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Knowledge Management Systems in Higher Education: A Comprehensive Study through Systematic Literature Review and Bibliometric Analysis (2019-2023)

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ABSTRACT

The objective of this study is to critically examine the existing body of literature on Knowledge Management Systems (KMS) in the context of higher education. The research employed the PRISMA technique (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) together with a bibliometric approach and computational mapping analysis utilizing VOS Viewer. The study period used as literature data material is Scopus-indexed articles and conference papers from 2019 to 2023. The keywords used were "knowledge, management, system, and higher education". From 313 references that were considered relevant, data reduction was carried out with inclusion and exclusion criteria. Analysis was conducted on 10 articles with the highest number of citations and 5 articles that specifically used the keyword "human resource management". The findings of this study offer a comprehensive outline for future research on human resource management in higher education, specifically focusing on knowledge management systems.

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1. INTRODUCTION

Knowledge management (KM) originated as a novel field of management theory during the 1980s when it was acknowledged that knowledge is the primary foundation of capital value [1]. The topic gained more prominence in the 1990s, coinciding with the rise of the information-based economy and the acknowledgment of knowledge as a valuable competitive edge [2],[3]. As a result, knowledge management emerged as a distinct topic of study, garnering increasing attention in the last twenty years [4]. The primary emphasis of knowledge management is in the realm of information systems and human resource management [5].

Over the past three decades (1988-2018) there has been an explosion of attention, both in the popular media and in academia, to innovation to create and sustain sustainable competitive advantage [6]. The consequences of innovation are contingent upon the

accumulation of existing knowledge, which enables the integration and utilization of new information. Hence, it may be asserted that there exists a robust correlation between knowledge and innovation [7]. As a result, we have also seen an explosion of arguments about the importance of knowledge, and more and more researchers are stating that knowledge is the main source of economic rents [8].

The emphasis on knowledge and its significance might be viewed as a continuation of the efficiency-oriented strategy. At a conceptual and theoretical level, we have observed the development of knowledge-based theory [9] [10], organizational knowledge creation theory [11], and diamond theory [12]–[14]. The fundamental concept behind these techniques is that the primary valued assets of a corporation are knowledge and creativity [15]. Knowledge is defined as the process of organizing and arranging information for a certain objective. This term is also provided by Drucker [16], who states that: "Knowledge is systematic, purposeful, and organized information" [6].

Additional analysis is necessary to explore the correlation between knowledge management and innovation, utilizing the existing evidence. Additionally, several studies emphasize the significance of comprehending the mechanisms via which information is obtained, disseminated, and utilized, as well as methods for enhancing these processes. These studies highlight the significance of knowledge management in organizations and emphasize the imperative for management and leaders to acknowledge its value. However, there is a need for new metrics to measure knowledge quality and evaluate the contribution of organizational learning to company performance. Some past studies also suggest that future research should consider the broader context in which knowledge management occurs and the role of technology as an enabling agent [17].

Knowledge management in higher education refers to the process of effectively managing and sharing knowledge to improve teaching, learning, and research outcomes [18]. The process includes developing a thorough knowledge management framework, promoting cooperation among institutions, allocating resources to technology infrastructure, cultivating a culture of information exchange, and facilitating unrestricted access to research papers and instructional resources [19]. Knowledge management enables institutions to enhance their ability to adapt and respond effectively to external changes, as well as to accomplish more ambitious objectives [20]. It adds value and competitiveness to higher education institutions, supporting regeneration, international relations, and social cohesion [21]. In academia, knowledge management has a direct impact on faculty members' academic performance and promotes academic discourse [22].

The notion of knowledge management in higher education is crucial for fostering a more robust knowledge-based economy, as it is recognized to enhance people's intellectual capital and contribute to the overall knowledge economy of society.

This study sought to answer the following research questions:

1. What is the trend of research publications on Knowledge Management Systems in Higher Education over the past 5 years, based on the field of study, journal source, and country of origin that produced the highest number of publications?
2. How has the topic developed in research on Knowledge Management Systems in Higher Education, and how does it relate to the topic of HR Management?

How is the literature mapping and opportunities for future research plans on Knowledge Management Systems in Higher Education?

2. METHODS

PRISMA ***(Preferred Reporting Items for Systematic Review and Meta-Analysis)***

This study used the PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) methodology.

The data source used is Scopus, by entering keywords namely "knowledge AND management AND system AND higher education". The results obtained were 2470 documents. Then with the publication year filter from 2019 to 2023, 1007 documents were obtained, and only 382 publications could be accessed. The next step is to filter the search results by selecting articles and conference papers in English from Journals and Seminar Proceedings. The results obtained were 313 publications, with 258 categorized as journal articles and 55 as conference papers. More details can be seen in Figure 1.

The analysis framework of this research uses a three-step method, as shown in Figure 2. The first step is to determine the scope of the research. In this step, the research focuses on exploring articles on Knowledge Management Systems in Higher Education, using certain keywords. Journal articles were obtained from the Scopus database, totaling 313 documents, with 258 journal articles, and 55 conference papers. The results were downloaded in RIS (Research Information System) format. The next step, the RIS of the entire journal was entered into VOS Viewer Software to produce a graphical representation of the Bibliometric map.

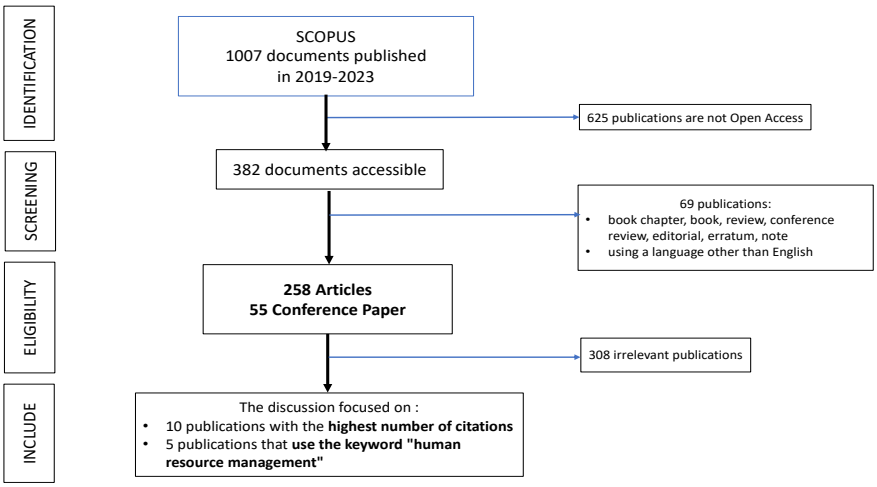

Figure 1. PRISMA Diagram of Knowledge Management System Research in Higher Education Bibliometrics with VOS Viewer

Figure 2. Literature Framework

The second step is bibliometric analysis using VOS Viewer software, which can map patterns, show the position of the research scope, and show the clustering of the literature by dividing it into different colors.

The VOS Viewer software shows three mapping visualization models based on keywords, consisting of first, Network Visualization is used to identify the strength of an item about other items, Overlay Visualization illustrates the use of items in the literature over time, Density Visualization is used to show the density of items displayed. At this stage, bibliometric analysis is only focused on keyword linkage between articles and conference papers with the same theme. The third step was to collect and analyze articles by focusing only on articles and conference papers. The analysis was conducted on 10 publications with the highest number of citations and 5 publications that specifically used the keyword "human resource management".

3. RESULTS AND DISCUSSION

Research Publication Trends of Knowledge Management Systems in Higher Education

313 published results were found from a search for publications on the issue of Knowledge Management System in Higher Education in the Scopus database from 2019 to 2023. That is, 258 are categorized as journal articles and 55 are categorized as conference papers. Most of the research studies are 26.4% in social science, 15.8% in computer science, and 8.7% in engineering, the remaining 49% are divided into other fields such as business, management and accounting, environmental science, decision sciences, energy, medicine, psychology, and mathematics. For more details, please see Figure 3.

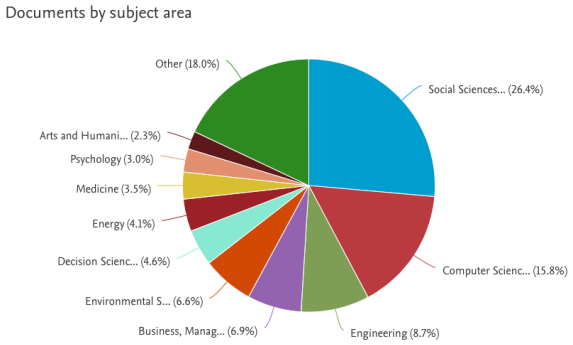

Figure 3. Category of publications of Knowledge Management Systems in Higher Education based on field of study
Source: Scopus 2023

In the last 5 years, the research trend on Knowledge Management Systems in Higher Education has fluctuated. In 2019 there were 56 publications, then increased to 64 publications in 2020, and experienced a decline again in 2021 by producing 59 publications. In 2022, the highest peak in the number of publications in the last 5 years was 76 publications, before finally decreasing again to only 58 publications in 2023. The trend of research publications on Knowledge Management Systems in Higher Education can be seen in Figure 4.

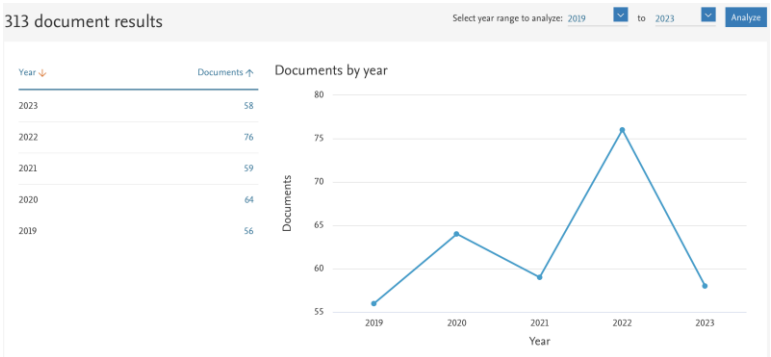

Figure 4. Trends in the publication of Knowledge Management Systems in Higher Education
Source: Scopus 2023

Meanwhile, the 5 journal sources that published the most articles related to Knowledge Management Systems in Higher Education in the last 5 years can be seen in Figure 5, including Sustainability Switzerland published by MDPI (Multidisciplinary Digital Publishing Institute) with a total publication of 21 articles. Other journals are the

International Journal of Emerging Technologies in Learning and Journal of Physics Conference Series, each producing 7 articles; Procedia Computer Science with 6 articles and Education Sciences with 5 articles.

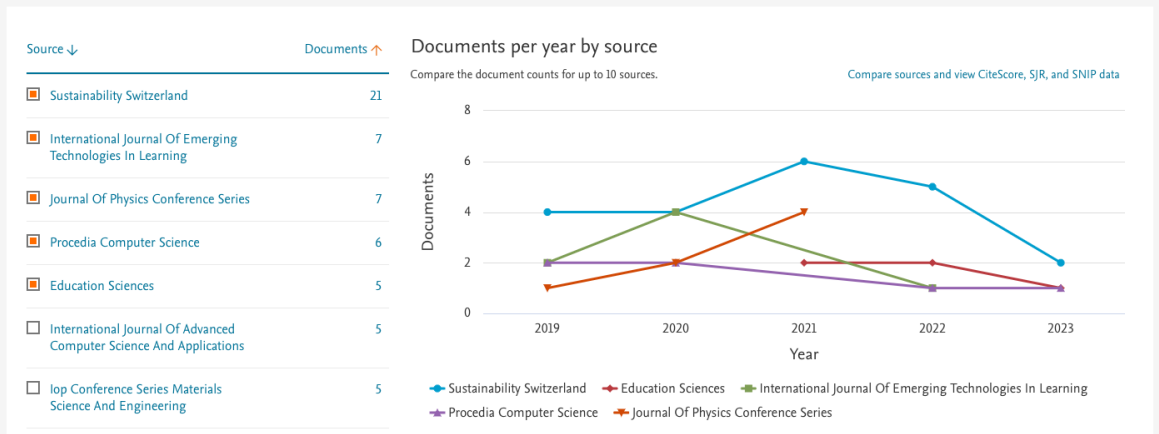

Figure 5: Leading journals/journals productivity in Knowledge Management System Publications in Higher Education
Source: Scopus 2023

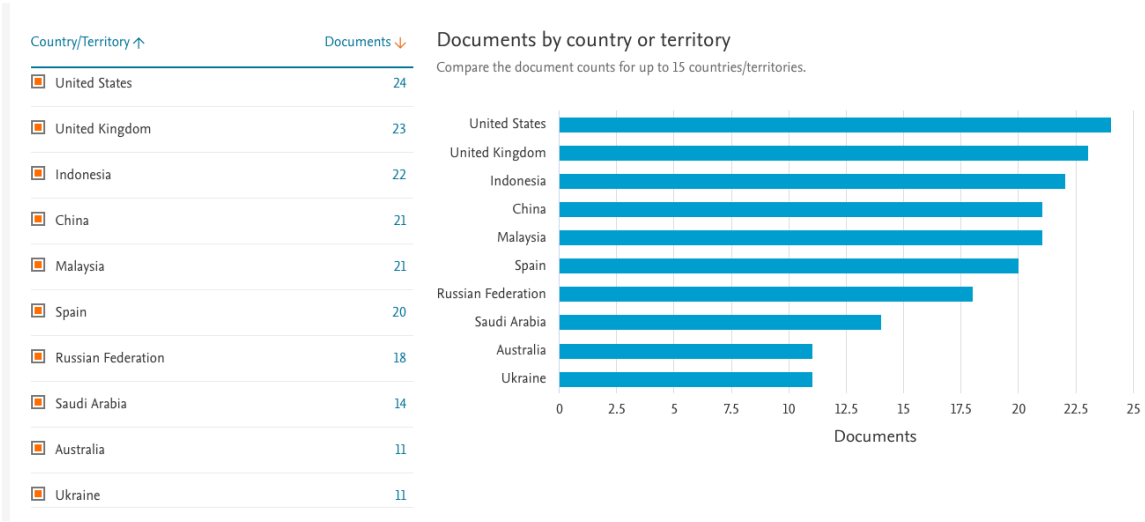

Figure 6: Publications by nations/countries in *Knowledge Management* Systems in Higher Education
Source: Scopus 2023

Based on the results of the search for Scopus-indexed publications on Knowledge Management Systems in Higher Education, it was found that the country that produced the most publications over the past 5 years was the United States with 24 publications, followed by the United Kingdom with 23 publications, and Indonesia with 22 publications on Knowledge Management Systems in Higher Education. Publications by nations/countries in Knowledge Management Systems in Higher Education can be seen in Figure 6, it shows that in these countries, research topics related to Knowledge Management Systems in Higher Education have developed and are in great demand.

Systematic Literature Review with PRISMA

Based on the search for publication results on Knowledge Management Systems in Higher Education in the Scopus database from 2019 to 2023, 313 publications were obtained with 258 in the form of journal articles, and 55 in the form of conference

papers. To see the most relevant contributions in this study, from 313 documents that have been obtained by the PRISMA method, 10 publications that have the highest number of citations in the period of 2019 to 2023 were selected. Citation analysis is used to determine the number of times a person's work is cited by others [23]. The results can be seen in Table 1.

Table 1. Article Publication of Knowledge Management System in Higher Education with the Most Number of Citations

No.	Author/Year	Publication Title	Number of Citations	Research Theme
1	Liu, Lomovtseva, & Korobeynikova (2020)	Platforms for online learning: Reconstructing contemporary higher education	79	ICT
2	Mora et al. (2020)	A paradigm of collaborative effort to improve the learning experience of engineering and scientific students	64	ICT & Collaboration
3	Al-Husseini et al. (2021)	Innovation and transformational leadership: the mediating function of faculty knowledge sharing in higher education	62	Leadership & Innovation
4	Cabero-Almenara, Arancibia & del Prete (2019)	Knowledge both didactic and technical regarding the Moodle LMS in higher education. Beyond mere functionality	60	ICT
5	Gamage et al. (2019)	Enhancing Moodle quizzes to function as online assessments	51	ICT
6	Samin and Azim (2019)	A Case Study of a Knowledge-Based Recommendation System for Academia Utilizing Machine Learning in Pakistan's Higher Education Landscape	43	ICT & Collaboration
7	Prifti (2022)	Student satisfaction and self-efficacy in the context of integrated learning courses	41	ICT
8	De la Poza, Merello, Barberá, & Celani (2021)	Impact Rankings-Based Universities' Reporting on the SDGs: Modelling and Measuring Their Sustainability Contribution	41	Sustainability
9	Mohammadi et al. (2021)	Examining the obstacles and determinants that impacted the utilization of the learning management system in Afghanistan amidst the Covid-19 pandemic	40	ICT
10	Brugmann et al. (2019)	Enhancing student involvement in sustainability: Curriculum transformation at the University of Toronto through the utilization of SDG and CEL-focused inventories	40	Sustainability
TOTAL			**521**	

Source: Scopus 2023

Table 1 shows 10 publications on Knowledge Management Systems in Higher Education with the highest number of citations from 2019 to 2023. The research article conducted by Liu, Lomovtseva, & Korobeynikova [24], with the title "Platforms for online learning: Reconstructing contemporary higher education" received the highest number of citations (79 citations). Their study involved doing a comparative analysis of several distant learning platforms based on certain criteria. They conferred with university professors and performed tests on students who utilized online platforms for learning to determine the impact on academic achievement. Through the examination of remote learning systems, student assessments, and instructor discussions, it was determined that online learning platforms enhance the accessibility and

convenience of education. Furthermore, the educational process incorporates the integration of information technology. Therefore, the use of online learning tools in higher education is essential [24].

Still related to Technology, Information, and Communication (ICT), another study links ICT with collaboration activities in higher education. Mora et al [25] in their research entitled "A paradigm of collaborative effort to improve the learning experience of engineering and scientific students" (with 64 citations) developed a novel learning project that involved students working together. The study investigated the effects of this collaborative approach on learning outcomes, finding that it led to improved collective intelligence and motivation. The findings demonstrated a higher level of absorption of information and enhanced acquisition of various scientific abilities. Information and Communication Technology (ICT) based learning techniques offer innovative approaches for conveying and managing knowledge in higher education [25].

Meanwhile, Al-Husseini et al. [26] in their research entitled "Innovation and transformational leadership: the mediating function of faculty knowledge sharing in higher education" (62 citations), the purpose of this study is to examine the relationship between transformational leadership, information sharing, and innovation in higher education. The study unveiled a noteworthy and affirmative association between transformative leadership, information sharing, and creativity. Moreover, the act of disseminating information was acknowledged as a facilitator between transformational leadership and creativity. The implications of these results for higher education institutions are also analyzed [26].

Next, Cabero-Almenara, Arancibia & del Prete [27] in their article entitled "Examining the obstacles and determinants that impacted the utilization of the learning management system in Afghanistan amidst the Covid-19 pandemic" (60 citations), conducted a study to measure the pedagogical and technological use of Moodle and its impact on teaching. The results of this study are consistent with earlier studies, confirming the platform's practical and useful characteristics. It mostly serves as a storage space for goods and information, with little application in pedagogy. This issue pertains to higher education institutions and necessitates deliberation and contemplation from a systemic standpoint on the use and incorporation of technology in the classroom [27].

This is in line with the research of Gamage et al. [28] in the article titled "Enhancing Moodle quizzes to function as online assessments" (51 citations). This study centers on the Learning Management System (LMS) "Moodle" to determine the efficacy of "Moodle quizzes" in enhancing, evaluating, and distinguishing knowledge in a civil engineering course at an Australian university. Utilizing the offered Moodle statistics enables informed decision-making for enhancing summative quizzes [28].

In line with this, the article by Samin and Azim [29] titled "A Case Study of a Knowledge-Based Recommendation System for Academia Utilizing Machine Learning in Pakistan's Higher Education Landscape" (43 citations), illustrates a case study showcasing the application of probabilistic topic models in providing suggestions to academic users by effectively assigning courses and supervisors. The ScholarLite system employs machine learning to analyze faculty members' past publications, extract research themes, and identify their research interests from their resumes. It then integrates this information with their educational background to generate suggestions for course instruction, research supervision, and collaborations between academia and industry [29].

In a recent article published in 2022, Prifti's [30] research titled "Student satisfaction and self-efficacy in the context of integrated learning courses" (41 citations), this study examines the impact of introducing blended courses in the 'Management' course at a university, specifically focusing on student happiness. The study specifically examined the components of the Learning Management System (LMS) that affect self-efficacy and how it affects student

satisfaction. The findings indicated a favorable correlation between students' happiness with their education and their self-perceived ability to effectively utilize the Learning Management System (LMS) [30].

Apart from being associated with the learning process, Knowledge Management Systems in Higher Education are also widely associated with sustainability issues. De la Poza, Merello, Barberá, & Celani [31] in their article "Impact Rankings-Based Universities' Reporting on the SDGs: Modelling and Measuring Their Sustainability Contribution" (41 citations), evaluate the extent to which the reporting and accomplishment of Sustainable Development Goals (SDGs) are in line with the overall ranking score of Times Higher Education (THE). The findings indicate a correlation between the overall rankings and the Sustainable Development Goals (SDG) reporting of Higher Education Institutions (HEIs). Top-ranked institutions and other universities differ in geographical location, information disclosure, and influence. Top-tier colleges prioritize the dissemination of knowledge to businesses to address its requirements (SDG9), bolstering robust institutions within their respective nations and fostering peace and justice (SDG16) [31].

The forthcoming study is named "Examining the Obstacles and Determinants Impacting the Utilization of the Learning Management System amidst the Covid-19 Pandemic in Afghanistan" (40 citations), conducted by Mohammadi et al. [32]. The objective of this study is to examine the difficulties encountered during the deployment of HELMS (Higher Education Learning Management System) and evaluate the variables that impact the willingness of instructors and students to adopt HELMS [32].

Brugmann et al. [33] in their research "Enhancing student involvement in sustainability: Curriculum transformation at the University of Toronto through the utilization of SDG and CEL-focused inventories" (40 citations), the research involved the implementation of an Expanded Student Engagement Project (ESE) at the University of Toronto (U of T). This project consisted of the development of three detailed inventories. The goal of these inventories was to enhance students' understanding of sustainability-related course material and encourage their participation in both on- and off-campus sustainability projects, whether they were part of the curriculum or not [33].

Based on the analysis of research themes from the 10 publications with the highest number of citations (521 citations in total), it shows that in the last five years, research publications on Knowledge Management Systems in Higher Education mostly take the main theme of the utilization and use of Information and Communication Technology. Among them are ICT and learning (271 citations); and ICT and collaboration in higher education (107 citations). The rest take the theme of Sustainability (81 citations), and the theme of Leadership and Innovation (62 citations).

This means that there have not been many studies that specifically discuss or link the Knowledge Management System in Higher Education with the field of HR management studies. Therefore, the author conducted further analysis by re-selecting the results of the publication search using the keyword filter "human resource management" on 313 documents found. The search results obtained from as many as 5 relevant publications can be seen in Table 2.

Table 2 shows publications that specifically discuss or link the Knowledge Management System in Higher Education with the field of HR management, namely 5 articles that use the keyword "human resource management" in the Scopus search filter.

Table 2. Discussion of Knowledge Management Systems in Higher Education in the context of HRM

No.	Title	Author/Year	HRM Context	Citation
1.	Factors Influencing the Acceptance of Mobile Learning in Higher Education: An Empirical Investigation	N Abdallah, O Abdallah, O Bohra (2021)	learners' intention & motivation to adopt M-learning	10
2	Social accountability and professional expertise of safeguards specialists for food product quality and safety	Goncharov, V. N et al., (2020)	skill competencies of workers as higher education graduates	6
3	Multidimensional Big Data-Driven Research on the Optimization and Implementation of University Student Development and Management Strategies	Lv (2022)	student development and strong HR background	5
4	Infrastructure for knowledge administration in a higher education institution: Expertise search system development	Abidin et al. (2021)	organizational effectiveness, organizational performance, and competitive advantage	4
5	Computer-assisted research into the evolution of human resource management mechanisms in higher education institutions.	Zheng (2020)	HR innovation in higher education	2
TOTAL				**27**

Source: Scopus 2023

First, the article written by N Abdallah, O Abdallah, and O Bohra [34] engaged in research pertaining to the utilization of mobile devices to facilitate learning and teaching activities as a crucial component of the informal learning process. Mobile learning, often known as M-learning, refers to the utilization of mobile devices to facilitate and enhance students' learning activities and assist the overall learning process. Nevertheless, the successful integration of M-learning in higher education institutions relies on the acceptance of learners. Therefore, it is crucial to identify and examine the elements that impact learners' inclination to utilize and embrace M-learning. Hence, this study examines the variables that impact students' inclination to embrace M-learning in higher education establishments.

The findings indicate that students' inclination to embrace M-learning is influenced by a range of factors, including individual creativity, self-control, enabling circumstances, social persuasion, comparative benefit, and anticipated effort. The study's findings offer significant insights and practical implications for the implementation of M-learning in both research and practice. An inquiry into the essential factors can facilitate learner acceptance and is crucial for increasing students' educational experience and aiding in their acquisition of information and academic success. This study's significance is in delineating the elements that impact the acceptability and utilization of M-learning systems by higher education students. The anticipated outcome of this study is that policymakers will derive advantages in formulating an all-encompassing M-learning system [34].

The research of Goncharov, V. N et al. [35] highlights the significance of both social responsibility and professional competence among workers, and how these qualities are manifested in the concrete competency profile outlined in the Educational Standards for graduates of higher education programs. Within the quality management system for educating future process technologists, a crucial aspect for updating educational programs is the examination of the real skills

needed in the production process, in contrast to the competencies possessed by the personnel. The degree of professional competence is determined by a range of factors, including the business and personal traits of professionals. It is manifested via the knowledge, abilities, and experience necessary to accomplish objectives in a certain professional field.

Another study entitled" Multidimensional Big Data-Driven Research on the Optimization and Implementation of University Student Development and Management Strategies" written by Lv [36] explains the purpose of education is to enable students to develop fully, freely, comprehensively, and harmoniously. Student development is a societal concern that higher education institutions should prioritize, drawing upon a robust human resources foundation. Higher education should prioritize and address the issue of equipping college students with the necessary knowledge and strategies to effectively confront, resolve, and mitigate risks, tackle obstacles, and foster healthy growth. To align with the new mode of development, colleges and universities must incorporate the concepts of big data and advanced technology into their management practices. This will enable the widespread implementation of innovative strategies in education system development, as well as address the practical needs of the times, such as understanding teaching patterns, student growth, and developmental tasks.

Big data serves as a potent internal catalyst for the advancement of education, enabling schools and universities to achieve cutting-edge, timely, interactive, and personalized education management. Colleges and universities should proactively adopt the concept of big data, enhance the integration of data resources and the efficiency of staff in the field of education management through various methods, enhance management capabilities in multiple aspects, and facilitate the modernization and enhancement of the management structure of higher education and teaching. This paper examines the issues of student management in the era of big data by evaluating the historical context. It proposes ways to enhance the quality and efficiency of student management in this period [36].

In an article titled "Infrastructure for knowledge administration in a higher education institution: Expertise search system development", Abidin et al. [37] state that knowledge management is a determining factor for organizational effectiveness, organizational performance, and sustainable competitive advantage in higher education institutions (HEIs). Universities generate novel knowledge through research and community engagement, disseminate knowledge through instruction and learning, and transmit knowledge through consultations and scholarly discourse. A knowledge management system (KMS) is important for higher education institutions to ease the process of knowledge management. This study delineates the procedure of constructing a Knowledge Management System (KMS) as a platform to enhance the faculty's organizational capabilities. Data collecting was carried out via a discussion forum to get information and pinpoint existing difficulties with the data utilized in the creation of the KMS. Several IT specialists, academic members, and senior management personnel actively participated in the conversation. The acquired data was examined and subsequently integrated into the system, namely the expertise database and the conference database. The KMS development process followed the iterative approach as a guiding framework. This architecture enables engineers to revisit the system for future updates.

In line with this, previously in Zheng [38] mentioned that the era of the knowledge economy puts forward new requirements for human resource management in colleges and universities. An innovative human resource management system is necessary in higher education to foster the advancement of the field. This article discusses the implementation of computer-aided technology in the human resource management of colleges and universities. It suggests measures to establish mechanisms

for enhancing the overall talent resources in higher education, optimizing and renewing existing human resources, and promoting innovative resource management.

Based on the explanation of the five articles, it can be concluded that human resources (HR) plays an important role in organizational success. Qualified human resources are needed to achieve organizational goals, and good human resource management can improve overall company performance. Human resources are also considered a determining factor in achieving organizational excellence.

Hence, the examination of HR management holds great significance when it comes to the creation and execution of knowledge management systems in higher education. This is because the caliber of HR will directly impact the efficiency and triumph of implementing knowledge management systems in higher education institutions. Knowledge management plays a crucial role in HR management by enhancing employee performance and facilitating the exchange of knowledge within the firm.

This is the opinion that knowledge management has a significant impact on HR management [39]. HR practices, such as knowledge acquisition, sharing, interpretation, and storage, are positively influenced by knowledge management [40]. Companies with better knowledge management practices tend to perform better in HR management [41]. Knowledge sharing and utilization directly impact HR management, while knowledge generation and sharing have an indirect impact [42]. The role of HR is very important in mediating the impact of knowledge management on organizational performance, including HR management. HR practices affect human behavior and leadership, which in turn affect knowledge management and HR management. Therefore, knowledge management plays an important role in shaping and improving HR management practices in organizations.

Bibliometric Analysis with VOS Viewer

Furthermore, to find out the mapping of publications based on network/keyword linkage, the historical development of literature over time, and visualization of density based on keywords, Bibliometric Analysis was carried out using VOS Viewer, which is presented in Figures 5, 6, and 7.

Within the network representation seen in Figure 5, each element is denoted by both a textual label and a circular shape. The dimensions of an object's label and circle are contingent upon the dimensions of the item itself. The size and strength of an object directly determines the dimensions of its label and circle. Labels may be absent for certain goods. This is done to prevent the occurrence of overlapping labels. The color of an object is dictated by the cluster to which it is assigned. Lines connecting objects indicate hyperlinks. The proximity of the two journals in the graphic provides an approximate measure of their interconnectedness based on citation relationships. Typically, the proximity between two journals is directly proportional to the strength of their connection. The most robust co-citation among journals is also depicted as a line.

The network mapping of the Knowledge Management System in Higher Education study consists of 92 items, 4 clusters, 1406 links, and a total link strength of 3593.

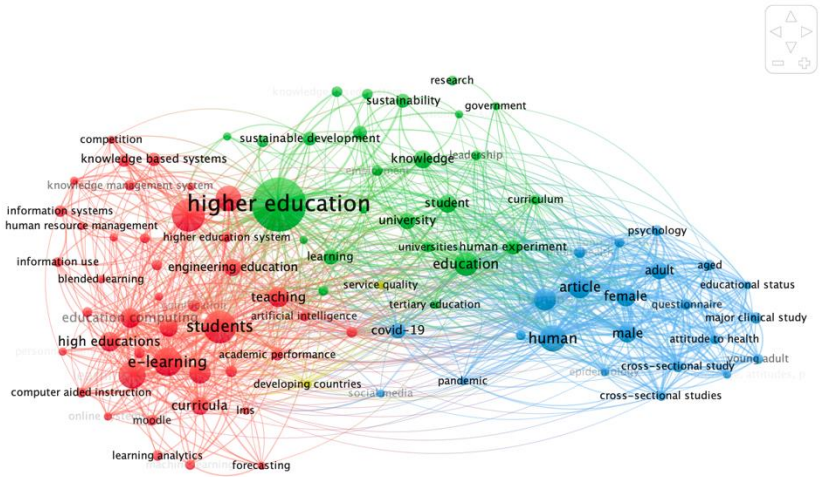

Figure 5. Network Visualization of Knowledge Management Systems in Higher Education
Source: VOS Viewer 2023

Based on the network visualization Figure 5, shows four research clusters categorized by certain colors, and in each cluster, several keywords with the same color can be seen. Cluster 1 discusses the theme of learning visualized by red, while Cluster 2 discusses the theme of colleges/universities visualized by green, cluster 3 discusses the theme of demographic characteristics with blue visualization color, and Cluster 4 discusses the theme of service quality and developing countries visualized by yellow. For more details, please see Table 1.

In Figure 5 it can also be seen that the most powerful items in the Knowledge Management System in Higher Education are the items "higher education", "students", "education" and "human". The item "students" represents cluster 1, with 68 links, a total link strength of 302, and 48 occurrences. The item "education" represents cluster 2, with 64 links, a total link strength of 187, and 27 occurrences. While the item "human" represents cluster 3, with 61 links, a total link strength of 326, and 33 occurrences. This means that the "human" item has the highest total link strength in the Knowledge Management System in Higher Education literature. This also illustrates that students are the main object of Higher Education HR and are part of a knowledge management system, especially in the education process.

Table 1. Color Grouping of Knowledge Management System Networks in Higher Education

Cluster	Keywords	Color
Cluster 1 (42 items)	academic performance; artificial intelligence; big data; blended learning; competition; computer-aided instruction; curricula; data mining; decision making; e-learning; education computing; education systems; engineering education; forecasting; gamification; high educations; higher education institutions; higher education institutions (heis); higher education systems; human resource management; information management; information systems; information use; knowledge-based systems; knowledge management; knowledge management system; knowledge sharing; knowledge-sharing; learning analytics; learning management system; learning management systems; learning systems; LMS; machine learning; moodle; online learning; online systems; personnel training; students; surveys; teaching	Red
Cluster 2 (25 items)	competencies; curriculum; education; employment; government; higher education; human experiment; innovation; knowledge; knowledge-based system; knowledge transfer; leadership; learning; quality control; questionnaire	Green

	survey; research; stakeholder; student; student engagement; sustainability; sustainable development; tertiary education; university; university sector	
Cluster 3 (23 items)	adult; aged; article; attitude to health; controlled study; covid-19; cross-sectional studies; cross-sectional study; educational status; epidemiology; female; health knowledge, attitudes, practice; human; humans; major clinical study; male; pandemic; procedures; psychology; public health; questionnaire; social media; young adult	Blue
Cluster 4 (2 items)	developing countries; service quality	Yellow

Source: VOS Viewer 2023

Furthermore, Figure 6 presents the development of literature from research on Knowledge Management Systems in Higher Education from year to year. The color range is from blue (oldest), then green, and finally yellow (newest).

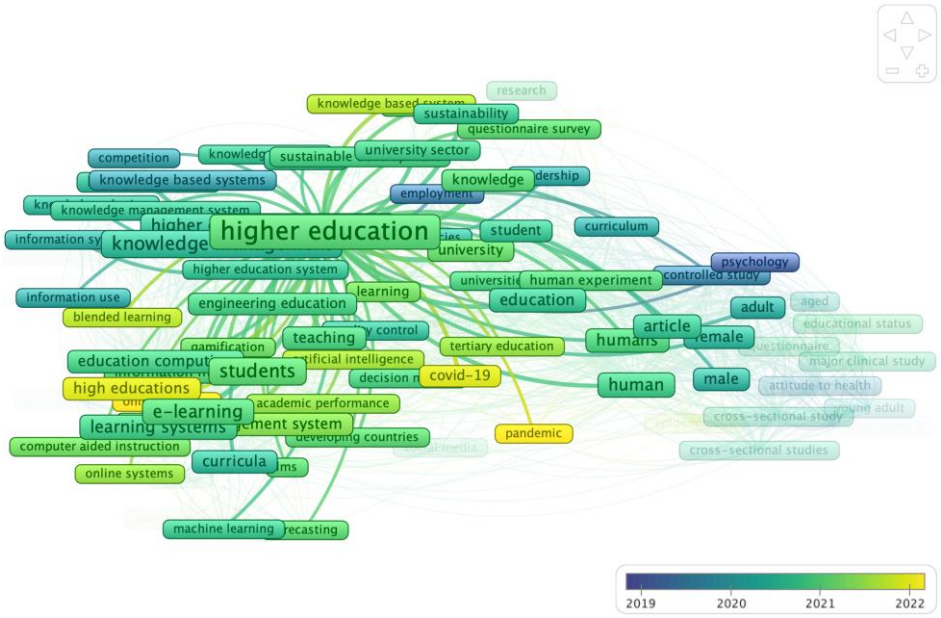

Figure 6. Historical development of *Knowledge Management* System literature in Higher Education

Source: VOS Viewer 2023

This research began in 2019, where in the early years' knowledge management was widely associated with the fields of psychology and labor studies. Knowledge management research in that year had a lot to do with competition items, knowledge-based systems, the use of information, and leadership. Only in mid-2020, did the research direction shift to the education area, such as teaching, learning, curriculum, and higher education systems. 2021, marks the latest discussion on higher education *knowledge management*, which has a lot to do with information technology development items such as computerization, blended learning, online systems, artificial intelligence, and gamification. Until the emergence of links to current issues such as the pandemic and COVID-19 items in research conducted around the beginning of 2022.

Figure 7 shows a visualization of the density of research areas. The brightness of the depicted area indicates the number of studies using the item as a keyword in that area. The brighter and lighter the depicted area, the greater the number of studies conducted using the item as a keyword. And conversely, the darker the color, the less the keyword was used. Thus, this condition can be interpreted as the greater the chance of novelty of future research using keywords in

darker areas, because it means that the use of these keywords is still relatively little used.

In Figure 7, the area around the "higher education" item is the lightest or brightest area. Followed by "e-learning", "students", and "human". This means that research on Knowledge Management Systems in Higher Education mostly uses the item "higher education" as a keyword. Students are also the main object as a measure of the success of human resources in Higher Education. While e-learning is a learning method that utilizes the use of ICT in the process of gaining, sharing, and using knowledge in Higher Education.

Based on the mapping in the three figures, it can be concluded that the literature on Knowledge Management Systems in Higher Education is divided into four clusters, namely: learning cluster; college/university cluster; demographic characteristics cluster; service quality and developing countries cluster. The development of topics in the literature on Knowledge Management Systems in Higher Education starts from psychology and labor studies, shifts to the education area, and then relates to the development of information technology, to the issue of the COVID-19 pandemic. The density of item usage in the literature on Knowledge Management Systems in Higher Education is centered mostly on the item "higher education", "e-learning" and "students."

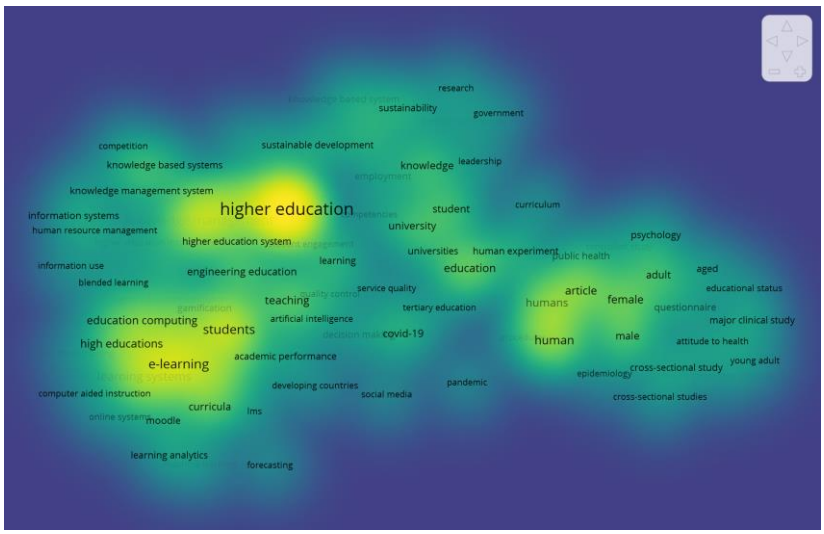

Figure 7. Visualization of Knowledge Management System Density in Higher Education
Source: VOS Viewer 2023

4. CONCLUSION

Based on the trend of Scopus-indexed publications, the results of the literature review, and bibliometric analysis during the period 2019 to 2023, it can be concluded that research on Knowledge Management Systems in Higher Education has not been widely studied in the context of HR management. Studies that link the Knowledge Management System in Higher Education with HR management are relatively few. Of the total 313 relevant documents, only 5 research articles, with a total of 27 citations, specifically use the keyword "human resource management".

Whereas the results of research mapping based on network/keyword linkage, the item "human" has the greatest total link strength in the Knowledge Management Systems in Higher Education literature.

In addition, the results of the Bibliometric analysis also show that the research object is still centered on the item "higher education", "e-learning" and "students" in the Knowledge Management

System in Higher Education. Higher education human resources are not only students, there are teachers or lecturers, education staff, policymakers, and higher education graduates, who are also part of a system of higher education.

This can be used as an opportunity for future research development related to the study of Knowledge Management Systems in Higher Education in the context of HR management. In addition, this opportunity can also be a novelty of research. It is hoped that knowing and understanding more about HR management in Knowledge Management-based Higher Education comprehensively can provide the widest possible benefits for various parties.

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