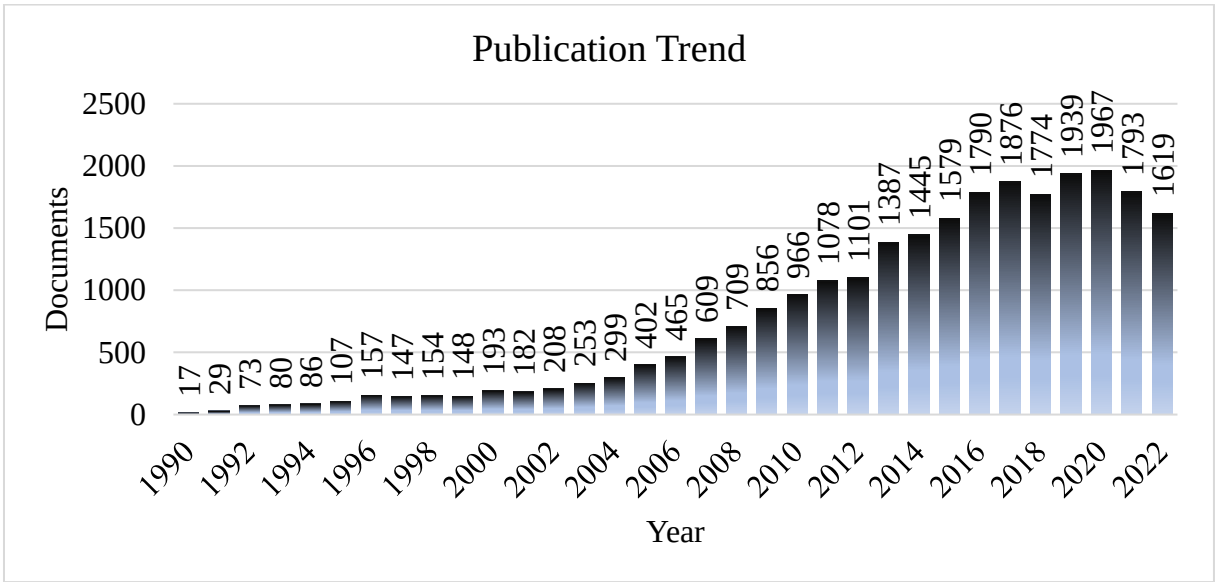

Figure 1 Publication trend
Source: Own elaboration using WOSviewer.

The term "co-occurrence" describes the existence, closeness, and frequency of related keywords in articles and can indicate popular study areas. It is related to different but

thematically similar keywords. There was a total of 52,605 keywords used in publications between 1990 and 2022. A limit was established for keyword frequency. Throughout the full study period (1990–2022), a threshold of 50 was established, resulting in a total of 495 terms. The top 50 frequently used terms throughout these times are displayed in Table 2.

In this setting, 5 clusters were created, the first of which included 155 keywords, the second 138, the third 104, the fourth 83, and the final 15 keywords. The network of co-occurrences is shown in Figure 2. The most popular search terms were grouped into five clusters, each of which had a different colour. A cluster of keywords was formed based on their similarity in content.

The keywords "performance" and "innovation," for instance, were in the blue cluster whereas the keywords "Human capital" and "education" were in the green cluster. The circles' sizes represented keyword frequency, while the lines' thicknesses represented the degree of co-occurrence both inside and across clusters. As can be seen from the image, there were strong connections between each cluster, and they were all interconnected. This demonstrated the close ties that connect several fields of higher education's human capital research.

Table 2 Top 50 keywords

Keyword	**Occurrences**	**Strength**	**Keyword**	**Occurrences**	**Strength**
Human capital	4919	19602	Employment	474	2111
Education	2204	9155	Models	450	2148
Performance	2130	11407	Policy	450	1921
Growth	1781	8896	Research and development	442	2753
Impact	1596	8791	Gender	439	2087
Innovation	1370	7017	Data envelopment analysis	434	1752
Efficiency	1133	4378	Students	433	1453
Model	1124	5200	Income	427	2122
Productivity	998	5355	Firms	422	2430
Investment	981	5044	Information	419	1809
Intellectual capital	925	4122	Firm performance	407	2484
Knowledge	881	4712	Institutions	403	2200
Economic growth	856	3384	University	398	1359
Management	853	4124	Migration	388	1860
Economic growth	830	4379	Firm	385	2177
Inequality	734	3832	Trade	383	2104
Social capital	725	3043	Higher education	371	1606
Technology	713	3751	Risk	369	1573
Higher education	700	2078	Panel-data	365	2223
Earnings	680	3244	Endogenous growth	363	1707

Keyword	Occurrences	Strength	Keyword	Occurrences	Strength
Determinants	620	3559	Knowledge management	353	1458
Returns	591	2990	Market	347	1702
Quality	591	2932	Economics	346	1547
Entrepreneurship	570	2977	Universities	338	1371
Health	525	2458	Wages	337	1628
China	519	2414	Work	334	1554

Source: Own elaboration using WOSviewer.

In all, this network had 495 keywords, 5 clusters, 47,266 linkages, and a total link strength of 207,348. The largest cluster was Cluster 1 (Red), which contained 155 keywords and was designated as "Higher education." Other significant clusters included Cluster 2 (Green), which contained 138 keywords and was designated as "human capital," Cluster 3 (Blue), which contained 104 keywords and was designated as "Performance," Cluster 4 (Yellow), which contained 83 keywords and was designated as "Growth," and Cluster 5 (Purple), which contained 15 keywords and was designated as "Efficiency."

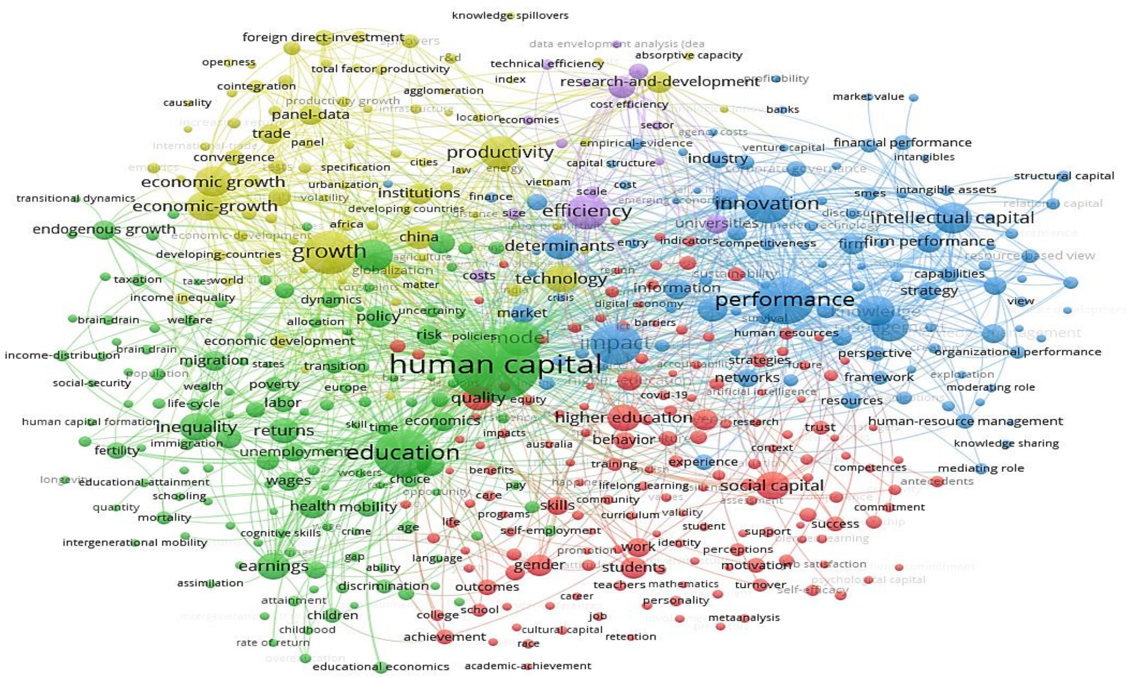

Figure 2 Co-occurrence network of keywords (1990-2022)
Source: Own elaboration using WOSviewer.

3.1. TOP Authors

The top 10 writers according to several documents released are listed in Table 3. These data show that "Tommaso Agasisti" has written 30 documents, making him the top author in

the human capital category. Readers may use this list to find out who the most well-known experts in this subject are.

Table 3 Top 10 authors by documents

Author	University	Documents	Citations
Tommaso Agasisti	Politecnico di Milano School of Management	30	772
Jesus Crespo Cuaresma	Wirtschaftsuniversität Wien	27	318
Mike Wright	Lancaster University	21	1597
Nick Bontis	McMaster University	19	996
Petr Kucera	Johannes Gutenberg-Universität Mainz	19	67
Cinzia Daraio	Sapienza Università di Roma	18	273
Tiago Neves Sequeira	Universidade de Coimbra	18	116
Frederic Docquier	IZA - Institute of Labor Economics	17	1312
J Zhang	Bournemouth University	17	475
Hana Chylova	Czech University of Life Sciences Prague	17	40

Source: Own elaboration using WOSviewer.

In the subject of Human Capital, there were a total of 46,941 writers, but only those who had produced at least five papers and received10 citations are shown in Figure 3. This benchmark was met by 63 writers. There was a total of 88 linkages, 12 clusters, and 63 authors. The overall link strength was 186 as well.

Researchers work with authors in a network. For instance, "Tommaso Agasisti" has worked on several research projects alongside "Geraint Johnes" and "Gou-Liang Yang." Of course, "Tommaso Agasisti" has worked with a lot of other researchers, but these connections have not been strong enough to create a network of co-authors.

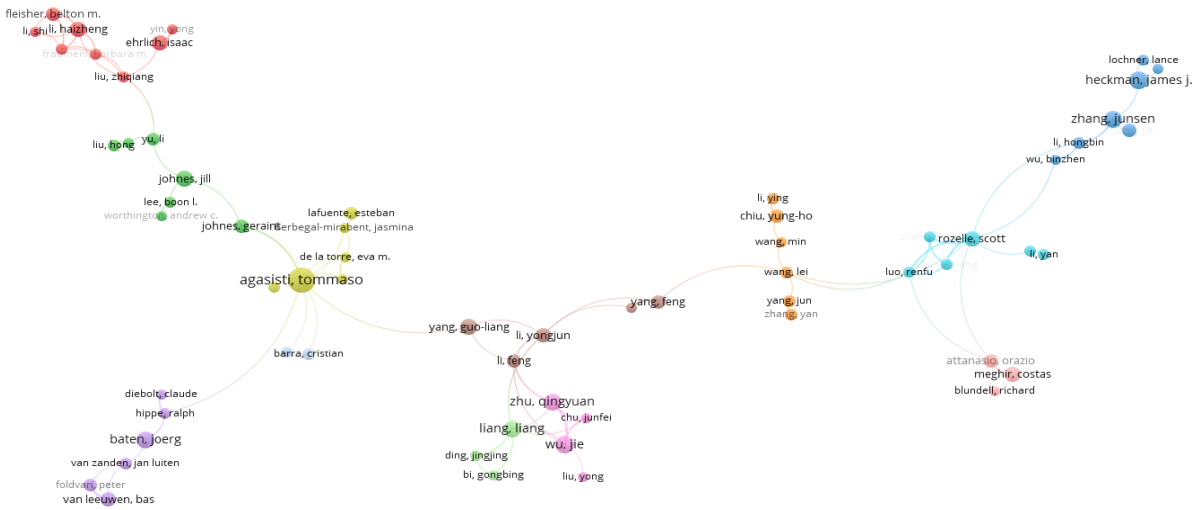

Figure 3 Co-authorship network
Source: Own elaboration using WOSviewer.

Table 4 Top 10 authors by citations

Author	University	Citations	Documents
Oded Galor	Brown University, Department of Economics	2534	6
Robert J. Barro	Harvard University, Faculty of Arts and Sciences	2411	5
Zoltan J. Acs	The London School of Economics	2124	10
David B. Audretsch	Indiana University	1925	14
Mr. Rosenzweig	International Economics at Yale University	1740	12
Robert E. Ployhart	Darla Moore School of Business	1636	11
Mike Wright	Lancaster University	1597	21
David P Lepak	University of Massachusetts Amherst	1478	6
Frédéric Docquier	Luxembourg Institute of Socio-Economic Research	1312	17

Source: Own elaboration using WOSviewer.

For the correct informative value of the analysis, we have also created a list of the most successful authors based on the number of citations. The most successful author in the field of "Human capital" and "Higher education" is Oded Galor with a total of 6 publications and 2,534 citations. Oded Galor has also contributed significantly to the area of economic growth and development.

3.2. TOP cited documents

The most frequently cited document was "A Contribution to the Empirics of economic growth", written by the authors Mankiw, Romer, and Weil in 1992, with a total number of citations of 5,032. The document entitled "The role of social and human capital among nascent

entrepreneurs", was published by the authors Davidsson, and Honig, in 2003 with 2,224 citations.

Table 5: Top 10 cited documents

Author	Year	Title	Citations
Mankiw, Romer, Weil	1992	A contribution to the empirics of economic growth	5032
Davidsson, Honig	2003	The role of social and human capital among nascent entrepreneurs	2224
Borensztein, De Gregorio, Lee	1998	How does foreign direct investment affect economic growth?	2102
Subramaniam, Youndt	2005	The influence of intellectual capital on the types of innovative capabilities	1874
Galor, Zeira	1993	Income-distribution and macroeconomics	1587
Barro, Lee	2013	A new data set of educational attainment in the world	1473
Glaeser, La Porta, Lopez-de-silanes, Shlaifer	2004	Do institutions cause growth?	1369
Benhabib, Spiegel	1994	The tole of human-capital in economic-development evidence from aggregate cross-country data	1339
Davenport, De Long, Beers	1998	Successful knowledge management projects	1309
Hitt	2001	The importance of resources in the internationalization of professional service firms: The good, the bad, and the ugly	1238

Source: Own elaboration using WOSviewer.

3.3. Current research period

Based on the keywords that appeared most often in the publications published in 2022, we can see that in the field of research "Human capital" and "Higher education" the most dominant topics were focused on "Impact", "Performance", "Growth", "Innovation", "Efficiency", "Technology", "Productivity", and "Model".

Table 6 Current research

Keywords	**Human capital**	**Impact**	**Performance**	**Education**	**Growth**
Occurrences	324	261	234	166	151
Strength	1856	1704	1462	899	896
Keywords	**Innovation**	**Efficiency**	**Technology**	**Productivity**	**Model**
Occurrences	129	108	90	89	88
Strength	843	595	544	587	467

Source: Own elaboration using WOSviewer.

3.4. Co-word analysis by geographical regions

Another objective of this publication was to examine regional differences in research on "Human capital" in the context of "Higher education", in Table 7 we can see the most frequently used keywords in the regions of Europe, Asia, North America, South America, Oceania, and Africa.

Table 7 Most common used keywords depending on the region

Asia	Africa	Europe	Oceania	South America	North America
Human capital	Human capital	Human Capital	Human capital	Human Capital	Human Capital
Performance	Impact	Performance	Impact	Education	Performance
Impact	Performance	Growth	Performance	Performance	Education
Growth	Education	Innovation	Education	Impact	Growth
Innovation	Africa	Productivity	Growth	Growth	Impact
Education	Growth	Intellectual capital	Innovation	Inequality	Productivity
Efficiency	Economic Growth	Management	Economic growth	Innovation	Investment
Intellectual capital	Determinants	Model	Productivity	Model	Inequality
Productivity	Innovation	Investment	Model	Management	Model
China	Economic growth	Efficiency	China	Quality	Knowledge

Source: Own elaboration using WOSviewer.

The Table 7 demonstrates the varying foci of human capital research across global locations. The study that is most directly relevant to performance and demonstrates the highest correlation between human capital and performance is conducted in Asia. African continent is in support of impact in relation to human capital study. In Europe, the emphasis is on education, and how it relates to performance, creativity, and intellectual growth. The focus on human capital and its relationship to education and performance is shared by Oceania and Australia. In South America, education is prioritized together with creativity and output. North America deals with human capital and its relations to specific indicators of education, growth, productivity, performance, knowledge, innovation, and impact.

Conclusion

This paper provides a comprehensive review of all publications published between 1990 and 2022 that are related to the topic of Human capital in the context of higher education through the phrase analysis and social network analysis. The results show that a considerable amount of research has been published in this sector recently, and that the trend of publications is rising annually. Within the manuscript, we define the topic´s status quo, identify research gaps, and suggest prospective routes for future research, all of which contribute to a better understanding of the conceptual framework of human capital research.

We studied word combinations from 1990 to 2022 whereas the results incline that "Human Capital," "Education," "Performance," "Growth," and "Impact" were most frequently used phrases during this period. The research centers on the recurrent topics in higher education's human capital research.

Regarding the inquiries about the most referenced papers and eminent writers in the field of human capital research, "Contribution to the Empirics of Economic Growth" was the most often referenced work; "Tomasso Agasisti" has the highest number of publications, while "Oded Galor" is the most well-known author. We acknowledge that the duration of a paper's existence can contribute to its referencing to some extent. However, the significance of this factor was not thoroughly examined in our study, same as more recent publications (e.g., last five years) were treated equally.

We further state that the “human capital” has the highest connections to the keywords "Impact," "Performance," "Education," and other terms related to technical advancement and innovation. Regarding the differences in research focus in various regions, we conclude that Asia focuses on the relationship between human capital and performance, Africa on the influence of human capital, Europe on the relationship between education, performance, and creativity, Australia and Oceania have comparable goals; South America places emphasis on innovation and education; and North America investigates the relationship between human capital, the economy, and performance measures.

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References:

[1] Andrikopoulos, A., & Kostaris, K. (2017). Collaboration networks in accounting research. *Journal of International Accounting, Auditing and Taxation, 28,* 1-9. https://doi.org/10.1016/j.intaccaudtax.2016.12.001.

[2] Bajzíková, Ľ., Luptáková, S., Rudy, J., Vargic, B., & Weidlich, R. (2006). *Manažment ľudských zdrojov*. Univerzita Komenského.

[3] Barth, M., Godemann, J., Rieckmann, M., & Stoltenberg, U. (2007). Developing key competencies for sustainable development in higher education. *International Journal of sustainability in higher education, 8*(4), 416-430. https://doi.org/10.1108/14676370710823582.

[4] Burgess, S. M. (2016). Human capital and education: The state of the art in the economics of education. https://doi.org/10.2139/ssrn.2769193

[5] Callon, M., Courtial, J. P., Turner, W. A., & Bauin, S. (1983). From translations to problematic networks: An introduction to co-word analysis. *Social science information, 22*(2), 191-235. https://doi.org/10.1177/053901883022002003.

[6] Callon, M., Law, J., & Rip, A. (1986). Qualitative scientometrics. In *Mapping the dynamics of science and technology: Sociology of science in the real world* (pp. 103-123). London: Palgrave Macmillan UK. https://doi.org/10.1007/978-1-349-07408-2.

[7] Faraji, O., Mohammadrezaei, F., Khodakarami, M., Soukhakian, I., & Effective Research Collaboration. Status and Barriers: An Important Factor for Accepting Articles in Top International Accounting Journals. *Accounting and Auditing Review, 29*(4), 650-672. https://doi.org/10.22059/acctgrev.2020.289096.1008272.

[8] Feng, J., Zhang, Y. Q., & Zhang, H. (2017). Improving the co-word analysis method based on semantic distance. *Scientometrics, 111,* 1521-1531. https://doi.org/10.1007/s11192-017-2286-1.

[9] Grant, J., Cottrell, R., Cluzeau, F., & Fawcett, G. (2000). Evaluating "payback" on biomedical research from papers cited in clinical guidelines: applied bibliometric study. *Bmj, 320*(7242), 1107-1111. https://doi.org/10.1136/bmj.320.7242.1107.

[10] Johnes, G., & Johnes, J. (2009). Higher education institutions' costs and efficiency: Taking the decomposition a further step. *Economics of Education Review, 28*(1), 107-113. https://doi.org/10.1016/j.econedurev.2008.02.001.

[11] Kılıç, M., Uyar, A., & Koseoglu, M. A. (2019). Co-authorship network analysis in the accounting discipline. *Australian Accounting Review*, *29*(1), 235-251. https://onlinelibrary.wiley.com/doi/10.1111/auar.12271.

[12] Lozano, R., Merrill, M. Y., Sammalisto, K., Ceulemans, K., & Lozano, F. J. (2017). Connecting competences and pedagogical approaches for sustainable development in higher education: A literature review and framework proposal. *Sustainability*, *9*(10), 1889.. https://doi.org/10.3390/su9101889.

[13] Fabrice, H. (2010). Learning our lesson review of quality teaching in higher education: Review of quality teaching in higher education. https://www.oecd-ilibrary.org/education/learning-our-lesson_9789264079281-en.

[14] Ranjan, P., & Singh, S. (2021). Efficiency Analysis of Higher Education Institutions: Use of Categorical Variables. *International Journal of Mathematical, Engineering and Management Sciences*, *6*(6), 1518. https://doi.org/10.33889/IJMEMS.2021.6.6.090.

[15] Serenko, A., & Bontis, N. (2022). Global ranking of knowledge management and intellectual capital academic journals: a 2021 update. *Journal of Knowledge Management*, *26*(1), 126-145. https://doi.org/10.1108/JKM-11-2020-0814.

[16] Thanassoulis, E., Kortelainen, M., Johnes, G., & Johnes, J. (2011). Costs and efficiency of higher education institutions in England: a DEA analysis. *Journal of the operational research society*, *62*(7), 1282-1297. https://doi.org/10.1057/jors.2010.68.

[17] Van Eck, N. J., & Waltman, L. (2007, March). VOS: A new method for visualizing similarities between objects. In *Advances in Data Analysis: Proceedings of the 30th Annual Conference of the Gesellschaft für Klassifikation eV, Freie Universität Berlin, March 8–10, 2006* (pp. 299-306). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-70981-7_34.

[18] Van Eck, N., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *scientometrics*, *84*(2), 523-538. https://doi.org/10.1007/s11192-009-0146-3.

[19] Vogel, R., & Güttel, W. H. (2013). The dynamic capability view in strategic management: A bibliometric review. *International Journal of Management Reviews*, *15*(4), 426-446. https://onlinelibrary.wiley.com/doi/10.1111/ijmr.12000.

[20] Wang, X., Zhao, Y., Liu, R., & Zhang, J. (2013). Knowledge-transfer analysis based on co-citation clustering. *Scientometrics*, *97*, 859-869. https://doi.org/10.1007/s11192-013-1077-6.

[21] Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational research methods, 18*(3), 429-472. https://journals.sagepub.com/doi/10.1177/1094428114562629.