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Conceptual Atlas of the Knowmad Literature: Visual Mapping with VOSviewer

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Abstract: This research paper aims to contribute to the advancement of the knowmad concept understanding in the academic literature. The relevance of the knowmad worker is sustained by their skills and competencies aligned with the pre-announced requirements for competitiveness in the future business environment, where disruptive changes will become the norm. Knowmads are agile, flexible, determined, and overall resourceful to succeed. During COVID-19 pandemics, companies and employees worldwide have been facing one of the most disruptive events of our times that marked the acceleration of an already shifting paradigm: the migration from rigid work arrangements towards flexible ones. In the context where the knowmad worker assets are seen as the solution to a global crisis, and they continue to be seen as significant competencies for the future, we consider that a better understanding of the concept is currently required. This has been achieved in the present research project by conducting a systematic literature review, enhanced by text mining and scientific mapping analysis. Even though the notion of knowmad worker is relatively new in the knowledge management literature being presented by John Moravec only in 2008, novel research instruments are being used as an innovation factor. Considering the unprecedented access to information and advancements in conducting academic research, in the present landscape of the business research domain, new methods are available to structure and examine a body of literature. The text mining and scientific mapping analysis conducted with VOSviewer software version 1.6.16 is allowing us to identify meaningful insights about the knowmad concept, such as the (1) existing research gaps, the (2) future research directions – understood as the peaks and the valleys are defining our knowmad concept atlas – and (3) the research interest trends seen by this topic for the period between 2008 and 2021. To achieve this, a database derived from Web of Science's core collection has been used, and the text mining based on term co-occurrence analysis contributed to a deeper understanding of current and future global workforce dynamics.

Keywords: Knowledge worker; knowmad; digital nomadism; education; mobility.

Introduction

According to Syrett and Devine (2012), we live in a world of known knowns and unknown unknowns. The rise of the latter category confronts business executives with a new and uncharted management problem. Research from the academic world has shown that one of the most important organizational goals is to achieve meaningful results in globalization, digitalization, and automation of tasks. These factors create an unpredictable and difficult-to-navigate employment environment where veritable human talent races begin at a global level (Florida, 2002; Igielski, 2017, Bratianu, Hadad, & Bejinaru 2020). Business managers must realize that competent personnel is not a cost nor a resource, but a capital without which no company can survive and thrive, according to Igielski (2017). Outstanding human talent can produce meaningful outcomes in today's disruptive and innovation-driven market and push the businesses ahead beyond their known limits, on routes less traveled, opened by technological advancements. There is a need to better comprehend the future of the workforce in the "volatile, unpredictable, complex, and ambiguous (VUCA) business environment" (Bratianu et al., 2020, p.1)

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corporate environment and the post-pandemic setting characterized by significant strategic knowledge gaps (Bratianu & Bejinaru, 2021).

Today's business environment, the job market itself, and the most relevant skills are shaped by the advancing knowledge economy, enhanced globalization, and agile tasks automatization. In this disruptive landscape, the knowmads play an exponential role in anticipating the global labor patterns of the near future. John Moravec has initially sketched the prototype of the future knowledge worker. He advanced the notion in 2008 and settled the groundwork for an emergent literature segment (Moravec, 2008) on the premises drawn by Peter Drucker. A knowmad, as Moravec explains, represents an updated and upgraded knowledge worker being a highly skilled nomad. First, the knowmad is competitive in the work market due to being creative, inventive, and highly adaptable. Furthermore, he can operate well in any social, temporal, geographical, or even virtual environment (Moravec, 2008, 2013a, 2013b). Second, he is a nomad when it comes to his work setup or professional path.

After more than one decade, the knowmad topic is an engaging one, generating interest amongst researchers (Cobo & Moravec, 2011; Garcia, 2012a, 2012b; Kubik, 2013; Moravec, 2008, 2013a, 2013b; Moravec & van den Hoff, 2015; Orel, 2019, 2020; Correa Arias & Garcia Hijar, 2021; Iliescu, 2021; Rosa Fernandez-Sanchez & Silva-Quiroz, 2021). Nevertheless, under the accelerated transformations witnessed during COVID-19 pandemics, with a primary effect on the work arrangements, a better understanding of the knowmadic workforce is required (Iliescu, 2021). As Bratianu and Bejinaru explain, enormous strategic knowledge gaps have been created at the organizational level during the COVID-19 crisis, "and the only way to navigate this crisis is to create emergent knowledge strategies" (2021, p. 11).

During the COVID-19 epidemic and state of emergency implemented across the countries, an unprecedented number of workers operated their professional tasks from home, at flexible hours, and far from their managers' direct supervision. The prevalence of remote work during pandemics has increased from being a niche occurrence to becoming a mainstream one in the activity segments where having a computer and Internet access are the main requirements for performing daily tasks.

Nearly one year and a half after pandemics break at the beginning of 2020, we are noticing a tendency on companies' behalf to consider maintaining flexible working arrangements even after pandemics will no longer represent a health threat, following employees' feedback. As a further step toward achieving this goal, many governments, including Romania, are considering offering digital nomad visas, which would allow foreigners to settle in Romania while providing remote working services to consumers and companies located in other countries (Ernst&Young, 2021).

To best serve the research objectives, throughout this article, we will examine the stage of the dedicated literature, and we will identify the intellectual correlations of the knowmad concept as they are present in the knowledge management research field. This will let us visualize the current status of research by observing the existing links between knownmad concept and other important concepts and emphasize the most relevant relationships that we have discovered between them. This will be achieved by implementing a text mining analysis and enhancing the systematic literature review with the help of a computer-aided analysis software: VOSviewer software version 1.6.16. By building a visual map of the intellectual peaks and gaps of the knowmad concept, we will obtain a conceptual atlas of the knowmad concept, emphasizing the most relevant coordinates of the existing literature that can contribute to the advancement of the knowmad concept understanding.

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The structure of this paper is the following: first, we will introduce the knowmads through the findings of a systematic literature review that focuses on the specific features, attributes, and characteristics that define each knowmad. We will then describe the methodological approach and text mining analysis technique. Finally, we will discuss the findings of the study, the limits, and new avenues of investigation that arose based on this research.

Literature review

According to Moravec, one of the most important correlations of the knowmad idea is their evolutionary linkage to knowledge workers and their distinctive traits, which Peter Drucker initially described in the second half of the twentieth century (Moravec, 2008, 2013a, 2013b). In the knowmad literature, this origin is generally accepted by upcoming researchers that studied the topic. Even more, scholars unanimously acknowledge that the new generation is better prepared to confront and overcome the present difficulties (Cobo & Moravec, 2011; Garcia, 2012a, 2012b; Hokanson & Karlson, 2013; Moravec, 2008, 2013a, 2013b; Moravec & van den Hoff, 2015).

In the context of an intensified and globalized knowledge economy, it is critical to understand how the skills shift affects the traditional knowledge worker profile, its workplace, and its managers' approach towards work to better understand what gap is filled in by the knowmads. For the most part, a better understanding can be achieved by analyzing the skills, duties, and characteristics of the knowmads. According to the World Economic Forum's Future of Jobs Report, 50 percent of all workers will need reskilling by 2025 because of increased uptake of technological advances (WEF, 2020), and the top ten skills identified for 2025 are analytical thinking and innovation, active learning and learning strategies, complex problem-solving, critical thinking and analysis, creativity, originality and initiative, leadership and social influence, technology user, monitoring and control. To acquire these features, business education should adapt and upgrade so it can be ready to play the main role in the education of future workforce generations (Bratianu & Pinzaru, 2015; Bratianu, Stanescu, & Mocanu, 2021; Bratianu, Vatamanescu, Anagnoste, & Dominici., 2021).

Chronologically, Cobo and Moravec (2011) were the first authors that established a list of knowmad skills, covering three main areas, collaboration, critical thinking, and complexity management. In this structure, they grouped a total of up to twenty different skills like perseverance, creativity, flexibility, initiative, cooperation, self-confidence, time management, responsibility, teamwork, effective communication, adaptability, information and knowledge management, problem-solving, innovation, leadership, persuasion, empathy, dealing with uncertainty. We see how a knowmad is a knowledge worker who experiences a significant degree of independence and autonomy in the performance of his work tasks, as well as in defining the context performing them.

Entrepreneurship has only lately been recognized as a separate area of business administration, after years of being linked with the action of starting a new firm and establishing a business plan. For the time being, the primary and most often recognized frameworks for entrepreneurship are: "being proactive", "taking risks", and "inventing". This is why, based on their basic skills, knowmads can also be considered intrapreneurial individuals or entrepreneurs within the organizations (Iliescu, 2021).

Garcia (2012b) outlined a set of abilities that knowmads are considerably more likely to acquire when compared to the traditional knowledge workers after being involved in E-

learning endeavors. The defined comparison criteria for her study are represented by a set of ten critical competencies for future work:

C1. Creativity, collaboration, intuition, capable of creating new ideas;
C2. Adaptability to new and challenging situations, assertive, unafraid of failure;
C3. Good users of existing information and expertise for solving novel problems;
C4. Social creators, engaging social groups;
C5. Network creators (networks of people, ideas, organizations);
C6. Horizontal knowledge network creators;
C7. Digital literate;
C8. Contextually aware, information adaptation and users;
C9. Knowledge exchangers and promoters of open information access;
C10. Committed to lifelong learning, unlearning, relearning.

For all ten skills, there are substantial improvements found in the performance of knowmads. Although this is visible in Figure 1, a basic need must be met to guarantee the development of such abilities. This demand is related to information and communication technology (ICT).

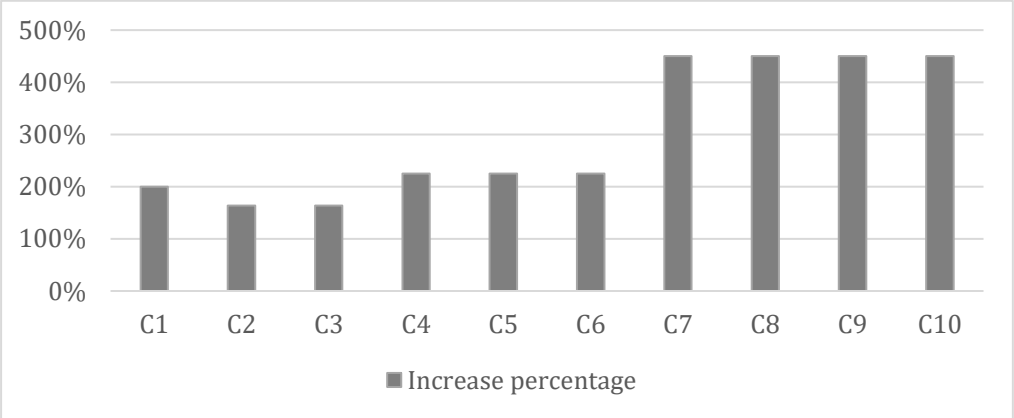

Figure 1. Performance increase rate visible in knowmads vs. knowledge workers
(Adapted from Garcia, 2012b)

In the current society, ICT skills are essential resources for lifelong learning, with a growing emphasis on thriving knowmads' success. E-awareness, technical, informational, and media literacy are pillars of a knowmadic lifestyle. They are the main assets that guarantee today's knowledge production and leisure, as Cobo (2013) points out in his book.

Nomadism is another crucial feature that distinguishes knowmads, complementing their unique skills. In recent years, several authors (Orel, 2020; Müller, 2016; Nash, Jarrahi, Shutherland, & Phillips, 2018; Wang, Schlagwein, Cecez-Kecmanovic, & Cahalane, 2018) studied labor migration trends and discovered knowmads designed new ways to be personally and professionally successful, outside of the well-known norms, defined by an open space office and fixed working hours schedule. Digital nomadism is a component of the knowmad worker's lifestyle, whether they choose flexible hours, opt for project-based engagements, or even choose to make a temporary home and work location out of an exotic destination or a traditional remote village in their own country. Irrespective of their preference, knowledge nomads thrive in their professional careers by surpassing the conventional time and space limitations traditionally imposed by a job. They manage this by enabling and sharing their knowledge with the help of technology, according to Moravec (2013a). Rather than following guidelines in completing predefined tasks inside hierarchical groups and organizations, the knowmads would rather continuously design

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their relevant working location and timeframe, activities, dependencies, and the knowledge networks that fuel their results for success.

In order to achieve the independence and autonomy they thrive, knowmads are naturally taking risks and have a fearless mindset towards failure (Garcia, 2012b; Hokanson & Karlson, 2013; Moravec, 2013b). Initially, Duckworth, Peterson, Matthews, and Kelly (2007) identified creativity, persistence, and grit as the three most important non-technical skills that a professional can hold to face the future challenges of the work environment. Building on these bases, Hokanson and Karlson (2013) consider that knowmads who show grit or perseverance have more chances of achieving their objectives. A new environment for development awaits them due to their involvement in increasingly exciting initiatives (Hokanson & Karlson, 2013).

According to Iliescu (2021), to remain relevant in the increasingly competitive global knowledge market, businesses must understand the complexity of knowmad skills. In a rapidly changing and uncertain economic climate, critical thinking assists knowmads in comprehending the complexity of their mission, while strategic thinking provides them with the necessary driving power to build their destiny via creative decision-making (Bratianu et al., 2021; Syrett & Devine, 2012).

Design of research

To learn more about future workforce dynamics trends, one may investigate the knowmad academic literature. Previous studies have proved to hold relevant information about how the next big jobs revolution will look like. The interdependency between the two concepts is supported by the proclaimed linkage between knowmad the workforce and a new type of society. While some authors name it a relational society (Cobo & Moravec, 2011; Engeström, 2004), other authors describe it as a borderless society (Kubik, 2013; Hokanson & Karlson, 2013), a digital one (Lindgren, 2017; Martin, 2008), or simply Society 3.0 (Moravec, 2008, 2013a, 2013b). What connects the views mentioned above is the depiction of a new type of individual able to succeed in any of the new societies.

As such, a better understanding of the knowmad workforce is needed, focusing on the peaks and gaps of the conceptual activity around this topic. In this context, the right research question that can guide us towards sought findings is: "*What is the intellectual distribution of the knowmad concept in the literature?*"

As regards the study's premise, this is built upon the assumption that, in the post-pandemics business environment, the knowmads will represent the new predominant employee worker prototype. The research objectives are twofold. The first objective targets are designing and conducting a comprehensive literature review and analyzing the knowmad workforce characteristics in detail. Furthermore, the second objective is to create a visual knowledge map that can guide researchers and practitioners in better understanding the theoretical distribution of the topic's correlated concepts and the knowledge gaps in the literature.

Text mining methodology

While the first specified aim of the research has been reached in the previous literature review section, a complementary computer-aided analysis process was conducted, utilizing VOSviewer software, version 1.6.16, to achieve the second defined objective. More precisely, by implementing this text mining analysis, we intend to identify and

explore those ideas in the Web of Science (WoS) core collection publications connected to the knowmad notion.

According to the software creators Van Eck and Waltman (2010, 2011, 2020), VOSviewer can be used in academic research projects to define, explore, and visually illustrate network-based scientific maps by employing text mining analysis. Out of the available range of approaches, the author used the term co-occurrence analysis option in the present conceptual exploration. In the present study, the terms or the words represent the unit of analysis. The analysis outcome is an intellectual plan or a knowledge atlas of the studied topic (Zupic & Cater, 2015).

While preparing the data extraction, specific settings were implemented concerning data search, filtering, and extraction. Firstly, the topic category has been defined, focusing on titles, abstracts, author keywords and keywords plus field. This allowed us to gather more accurate findings for our term co-occurrence analysis. Secondly, the search structure "knowmad*" has been established for identifying relevant publications. Any extra set of characters and no character are automatically considered on the corresponding place during the search process on WoS if an asterisk sign is inserted before, within, or after a search item. At the same time, if we use this character at the end of the search word, plurals are considered by the WoS search engine. In our study's case, the "knowmad*" search returned all publications including terms like "knowmad", "knowmads" or "knowmadic workforce". Therefore, we can state that the term before the asterisk symbol represents the search structure's core root. At the same time, different variants of the same lexical family could be relevant for the research. Furthermore, quotation marks have been used to ensure correct results and avoid lemmatization.

The software developers also support the idea of a controlled analysis environment in the manual for VOSviewer version 1.6.16 (Van Eck & Waltman, 2020), where they suggest that data cleaning processes should be implemented by researchers interested in term co-occurrence analysis. The main reason is to ensure a set of relevant data for the visual mapping by manually defining a thesaurus file. The first purpose of the thesaurus data cleaning file is to help the research author to replace specific structures, such as abbreviations ("ICT" has been replaced by "Information communication technologies"), to align synonyms under a core terminological umbrella ("business", "organization", "organizational"), or to align and harmonize small variation of the same concept (such as digital nomad lifestyle", "digital nomads perspective" and "digital nomadism"). The second purpose of data cleaning process based on a thesaurus file is to exclude author names, generic terms that – even though recurrent – do not bring added value to the analysis ("century", "job", "profession", "student", "world"), as well as research-specific terminology ("paper", "author", "keyword", "interview", "questionnaire", "journal").

To achieve the second research objective, we defined a relevant sample of data to be analyzed: all types of documents, available on WoS core collection, having their abstract and titles in English published as of 2008 until 30th of July 2021 have been considered. The so-defined data set has been exported. A total of ten WoS core collection publications have been identified. The VOSviewer analysis of the term co-occurrence in titles and abstracts by implementing the full counting method revealed a total of 323 terms. Of course, not all over 300 terms can be equally relevant for very specific research. As the current study approaches a still emergent concept, we find a data cleaning step essential in preparing the term co-occurrence analysis database. To identify and focus on the essential conceptual nuances and the meaningful connections between key intellectual ideas, it is important to make sure that terms diluting the database and the analysis results are eliminated.

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Finally, out of the total of 323 terms identified, 19 unique and relevant items were considered for VOSviewer mapping. The analysis parameters were adjusted: the minimum required amount of occurrences of a single term was set to 1 by manually adjusting the default option of the software of focusing on the top 60% of most recurrent terms (Van Eck & Waltman, 2010) to focusing to 100% of the terms. This option allows us to have a complete overview of the conceptual visual mapping after implementing data cleaning. There are no redundant terms in our database concerning the subject of analysis. Consequently, the text mining software generated an intellectual distribution map of 19 items (terms), assigned to three different clusters, sharing 144 links and a total link strength of 1,910. An initial finding is represented by the strong correlation between all 19 terms.

Findings and discussion

In this section, we will discuss in detail the connections established between the knowmad concept (cluster 1) and the education concept (cluster 2). As illustrated in this section, the two clusters are gaining relevant meaning only in the context of the knowledge society (cluster 3), and this will also reflect in the discussions below.

Table 1. VOSviewer cluster 1 analysis

Term	Cluster	Occurrences	Links	Link strength
Knowmads	1- Knowmads	26	18	509
Knowledge worker		14	17	271
Organization		14	18	255
Digital nomadism		8	11	248
Creativity		6	15	191
Mobility		6	16	162
Leisure		5	11	170

Source: Author's research

In Table 1, we present the first cluster, "Knowmads", the terms assigned by VOSviewer under this cluster, as well as the occurrences, links, and link strength value for each of the terms. The "Knowmads" term registers the most substantial values for all three parameters: throughout all analyzed publications and after performing the methodological data cleaning, the "Knowmads" term appears 26 times, and this value has been obtained by implementing the full counting analysis option. As the link's value is 18, this represents is that the term "Knowmads" is directly linked with each of the other terms in our database (a total of 19). This indicates a direct relationship between the subject of the research and the rest of the identified term co-occurrence analysis items. The link strength represents a parameter that always takes a positive numerical value, and it is flexible, depending on the incidence of a given term through analyzed documents. The value 509 indicates that the first and most popular term of the first cluster has the highest incidence across the ten identified documents, compared with all other terms, regardless of the cluster. The link strength values are also helping us to identify the peak points in our analysis – those concepts most related to the knowmad concept in the literature: "knowledge worker" (271), "organization" (255), and "digital nomadism" (248). At the same time, "creativity" (191), "mobility" (162), and "leisure" (170) have the lowest incidence values of the first cluster.

Table 2. VOSviewer cluster 2 analysis

Term	Cluster	Occurrences	Links	Link strength
Education	2 - Education	21	18	359
Holistic Learning		14	18	259
Virtual Environment		5	12	97

Source: Author's research

In Table 2, we summarized the terms associated with the second cluster, "Education". The term also gives the name of the cluster. It is the second most encountered term across all analyzed documents, having an occurrence value of 21, at only five occurrences behind "Knowmads." It is essential to mention that the frequency is cumulated, counting multiple occurrences per document, if the case might be. We have opted for this analysis option to obtain a comprehensive overview of the areas of interest in the literature associated with our topic of study. The alternative option of singular counting per document was not suitable for this study. Both "Education" and "Holistic learning" are linked to all other analysis units of analysis on our conceptual map. This shows us the importance of education and holistic learning in correlation with the knowmad concept. Both concepts also have very high link strength values, which again suggest researchers' interest in knowmads-education and knowmads-holistic learning correlations. When it comes to "Virtual environment" (97), its importance as an alternative learning environment has been recognized by scholars but not yet studied as much as other concepts.

Table 3. VOSviewer cluster 3 analysis

Term	Cluster	Occurrences	Links	Link strength
Knowledge Society	3 - Knowledge society	19	18	340
University		12	14	220
Information Communication Technology		7	15	137
Skills		7	17	175
Challenge		7	16	140
Learning		5	16	92
Academic Learning		4	12	74
Digital Infrastructure		4	16	104
Adaptability		1	10	17

Source: Author's research

Table 3 listed all nine units included by VOSviewer under the "Knowledge Society" cluster. Out of the group, we notice "Knowledge Society" (340), "University" (220), and "Skills" (175) as the peak points of interest presented by the authors. These could be interpreted as areas of literature that received high academic attention. At the same time, "Adaptability" (17), "Learning" (92), and "Academic learning" (74) could be interpreted as the associated concepts with knowmad workforce that received less attention amongst studied publications.

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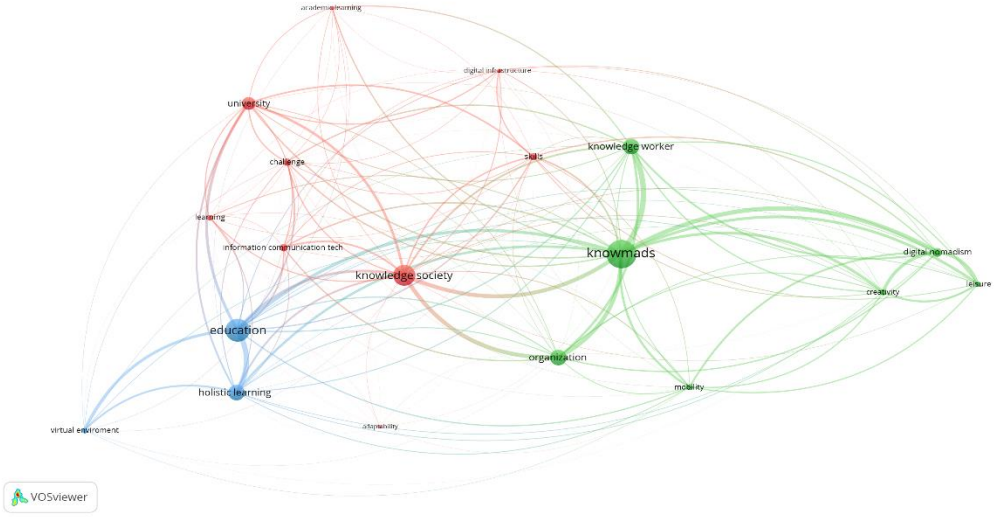

Figure 2. Network visualization by VOSviewer software version 1.6.16
(Author's research)

In Figure 2, we are presenting the network visualization of the three clusters: cluster 1 "Knowmads" in green, cluster 2 "Education" in blue, and cluster 3 "Knowledge society" in red. Each term sphere size and distance are visual representations of their connection strength values given in the tables, according to Van Eck and Waltman (2010). The word "Knowmads" is positioned in the relative center of the network, sharing a similar position with the "Knowledge society" term, as they are both located on the contour of an imaginary center of the network. This means that there is not one predominant concept in our analysis, but a set of essential ones defining the meaning of the knowmad idea. Another exciting network aspect relates to the fact that, even though directly connected through specific items, cluster 1 "Knowmads" and cluster 2 "Education" seem to be separated by cluster 2, "Knowledge society". Building on the insights gained through the systematic literature review, this visual distribution can be explained as follows: education is a fundamental concept associated with the knowmad workforce, but current education needs should be understood in a knowledge society. This idea will be extended in the following findings and discussions section.

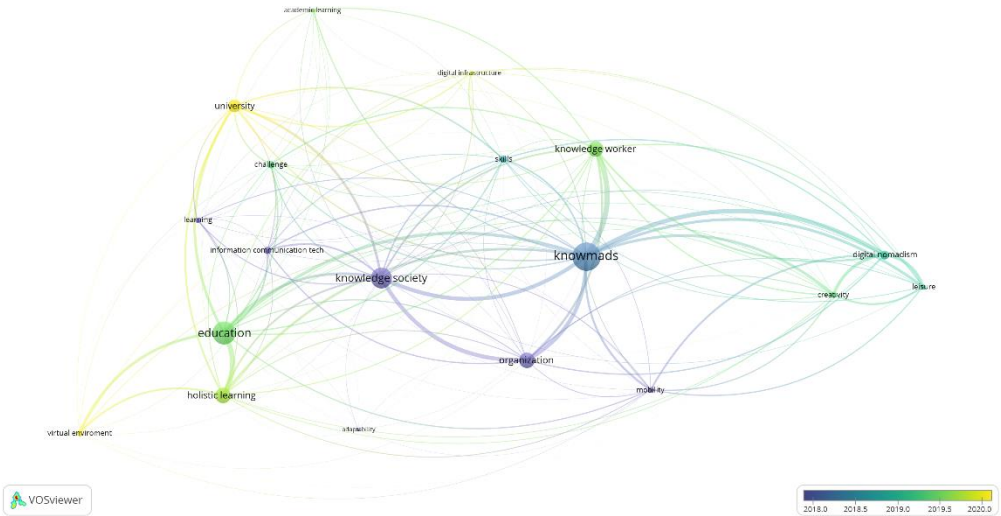

Figure 3. Overlay visualization by VOSviewer software version 1.6.16
(Author's research)

Next, we can see the terms color-coded by publication period in Figure 2 above. Concepts like "learning", "information communication technology", "knowledge society", "mobility" or "organization" are present in the dedicated studies since before 2018 (dark purple). By following the color gradient towards blue, we can visually understand how the scholar's attention slowly shifted towards "knowmads", "leisure", "creativity" and "digital nomadism" between mid-2018(blue) and 2019 (emerald). Advancing on the time axis, as of mid-2019 "knowledge workers", "education" and "alternative learning" topics became more attractive for researchers, while early and mid-2020 publications are starting to focus on "virtual environment", "holistic learning", challenges faced by "universities" and the "digital infrastructure" disparities, in correlation with the knowmad concept.

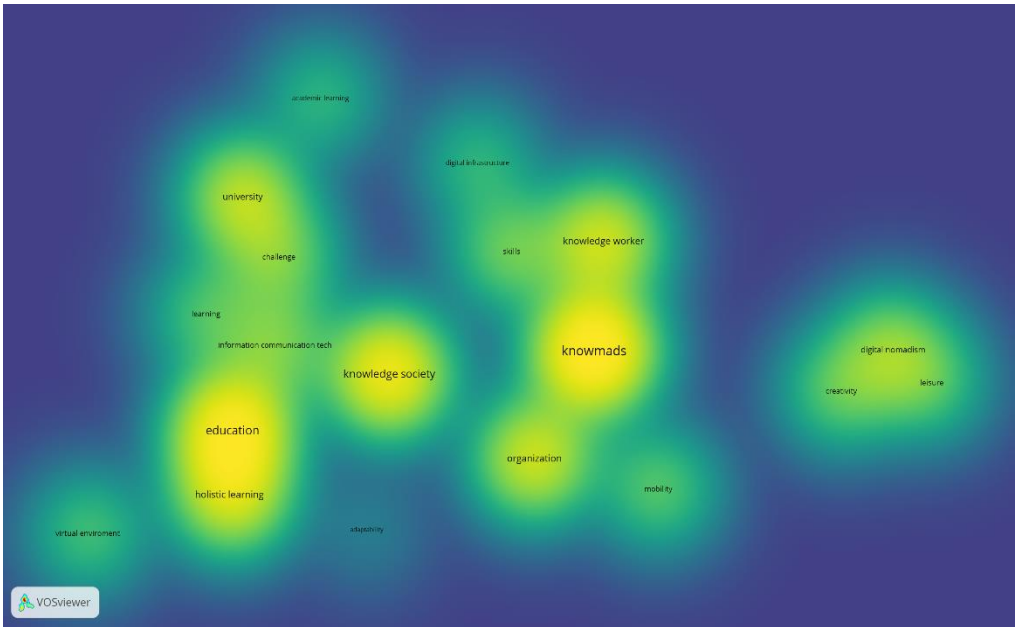

Figure 4. Density visualization by VOSviewer software version 1.6.16
(Author's research)

In Figure 4, we can observe the representation of the density overview of the clusters, broadcasting the most visited concepts in the literature, correlated with the knowmad concept. According to Van Eck and Waltman (2010), each term has an associated sphere with a specific dimension and density of color. Also, there is a specific distance between each sphere. These three parameters are directly linked to each item's values reflected in the cluster tables. For instance, "education", "knowledge society," and "knowmads" have the most visible hallows on the map, and this is in alignment with their leading clusters positions and highest values in their cluster when it comes to the occurrences. An interesting aspect is a fact that "knowmads" concept appears to be in closer relationship with "organization", "knowledge worker", "mobility," and "skills" in comparison to other items. This visual effect can be caused by the fact that closer items on the density map are part of the same article. It is also interesting to note the appropriation between items belonging to different clusters. In this respect, we notice how "knowmads" (cluster 1) is very close to "knowledge society (cluster 3) which is very close to "education" (cluster 2).

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Table 4. Selected articles for findings and discussion

Topic	Method	Author/s (date)
Education sector challenges in the hyper-connected society for both universities and students.	Quantitative	Garcia, Llamas-Salguero, Fernandez-Sanchez, and del Campo (2020)
Integrating holistic learning models in universities to meet knowmad learning needs.	Conceptual	Harkema & Popescu (2018)
Connection between new educational strategies mediated by virtual environments, social inclusion impact and educational policies.	Qualitative	Correa Arias, Cesar; Garcia Hijar, Maira Beatriz (2021)
Knowmad workforce potential and level of awareness amongst Ecuadorian companies.	Quantitative	Vizueta Choez, Genesis; Rojas Villagomez, Sheyla (2017)

Source: Author's research

The evident interest in education and the academic influence on the transmission of skills to generations to come to meet the demands of the business environment are two examples of spikes of the knowmad literature. Nevertheless, on our knowledge atlas of the knowmad concept, every intellectual peak is emphasized by a knowledge gap in proximity to each other.

For example, Garcia, Llamas-Salguero, Fernandez-Sanchez, and del Campo (2020) are implementing a quantitative study to identify critical challenges universities face in the learning models update processes in the new knowledge society. These processes are essential to the authors because they could ensure students' future market requirements, skills, and competencies. Surprisingly, upon initiating the research that could test the established hypothesis, the authors found that students also face specific challenges in benefiting from updated learning models within universities. Garcia et al. gathered 757 questionnaire responses from Spanish respondents between 20 to 57 years old and found that there is a double responsibility that universities and students need to assume. It is vital that universities adjust their strategic plans to accommodate the advancements in the technology industry and that students become technologically savvy to take advantage of new academic programs intended for the future. These findings prove that more studies might be required on the students' readiness for engaging in alternative learning methods across various countries.

Another research that strengthens the relationship between knowmads and education was developed by Harkema & Popescu (2018) and aims to contribute to the academic institutions' readiness to welcome new knowmads generations. First, they underline the different learning methods that the young generations - profoundly shaped by the digital environment they were born in – might prefer. The result of their exposure to the Internet from early ages creates open-minded and results-oriented future students that cannot separate the daily technology activities from acquiring new information and developing competencies. In the next generation adapted academic processes, according to the authors, the learning strategy should be a holistic one designed around a conceptual quadratus: the world, the cultural ecosystem, the economic system, and the social participation (Harkema & Popescu, 2018). As examples of related subjects in each area, we may point to the study of globalization, interconnection, and digitalization and the development of inclusive and diverse societies based on multiculturalism principles. Analyzing the knowmad atlas' education peak from a different perspective, once again, a knowledge gap reveals itself: are universities ready to integrate holistic learning methods that will have the individual at center and focus on future skills development?

Moreover, is there also holistic management waiting for the young generations on the work market? Today more than anytime before, technology allows us to replace the poor management limited to overseeing workers with management built on trust, which targets exceptional results and values employees' work-life balance and needs for autonomy and flexibility. For example, Vizueta Choez and Rojaz Villagomez (2017) analyzed the Ecuadorian business environment and found that most businesses are not yet open to accept the great potential of knowmads.

Furthermore, Correa Arias, Cesar; Garcia Hijar, Maira Beatriz (2021) performed qualitative research and applied semi-structured in-depth interviews to relevant individuals from an educational association to determine the relationships between three interest spheres: technological advancements in education practices, social inclusion limitations and opportunities and the formal education policy in Mexico. The study results proved that pedagogical initiatives enabled by virtual social networks work as incubators for knowledge workers and nomad knowledge workers. By combining the three dimensions, the authors find that significant benefits could be noticed if national education policy would promote horizontal learning strategies that would benefit all citizens regardless of educational backgrounds and training paths. We notice how social inclusion becomes a key variable in the success of new educational strategies for the future. This idea is supported by similar studies emphasizing the inequities amongst social groups in accessing educational opportunities suitable for developing knowmadic skills (Beck et al., 2013).

Conclusions and limitations

The purpose of this study was to build a visual atlas of the knowmad concept and contribute to the theoretical knowledge on the topic. This was achieved by implementing a comprehensive literature review initially, followed by a computer-aided text mining analysis. While we successfully identified a set of research interests associated with the knowmad concept, we have also found that each of them holds specific knowledge gaps and research areas that would require increased scientific attention.

Through this study, we have noted that the most visited research area in the knowmad literature is the knowmads' education in the knowledge society. Building on the insights gained through the systematic literature review and the visual distribution, we have found that education is a fundamental concept associated with the knowmad workforce, and it is mandatory to be understood in the knowledge economy context. Only from this perspective, we succeeded to identify a set of suggested future research directions. Out of these, we name education systems actors' readiness to learn for the future, companies' and managers' readiness to welcome future knowmads as well as potential inequities in accessing new forms of education at the society level. Consequently, we have found that all involved actors might need to prepare in specific ways for the upcoming work revolution: students, governments, academic institutions, business managers, and work professionals.

Regarding the limits of the study, for the present study, only papers from WoS have been analyzed, although papers on this topic were also published in some journals which are not indexed in WoS.

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