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Department of Marketing, Operations and General Management

Future of Work: a state-of-the-art

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Master in Management

Supervisor:

PhD, Leandro Ferreira Pereira, Associate Professor with habilitation

ISCTE-IUL

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Abstract

The future of work is an area of interest for scholars and analysts. Throughout the last few decades there have been several perspectives about it, and the greatest reason for concern is related to the technological evolution which, in many analysts' point of view, will relegate humans to an expendable status in many areas, thus generating a shortage of jobs and major economic problems. In this paper, this perspective and others put forward by analysts will be analyzed in a bibliometric way. Using data collected from the Scopus website, this will be analyzed using the outputs from the VOSviewer software, followed by a literature review of the 20 most cited articles about the future of work and, to conclude, a personal analysis intended to understand the most relevant topics and reasons for optimism and concern.

Keywords: Future of Work, Future Workforce, State-of-the-Art, Scopus, VOSviewer, Artificial Intelligence, Digitalization, Technology, Employment, Labor Market, Workplace, Covid-19, Remote Work.

1. Introduction

The future of work is a theme that has been on the agenda for several decades. There are several doubts about how the general structure of work will look like in the future, with these doubts going through several topics, namely the impact that technology will have on tasks, employment rates, and general working conditions.

The objective of this study is to perform a literature review about the topic of future of work and analyze data from it. This is done through a bibliometric analysis of all articles published on this thematic since 1976 and available in Scopus, and, based on the most recurring keywords, perform a detailed review of the 20 most cited articles, followed by a personal analysis, in the findings and conclusion chapters.

This study starts with a description of the methodology used. Based on this methodology, the author designed the research question, collected data about the future of work literature, resulting in a robust dataset containing 305 records, conducted a quantitative data analysis of the state-of-the-art, provided the most relevant findings from the 20 most cited articles, and concluded with a qualitative analysis of those findings.

Within the frame of the literature, the author formulates the following research question:

What are the main themes in discussion when it comes to the future of work, and what have the analysts' perspectives been through the years?

2. Methodology

To provide an insightful state-of-the-art for the future of work, both in quantitative and qualitative terms, the research methodology consists of several phases. Firstly, the formulation of the question, which is stated in the previous chapter. Secondly, the data collection, which was obtained from Scopus, a scholar database. Finally, this data was split into several clusters and outputs to facilitate its analysis, through a software called VOSviewer. A more detailed explanation of the data collection and analysis procedures follows.

2.1. Data Collection

As mentioned above, the data was collected through the scholar database Scopus.

Inside the website www.scopus.com, under the filter “Article title, Abstract, Keywords”, the author of this paper researched for “future of work” OR “future workforce”. Then, he limited the results to the subject of “Business, Management and Accounting”, the document type to “Article”, and the “Open Access” to “All Open Access”. This resulted in 305 articles. The author then sorted the results in terms of number of citations in descending order- which was relevant to subsequently carry out a detailed literature review of the 20 most cited articles- and extracted the bibliometric data of all articles, for it to be used in the VOSviewer software. It’s important to note that this was done on the 16th of March 2022, which means that all data is referent to that date.

2.2. Data Analysis

The data about these articles was then extracted, in order to be subject to a cluster-based analysis, through the previously mentioned software called VOSviewer. VOSviewer is a computer program used for constructing and viewing bibliometric maps (Eck & Waltmann, 2010). There are several types of analysis available: co-authorship, co-occurrence, citation, bibliographic coupling and co-citation. For this paper, the types of analysis executed were the following:

Type of Analysis	Unit of Analysis	Counting Method
Co-authorship	Countries	Full counting
Citation	Sources	
Bibliographic Coupling	Documents	
Co-occurrence	All keywords	

Table 1 – Types of analysis used in this paper (Source: Author)

These types of analysis were selected as they provide an overview of different indicators about the prevailing authors, their nationalities, most frequent keywords (which will serve as a

basis for the literature review itself) and the most cited journals and documents, as well as the links between these characteristics.

3. Results

Based on the types of analysis mentioned in the methodology chapter, VOSviewer produced several results which will be presented in this chapter.

The “Co-occurrence – All Keywords” analysis is of special importance, as it provides the basis of what the main topics relating to the future of work are. Therefore, a literature review is conducted in this chapter after the keyword analysis, being split between the following sub-chapters: Artificial Intelligence (also containing the keywords Automation, Technology and Technological Change); Employment and Labor Market; and finally, Working Conditions/Workplace and Covid-19.

3.1. Co-authorship - Countries

Starting with the “Co-authorship – Countries” analysis, through VOSViewer’s output, 8 different clusters were created, with 29 items (countries), as presented in the table below:

Cluster 1	Austria
	Belgium
	Denmark
	Finland
	Netherlands
	Norway
	Spain
Cluster 2	Canada
	Israel
	New Zealand
	Taiwan
Cluster 3	France
	India
	Italy
	United Kingdom
Cluster 4	Australia
	Oman
	Singapore
Cluster 5	Czech Republic
	Russian Federation
	Slovakia

Cluster 6	Malaysia
	Switzerland
	United States
Cluster 7	Brazil
	China
	Vietnam
Cluster 8	Germany
	Poland

Table 2 – Clusters of Co-authorship – Countries (Source: Author)

Not all countries whose authors released articles related to the future of work are mentioned in this analysis, because a minimum of 2 documents was defined as a requisite for the formation of the clusters. This resulted in 32 countries being presented in the network visualization, from the 65 countries featured in the extracted dataset. With this analysis, it is intended to understand which countries have made more work on the concept of future of work, both at an individual level, through the number of documents released and citations received, but also at a collaboration level, through the links between nationalities and total link strength.

The top 5 countries in terms of total link strength are the United States of America (USA), Germany, United Kingdom (UK), Australia and the Netherlands. A table containing the quantification of the total link strength, as well as the number of documents and citations of documents co-authored by authors from each country of this top 5, is provided in table 3:

Country	Documents	Citations	Total Link Strength
USA	75	935	40
Germany	34	406	34
UK	61	1008	30
Australia	38	357	26
Netherlands	6	50	16

Table 3 - Top 5 countries based in Total Link Strength (Source: Author)

It is important to note, however, that the Netherlands, despite having strong links, i.e. Dutch authors have collaborated a considerable amount of times with authors from other nationalities, is not the fifth country with most documents and citations. That status belongs to India, with 16 and 65, respectively. It is not included in table 3 because it has a lower link strength (2) than the Netherlands. This happens because Indian authors have only co-authored with authors from

two other nationalities - American and British – on one author each, whilst Dutch authors co-authored with sixteen people from different nationalities.

Besides the number of documents and citations, VOSviewer offers the possibility to visualize the average publication years for the documents of each country, as well as the average citations for each document.

Figure 1 contains a network visualization of the average publication years of documents related to the future of work. To generate this graphic, the chosen weight was “Documents” and the chosen type of score was “Average Publication Year”. Since the weight is “Documents”, the items with the biggest size in the figure represent the countries with the most documents published, and vice-versa. This is in accordance with the data presented in table 3, demonstrating that the United States, United Kingdom, Australia and Germany dominate in terms of number of documents published about the future of work. Note that the Netherlands, despite its strong number of links (which is also shown in figure 1 through the links connecting it with many other countries) has a very low weight, which happens due to there only being 6 documents authored by Dutch authors.

Since the generality of the documents extracted about the future of work are relatively recent, the interval of years chosen was between 2015 and 2020. This means that countries whose documents were predominantly published before 2015 have a dark blue color, whilst the countries whose documents proceed 2020 have a yellow color. The output produced was the following:

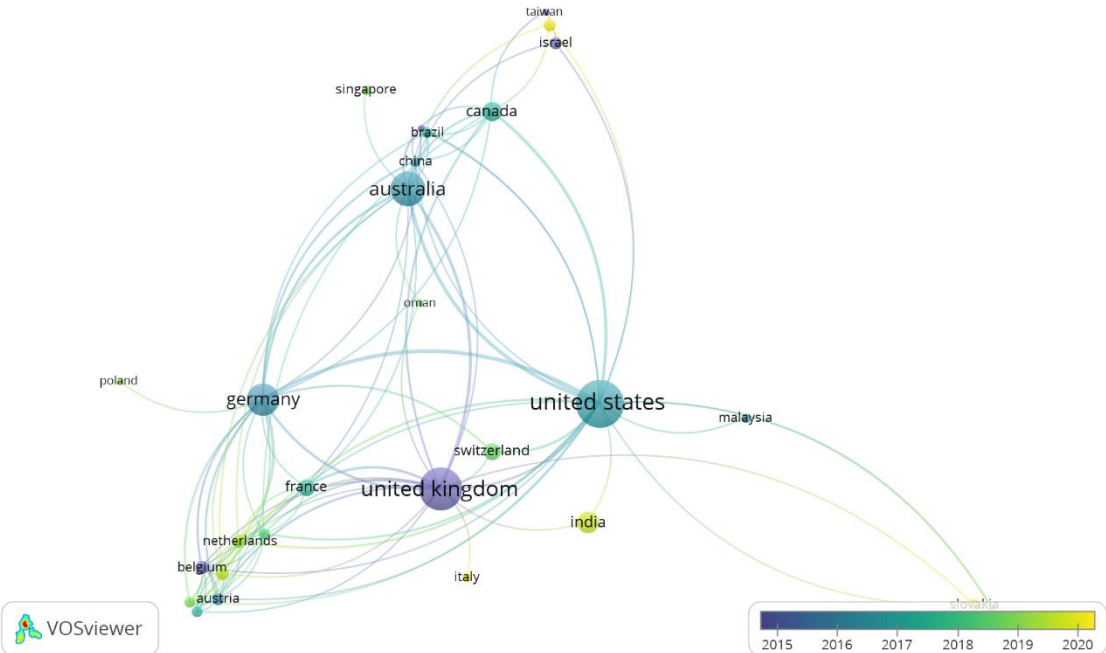


Figure 1 - Average Publication Years (Source: VOSviewer)

Through the colors, it's clear that the top 4 countries with most representativeness tend to have average publication years closer to the minimum score of 2015. Netherlands and India have more recent documents on average, as well as other countries with lesser link strength and number of documents, such as Belgium, Italy and New Zealand. The details of the top 5 countries with most documents published, in terms of average publication year, are shown in table 4:

Country	Cluster	Link	Total Link Strength	Documents	Avg. Publication Year
United States of America	6	22	40	75	2017
United Kingdom	3	18	30	61	2015
Australia	4	15	26	38	2016
Germany	8	17	34	34	2016
India	3	2	2	16	2020

Table 4 - Top 5 countries with most documents, and their average publication year

(Source: Author)

It's also important to describe the variables "Link" and "Total Link Strength". A link is a connection between two items in the dataset, which in this case means that if there is a link between two countries, there is a co-authorship between authors of those two nationalities. United States is the country with the most links (22), meaning that American authors collaborated with authors from 22 other nationalities for the concept of future of work.

As for "Total Link Strength", this represents the recurrence of a certain link. United States have a total link strength of 40, which means that there are 40 different authors included in the 22 nationalities mentioned in the previous paragraph.

The second figure generated is also based on "Documents", but the type of score is "Average Citations".

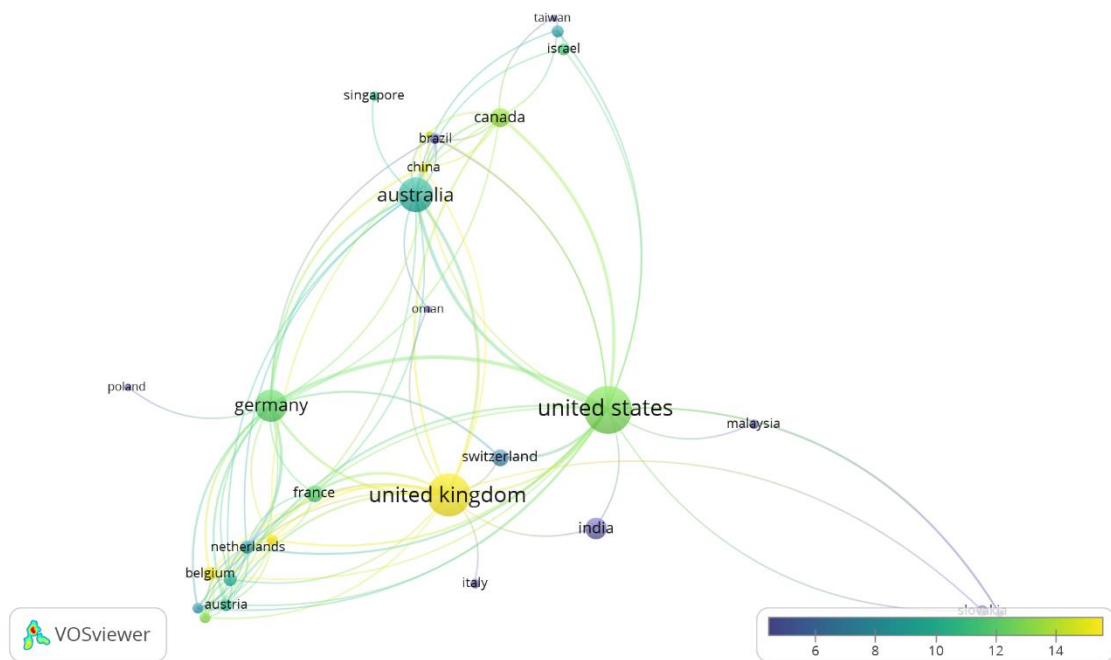


Figure 2- Average Citations (Source: VOSviewer)

The interval chosen was between 5 and 15. The previously mentioned countries with the highest number of documents have, in general, a considerable number of average citations. However, only the United Kingdom is represented in the top 5 countries with highest average citations. The details are presented in table 5:

Country	Cluster	Link	Total Link Strength	Documents	Avg. Citations
China	7	7	8	3	33,33
Finland	1	11	13	4	19,75
United Kingdom	3	18	30	61	16,52
Belgium	1	10	12	6	16,33
Vietnam	7	6	7	2	14

Table 5 - Top 5 countries with higher Average Citations (Source: Author)

China is the country with the most average citations (33,33) by a considerable distance from the second placed Finland (19,75). This means that, on average, each document co-authored by Chinese authors is cited 33,33 times. The fact that Chinese authors have only authored 3 documents may be a helpful factor for this indicator.

3.2. Citation – Sources

The “Citation – Sources” analysis shows the most cited journals who have published articles about the future of work, as well as the connections between them. The total number of sources is 190, and they have all been included in the dataset, as the defined number of documents to be eligible was 1. The dataset produced 9 clusters. Based on the number of citations, figure 3 contains the visualization of the weight and connections between journals:

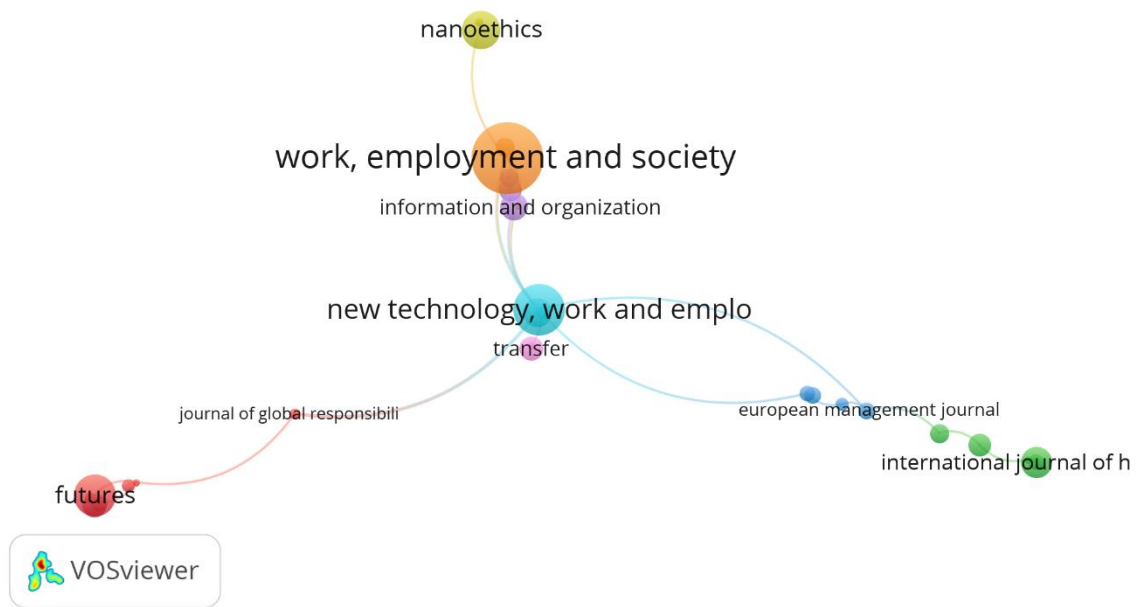


Figure 3 – Cited journals (Source: VOSviewer)

“Work, Employment and Society” and “New Technology, Work and Employment” are the two most cited journals, and they are also connected to each other, meaning that there have been papers in which these journals’ articles about future of work have been cited together.

However, despite being the most cited, neither of these two journals are the first placed in the hierarchy of number of documents released about future of work. That place belongs to the “Futures” journal, as shown in Table 6:

Source	Documents	Citations
Futures	16	130
International Labour Review	11	39
New Technology, Work and Employment	10	200

Work, Employment and Society	9	386
International Journal of Human Resource Management	5	75

Table 6 - Top 5 journals with most documents published (Source: Author)

Based on these numbers of citations and documents published, it's fair to say that "Futures", "New Technology, Work and Employment" and "Work, Employment and Society" are the three standout journals working on the subject of future of work.

3.3. Bibliographic Coupling – Documents

Another piece of analysis from the dataset obtained in VOSViewer is "Bibliographic Coupling – Documents", which refers to the frequency with which two documents are cited together, as well as individually (Small, 1973).

300 documents were eligible for the dataset, and a minimum of 10 citations was defined in order for them to be inserted in the dataset, with 84 documents meeting this criteria. The output produced 11 clusters and the following graphic:

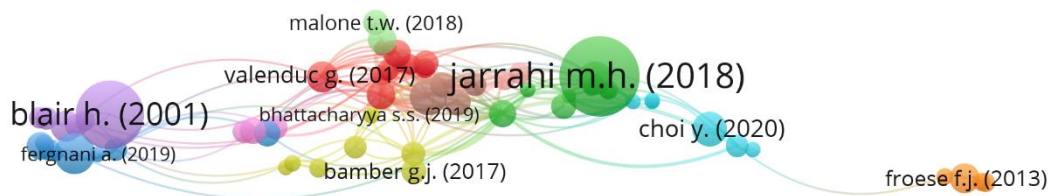


Figure 4 - Authors with most cited documents (Source: VOSviewer)

As it's possible to tell from this graphic, Jarrahi M.H. (2018) and Blair H. (2001) represent the biggest weights, meaning that they have the most citations. Details about the number of citations and the document titles of the top 5 most cited documents are shown in table 7:

Author	Document title	Citations
Jarrahi M.H. (2018)	Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making	281
Blair H. (2001)	‘You’re only as good as your last job’: The labour process and labour market in the British film industry	204
Hodgson D. (2013)	Controlling the uncontrollable: ‘Agile’ teams and illusions of autonomy in creative work	74
Spencer D.A. (2018)	Fear and hope in an age of mass automation: debating the future of work	63
Choi Y. (2020)	Service robots in hotels: understanding the service quality perceptions of human-robot interaction	56

Table 7 – Top 5 most cited documents (Source: Author)

Using “Total Link Strength” as a weight, the following graphic is obtained:

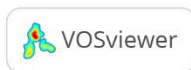
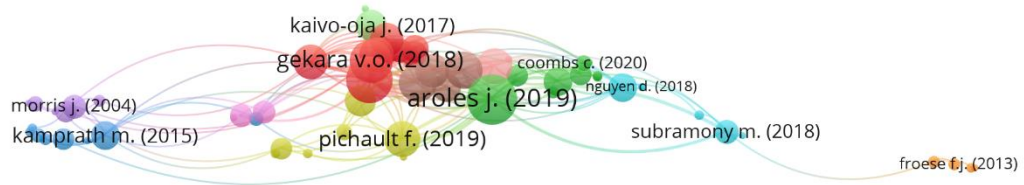


Figure 5 – Authors with the strongest links (Source: VOSviewer)

The authors and documents with the strongest links, i.e. the authors whose documents are most cited together with other documents about the future of work, are demonstrated in table 8:

Author	Document title	Links	Total Link Strength
Aroles J. (2019)	Mapping themes in the study of new work practices	20	49
Shestakofsky B. (2017)	Working Algorithms: Software Automation and the Future of Work	22	43
Gekara V.O. (2018)	New technologies and the transformation of work and skills: a study of computerisation and automation of	18	36

	Australian container terminals		
Spencer D.A. (2018)	Fear and hope in an age of mass automation: debating the future of work	14	29
Santana M. (2020)	What is the future of work? A science mapping analysis	15	27

Table 8 – Top 5 most co-cited documents (Source: Author)

3.4.Co-occurrence – All keywords

The “Co-occurrence-All Keywords” analysis was made with a minimum of 5 occurrences for a keyword to be eligible for the network. This meant that 41 items were utilized, from the initial 1312 keywords.

This query is particularly important for this paper, as by displaying the most frequent keywords in the articles about future of work one can establish similarities between them and the contents contained in the 20 most cited articles, by doing a detailed analysis regarding the latter.

The dataset produced 6 clusters, separating the 41 keywords through certain typologies. These clusters were formed through the frequency with which the keywords co-occur in the same articles. Table 9 contains the clusters, with its items and a description of each:

Cluster 1 (Technological Development)	Cluster 2 (Economic Factors)	Cluster 3 (Human Technology)	Cluster 4 (Work Development)	Cluster 5 (Post-Covid Work)	Cluster 6 (Social Characteristics)
Automation; Construction Industry; Digitalization; Labor Policy; Robotics; Skilled labor; Skills, Surveys; Technology Adoption; Work.	Australia; Capitalism; Digital Technologies; Future of Work; Gig Economy; Labor supply; Technology; Work Design.	Artificial Intelligence; Future of Works; Job Satisfaction; Machine Learning; Management; Technological Development; Technologic Unemployment; Workers.	Decent Work; Digital Transformation; Education; Employment; Industry 4.0; Innovation; Labor Market.	Covid-19; Future Prospect; Leadership; Technological Change; Working Conditions; Workplace.	Gender; Personnel.

Table 9 – Co-occurrences’ clusters (Source: Author)

The following graphic demonstrates the weight of each item (which reflects the number of occurrences), as well as the proximity between them. Each color is relative to a cluster.

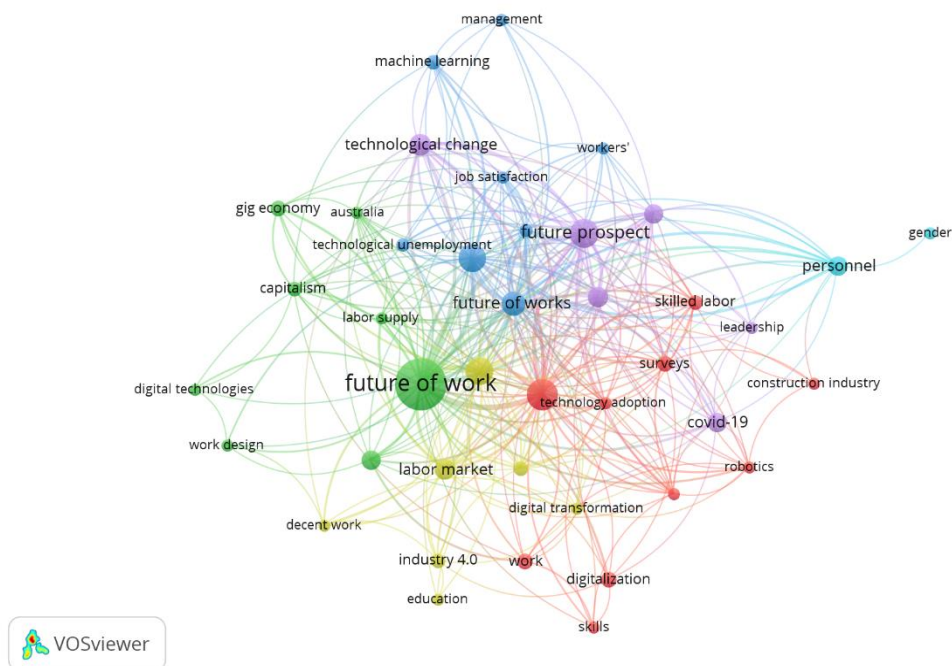


Figure 6 – Co-occurrences between keywords (Source: VOSviewer)

As one would expect, given that the subject of research of this paper is the future of work, it is precisely “future of work” that holds the biggest weight between all the keywords used in the dataset, with 99 occurrences. The top 12 keywords in terms of occurrences are the following:

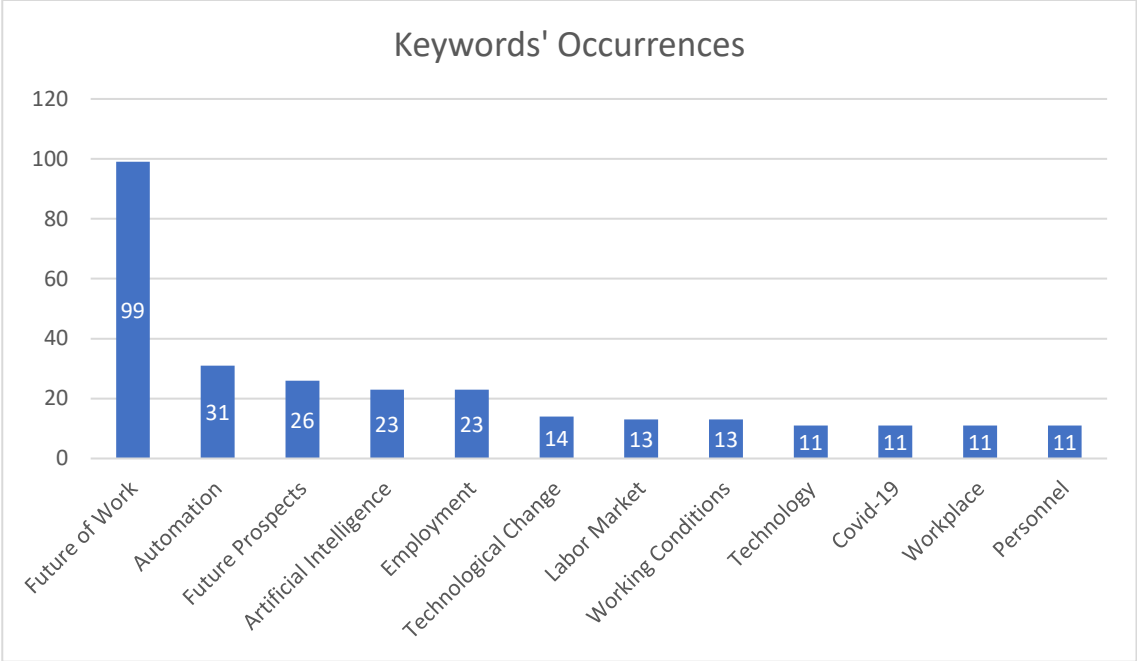


Figure 7 - Top 12 Keywords in terms of occurrences (Source: Author)

Another potentially interesting indicator is the average publication year of the documents containing these keywords. This would provide an overview of what are, generally, the keywords in debate throughout the last few years, especially considering the pre-covid and post-covid timelines. By selecting “Occurrences” as weight and “Average Publication Year” as score, and using a range between the years 2015 and 2020, the following graphic is obtained:

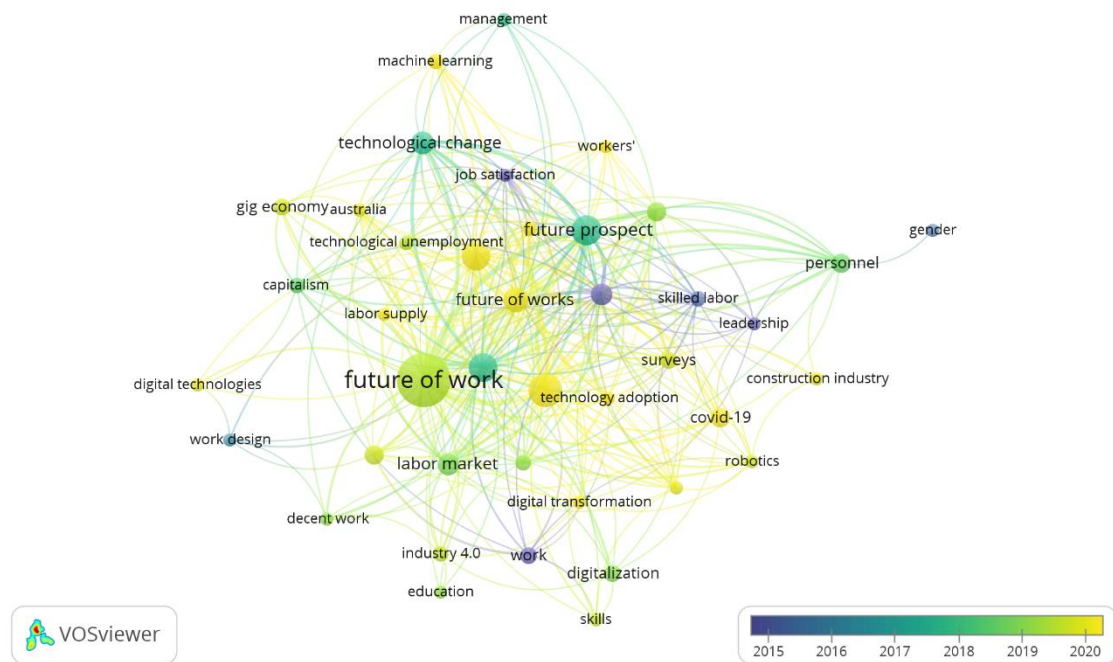


Figure 8 – Co-occurrences, with average publication years (Source: VOSviewer)

The top 5 most recent keywords in terms of average publication year are:

Keywords	Average Publication Year
Workers’	2021
Covid-19	2020
Machine Learning	2020
Technological Development	2020
Artificial Intelligence	2020

Table 10 – Top 5 most recent keywords, in average publication year (Source: Author)

Certain topics that have been subject to wide discussion after the surge of the Covid-19 pandemic, such as automation, digital transformation, artificial intelligence, technological development and workplace, tend to situate close to the 2020 range, whilst more traditional concepts, such as leadership, working conditions and job satisfaction situate closer to 2015, as shown in Table 11:

Keywords	Average Publication Year
Leadership	2013
Working Conditions	2014
Job Satisfaction	2014

Table 11 – Top 3 least recent keywords, in average publication year (Source: Author)

Considering that the totality of articles collected ranges between 1976 and 2022, the fact that the least recent keyword in terms of average publication year is situated in 2013 is a testament to how much the concept of future of work has grown in its interest and relevancy in the last decade.

3.5. 20 Most Cited Articles – an Analysis

To complement the “Co-occurrence – All Keywords” analysis, a literature review of the top 20 most cited articles about “future of work” is presented, based on the top 12 most frequent keywords.

“Future of Work”, which is obviously the most frequent keyword, and “Future Prospects”, which is a broad term and not very distant from “future of work”, are concepts which are present in all 20 articles. So the other 10 keywords from the top 12 will be under focus and analyzed.

3.5.1. Automation, Artificial Intelligence, Technological Change and Technology

Four of those keywords are related to each other, both in terms of definition, as in correlation in the documents they appear in. Those keywords are: Automation, Artificial Intelligence (AI), Technological Change and Technology, and they are most prevalent within clusters 1 (Technological Development) and 3 (Human Technology). Three of these keywords are in the top 6 most frequent keywords, demonstrating the great emphasis given to the thematic of technology influencing the future of work.

Editors of Encyclopedia Britannica define technology as “the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, to the change and manipulation of the human environment”. So the keywords “technology” and “technological change” are correlated with “artificial intelligence” and “automation”. Due to the broadness of the first two, the focus will be on Artificial Intelligence and Automation and their role on the top 20 articles about the future of work.

Raj & Seamans (2019) divide the definition of Artificial Intelligence into two types: “general”, which refers to computer software that can think and act on its own; and “narrow”, which refers to computer software that relies on highly sophisticated, algorithmic techniques to find patterns in data and make predictions about the future.

The most cited article has precisely AI as its main theme. It is titled “Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making”, authored by Jarrahi, M.H. In it, Jarrahi (2018) explores the complementarity of humans and AI in the context of organizational decision making. It points out that there are many variations of Artificial Intelligence (AI), but cites Russell & Norvig (1995) to define it, broadly, as “intelligent systems with the ability to think and learn”. AI systems are evolving towards possessing the ability to

learn and improve themselves, accelerating their use for some tasks that were before seen as the exclusive domain of humans (Jarrahi, 2018), with some naming this evolution, and the ability of machines being able to communicate and make decisions without human involvement, as the Fourth Industrial Revolution, which Pfeiffer (2017) states will have a huge impact on the future of work. There are reasons to believe that this trend will continue, causing even some concern upon a lot of people – the most notable being Elon Musk – about whether humans will be able to apprehend the decisions being taken by machines (Ernst, Merola & Samaan, 2019).

Campbell (2016) points out that some AI pioneers argue that “computers plus humans do better than either one alone”. Guszczka, Lewis & Evans-Greenwood (2017) argue that, while AI systems support an analytical decision-making approach, they are less capable of understanding common-sense, and Brynjolfsson & McAfee (2012) complement the downsides of AI in relation to humans by pointing out an apparent lower viability of AI decision making in ambiguous and unpredictable environments. Jarrahi (2018) highlights the importance of AI in assisting humans’ decision making in predictive contexts, as they can “generate ideas through probability and data-driven statistical inference approaches and identify relationships among many factors, which enables human decision makers to more effectively collect and act upon new sets of information”. And so, the speed of AI’s collection and analysis of information could combine with humans’ intuitive judgement to create a synergistic relationship, with machines working on mundane tasks and humans with a more creative role (Jarrahi, 2018). Choi, Y, Choi, M, Oh & Kim (2019) amplify this vision through their study about service robots in hotels, in which they concluded that, as of today, robots have difficulty performing the role of attending to customers’ needs due to lack of communication skills and human sensitivity. This vision, however, goes against Spencer (2018)’s opinion that human tasks will evolve into a set of less interesting, more repetitive tasks that require fewer skills.

Entering into other top 12 keywords, and starting by automation. Raj & Seamans (2019) define automation as “the use of largely automatic systems and equipment in manufacturing and production processes that replace some or all of the tasks that previously were done by human labor”, and Coombs (2020) defines it as “the transformation of something which is done in a manual way into an automatic process”, and points out that the previously mentioned AI is one of the most frequent forms of automation. Coombs (2020) argues that three main themes will cause a bigger adoption rate of Intelligent Automation (IA) after the Covid-19 pandemic: consumer preferences changing in favour of automation, increasing familiarity of the general public regarding automation tools, and increasing business confidence in IA. Coombs (2020)

also suggests four arguments against increased adoption of IA: big data availability and reliability limitations, inefficiency of these tools in many tasks which, for now, can only be done by humans, narrow capabilities of IA technologies and a high availability of human workers. With that said, Coombs (2020) converges with Jarrahi (2018) in that a collaboration of automation processes with human labor is the most efficient way of optimizing the company's processes, and also highlights the importance of clear communication to employees about these changes, in order to promote a feeling of job security among the workers. Shestakofsky (2017), in the article "Working Algorithms: Software Automation and the Future of Work", agrees that, despite concerns from some people that automation can potentially take away jobs, there is a lot of potential for complementarity between the two. In a case study about the company AllDone, Shestakofsky (2017) points that "full automation of every task was impractical given the instability of the firm's environment and product". However, by combining the automation of certain tasks with human workers, new functions began to arise, by workers helping with these new processes; managing their emotional responses to these changes; or doing "what software alone cannot accomplish" (Shestakofsky, 2017), strengthening the argument that automation doesn't necessarily diminish the number of jobs. Lent (2018), who studied both opportunities and reasons for concern about the future of work in relation to digitalization, points out, however, that the lower skilled and lower paid workers are at a more vulnerable position when it comes to this aspect, as the automation of tasks makes them replaceable, especially in times of economic struggle or uncertainty. In that study, a cause for optimism directly related to automation is mentioned, which is the enhancement of many people's work lives, by assisting with completion of routine, dangerous, or unpleasant tasks (Lent, 2018). Other reasons of concern and optimism were mentioned, but these will be analyzed in the "Labor Market" keyword, as their nature is more related to economic aspects.

Also related to AI and Automation is the concept of digitalization. Brennen & Kreiss (2016) define digitalization as "the technical process of converting analog or traditional paper-based tasks or processes to digital form, so that computers can help in accessing, storing, and transmitting information". Beier, Niehoff, Ziems & Xue (2017), in their study about sustainability in a digitalized world, point out that digitalization can bring benefits to the environment, mainly through an increase in usage of renewable energy sources, and can even create new jobs in this specific sector, but overall foresee major job losses in other areas due to the automation of processes.

3.5.2. Employment and Labor Market

Since Employment and Labor Market are also relatable keywords, relating to economic aspects of labor (like employment rate, differences between sectors, etc.), it was chosen to present them both together in this subchapter. These two keywords are contained in cluster 4 (Work Development), but similar keywords, like “Economy” and “Labor supply” are included in cluster 2 (Economic Factors).

As noted in the previous subchapter, when it comes to employment, digitalization currently has, and most likely will continue to have, a huge role on it. Valenduc & Vendramin (2017), in their study about digitalization and the effect that it can have on employment, state that the perspective on this topic has been changing throughout the years. Whilst in the early 80s there were articles arguing that digitalization could raise employment rates (through corporate development) as well as lower it (through a productivity raise in technological tools that makes humans dispensable) (Parienty & Combemale, 1997), this perspective evolved in a pessimistic manner, with statements that only the appearance of new technological industries could soften the likely reduction in the number of jobs (Missika, Pastré & Meyer, 1981). Frey & Osborne (2013) argue that this theory was proven right in the industrial sector, but wrong when it came to employment rates in the services sector, which rose overall. They also state that the proportion of jobs under danger of becoming extinct due to digitalization could reach 40% (Frey & Osborne, 2013). Askénazy & Gianella (2000) state that the productivity raise with the introduction of new technologies is only possible if, along with the implementation of those technologies, companies proceed with a restructuring of work itself, and Sparrow (2000) outlined the rising tendency of recruiters to value new job competencies in candidates.

Valenduc & Vendramin (2017) highlight three weaknesses in the studies about the quantitative impact of technology on employment: an “overestimation of the link between the technology’s capacity and the substitution of jobs by machines”, an “underestimation of the importance of work organisation patterns and human resource management practices”; and a “neglect of the long period that may exist between the initial uptake of an innovation and its generalisation in the whole economy”. Valenduc & Vendramin (2017) also state that the future of work will be more determined by “work organisation, reconstruction of occupational profiles, skills and learning, human resource management, social dialogue, economic and social processes of diffusion and adoption of innovations”, and that technology is only one of the many factors to be considered.

The next keyword to be analyzed is “labor market” Within the 20 most cited articles, there are a few containing this keyword. One of these is “Old-age security and silver workers: An

empirical survey identifies challenges for companies, insurers and society”, authored by Deller, Liedtke & Maxin (2009). It has a thematic that no other article in the top 20 addresses: the importance of employment of older workers. Deller, Liedtke & Maxin (2009) argue that integrating Silver Workers (term for 50+ year old workers) can contribute to macroeconomic growth potential, relieve old-age pension systems and provide new business opportunities, thus providing a key advantage in national and international competition in the short term. In order for this to happen, several work conditions have to be provided by the generality of companies looking to adopt this strategy: projects and tasks have to be structured so they can accommodate these workers’ desire for independence and performance in their task; training of new skills and application of appropriate policies in order to efficiently employ older workers even after they have retired; and appreciation of their work, which can be accomplished in some cases through additional income (Deller, Liedtke & Maxin, 2009).

Froese (2011) studied the work values of the next generation of business leaders in Shanghai, Tokyo and Seoul. Despite focusing on three specific geographic locations, the key takeaways related to the future of work are that understanding the work values of the current and future workforce is essential for designing a human resource management system that attracts, motivates, and retains talent, and this is something which differs heavily from country to country, which means that multinational companies may need to select different strategies for each country (Froese, 2011). Besides work values, economic factors also differ from country to country, and have profound influences on career choice, career opportunities, job mobility, and work attitudes, which further enforces the need for different strategies to be applied to each location (Froese, 2011).

As mentioned in the AI chapter, Lent (2018) mentions some reasons for concern and optimism related to the future of work in a digital world, and some of them are related to economic aspects. For that reason, it was chosen to present them in this chapter. Lent (2018) mentions that the migration of certain industries from one geographic location to another, the exploitation of labor and tax opportunities from multinational corporations, the unequal distribution of wealth and fierce global competition are factors which may lead many companies to employ a smaller, lower paid, and less permanent workforce. Such concerns are shared by Ernst, Merola & Samaan (2019), who state that “risks in the form of further increases in inequality need to be addressed if the benefits from AI-based technological progress are to be broadly shared”. On the more optimistic side, Lent (2018) refers to the fact that some writers believe there will be labor shortages, due to aspects like the retirement of people born in the 1950s and 60s, which could create many job openings and make experienced workers a “prized

resource”; and the creation, thanks to technology, of new jobs and opportunities for work-life balance, as shown by the rise of social media and other applications like Uber, Airbnb, among many others, and by the rise of gig work.

On that topic of gig work, Aroles, Mitev & Vaujany (2019) highlight the increasing focus on freelancing, individual mobility, autonomous platforms and independent work communities, which, in the authors’ point of view, reveals a rising tendency of the practice of “non-managerial” ways of living and working. Such opinion is corroborated by Kaine & Josserand (2019), who highlight the strong media and research interest in the topic of gig work. If this tendency keeps rising, especially after a pandemic in which the work habits of so many people have shifted toward a more autonomous schedule, it promises to revolutionize the labor market.

3.5.3. Working Conditions, Workplace and Covid-19

These three keywords will also be analyzed together. “Workplace” has been in the spotlight since the outbreak of the covid-19 pandemic, with many workers switching to remote work. Even with the improvement of the pandemic situation, many companies chose to keep remote work, either in full-time remote or hybrid regime. In terms of “Working Conditions”, this includes not only the location where the work is executed, but also remuneration, work-life balance, etc. It could be argued that covid-19 has greatly affected both of these components. Therefore, it was chosen to include covid-19 alongside these variables in this sub-chapter. These three keywords are mainly contained in clusters 5 (Post-Covid Work) and 6 (Social Characteristics).

It should also be noted that the thematic of digitalization, despite being mainly addressed in the first subchapter, is also embedded in studies with these three keywords, despite obviously being a different concept.

Stephens, Jahn, Fox, Charoensap-Kelly, Mitra , Sutton, Waters, Xie & Meisenbach (2020) conducted a study about the impact of covid-19 on organizational lives, and concluded that it will likely cause permanent changes that will be visible long after the pandemic is over. Coombs (2020) states that AI technologies have allowed to maintain proximity between workers even when they are not physically together in the workplace, and that companies have sought to reduce the number of workers in the workplace. This is coherent with the statement made by Amankwah-Amoah, Khan, Knight & Wood (2021) that “covid-19 is “the great accelerator” in fast-tracking the existing global trend towards embracing modern emerging technologies ushering in transformations in lifestyle, work patterns, and business strategies”.

In relation to remote work, Felstead, Jewson, Phizacklea & Walters (2001) wrote an article titled “Working at Home: Statistical Evidence for Seven Key Hypotheses”. It analyzes several aspects of remote work: the frequency of its utilization, trust in technology, salary level, gender issues, ethical minorities’ participation in this kind of work and composition of family aggregate, with seven hypotheses put forward by the authors. It has an important limitation: the fact that it was written more than two decades ago, which means that some of the hypotheses, as well as the authors’ conclusions, are outdated, and don’t take into consideration the effect of the covid-19 pandemic. However, it allows the readers to have a vision of how remote work evolved up until that point in time, especially after the popularization of the internet in the 90s. To summarize, Felstead, Jewson, Phizacklea & Walters (2001) state that remote work was indeed increasing in frequency (1st hypotheses); no proof was found that Information and Communications Technology (ICT) was facilitating the work at home (2nd hypotheses); remote workers earn less money than people working in more conventional settings (3rd and 4th hypotheses); people working at home were predominantly women (5th hypotheses); ethical minorities’ didn’t get as many chances to work at home (6th hypotheses) and mothers with more dependent children work more at home than mothers with not so dependent children (7th hypotheses).

Bamber, Bartram & Stanton (2017), in a study about Human Resource Management and workplace innovation, state that the biggest challenge for HR managers regarding the future of work consists of facilitating innovation in the workplace. They can encourage, nurture and promote practices that foster innovation by promoting High Involvement Work Systems, i.e. engaging employees in decision making, or by implementing practices that “reward and encourage creative and innovative outcomes such as employee participation, collective learning and development” (Bamber, Bartram & Stanton, 2017). This need to innovate is emphasized by the 20th (and therefore, last within this paper) most cited open access article about the future of work, which is titled “Manifesto for the future of work and organizational psychology”, authored by Bal, Dóci, Lub, Rossenberg, Nijs, Achnak, Briner, Brookes, Chudzikowski, Cooman, Gieter, Jong, J., Jong, S.B., Dorenbosch, Galugahi, Hack-Polay, Hofmans, Hornung, Khuda, Klamer, Mendy, Mol, Navarro, Notelaers, Ossenkop, Pickett, Röllmann, Sanderson, Sosnowska, Spanouli, Vantilborgh, Dijk & Zelst (2019). In 10 recommendations, it advocates the responsibility of organizational psychologists towards several types of stakeholders, including the need to innovate to create a workplace with integrity and dignity for all.

4. Findings

Although there are several thematics related to the future of work, there is a particularly great emphasis given to technology, which enters in every topic influencing the future of work, including employment and working conditions.

AI will continue to evolve and to influence the future of work in unpredictable ways, and there are conflicting arguments on behalf of analysts about what its impact will be on employment. Some consider that machines will be able to perform more and more tasks, depriving humans of work, with Frey & Osborne (2013) advancing the specific estimate of 40% of jobs at risk. There are also other reasons for concern, like the unequal distribution of wealth (Lent, 2018). Others, on the contrary, consider that the evolution of AI will have positive effects on employment, through the creation of new jobs based on the complementarity between humans and AI and also the creation of new sectors, as seen by the emergence of social media and other platforms that facilitate self-employment; and also on environmental sustainability, through the increased use of renewable energy sources.

Despite the unpredictabilities, it is a common opinion from several analysts that the complementarity between humans and AI is good, as each other's strengths complement one another. Among humans' strengths, situations that require greater sensitivity and decision-making in ambiguous contexts stand out, while machines stand out for being able to assist humans in analytical processes, mainly in more predictable contexts, using statistical data and probability analysis. Thus, there seems to be a general consensus that it is possible to generate complementarity between humans' and AI's strengths, to minimize the weaknesses and maximize productivity.

The nature of the new types of work that will appear is also an unpredictable matter. Some analysts consider that it will be important to keep humans performing tasks that require greater sensitivity and communication skills, like customer service, as seen by the case study of service robots. Other analysts consider that those new tasks will be more mundane and repetitive.

Another topic that has been on the agenda is remote work. It was imposed on millions of workers worldwide, under the pretension of stopping the spread of the Covid-19 disease. As mentioned in the literature review, Stephens, Jahn, Fox, Charoensap-Kelly, Mitra, Sutton, Waters, Xie & Meisenbach (2020) consider that this pandemic will have permanent effects on companies' organization and workers' lives. And remote work is one of the reasons for that. The evolution of AI allowed the maintenance of a stable communication between workers, even when they were at a distance (Coombs, 2020) and, given the will of many employers and

workers to maintain remote work, it's expected that AI will continue to play an important part in this area. Further reflections on this topic will be presented in the conclusion of this paper.

5. Conclusion

This paper's findings demonstrate the role of technology on defining what the future of work will look like. After exposing the points of view from several analysts, a personal analysis about the evolution of the future of work follows.

Obviously, during the covid-19 pandemic, remote work became a part of millions of workers' daily lives. And instead of it being discarded with the sanitary and economic recovery and consequent relief of restrictive measures imposed by governments, remote work is here to stay. This is the will of many companies, as it allows them to save money on infrastructures and recruit workers in farther areas, who would perhaps not accept the offer if they were obliged to go to the office every day. And it is also the will of a significant proportion of workers: according to a study from consulting company Advanced Workplace Associates quoted by *Jornal de Negócios*, only 3% of workers agree with a full return to office work. This is due to a productivity increase that many people felt from the moment they started working at home, as revealed by studies from consulting company Robert Walters and ManpowerGroup (although the exact proportion indicating a productivity increase differs between both studies). Other motives for the approval of remote work are related to time and money saving on trips, higher schedule flexibility and greater comfort, which, along with the convenience to companies, means that remote work – which is already embedded in society – is here to stay.

Therefore, companies will have to adapt to remote work. Not only will managers need to be able to deal with this tendency and try to keep productivity and intercommunication at a maximum, but technology will also play an important role in its evolution. If tools like Zoom and Microsoft Teams have entered workers' daily lives since the beginning of the pandemic, it remains to be seen which new tools will appear to potentiate remote work.

Besides technological matter, when it comes to the rising tendency of remote work, it will be important for companies to pay attention to the workers' mental health. As pointed out by Subramony, Solnet, Groth, Yagil, Hartley, Kim & Golubovskaya (2018), remote work can have negative effects on workers' mental health, causing feelings of social isolation and loneliness, as well as an incapacity for them to switch off from work in their leisure time. Companies will have to focus on solving or minimizing this problem, in order not only to increase productivity, but also to contribute to a more ethical and solidary future of work.

Besides remote work, there are other questions related to the future of work. As mentioned in the findings chapter, the type of tasks that humans will perform is unpredictable and depends on the evolution of AI. There seems to be a general consensus among analysts that humans and

AI complement one another, but the doubt remains on whether the number of jobs will diminish or not. Taking into account that as of today machines stand out in contexts where they benefit from factual and statistical data to make decisions, and in case they evolve in a way that they manage to make more accurate decisions and are easy and affordable to obtain, it is difficult to argue against an employer's decision to opt for a machine in this type of role instead of a human, who will be less accurate and more expensive. And, from this perspective, one can visualize a decrease in the number of jobs as a very possible scenario.

However, recent history offers reasons for optimism: the truth is that technology and AI have been evolving tremendously throughout recent decades and that hasn't stopped the number of jobs from growing. On the contrary, it created new types of jobs, against the predictions from many analysts. History is, therefore, repeating itself when it comes to these pessimistic predictions, and if society managed to adapt well to these changes, there are reasons to believe that it can do it again.

With the evolution of machines, it wouldn't be surprising to see a tendency of more people entering the technological sector. Besides, humans possess qualities that machines do not yet have, namely the previously mentioned sensitivity and communication skills. And these are valuable qualities that many jobs require. Even through a more "theoretical" perspective, if one analyzes Porter's value chain, it is possible to see several activities in which machines, with their current limitations, would have difficulties, like Marketing & Sales, Service, and Human Resource Management.

In spite of the future of work's underlying unpredictability and the reasons of concern having solid ground, and even though the author believes that there will be big changes in the world's microeconomic structure and activity sectors, it is the author's belief that global society will be capable of adapting to those changes as it has to this day, and that humans' strengths and the necessary complementarity between them and AI will generate opportunities for this paradigm shift to not result in a decrease of the number of jobs.

Having this study been done from a business management perspective, and for the purpose of future research, the author suggests that this study be expanded to a more technological point of view. Despite the emphasis given to technology in this paper, with a definition of each concept presented, there is a lack of a broader technical knowledge from the author on that subject, which may represent both a limitation of this particular paper, as well as an opportunity for complementarity with another study, which can take the findings presented in this state-of-the-art and expand on the technological front, approaching subjects like cybersecurity,

digitalization and the evolution of AI, and whether there are more reasons for optimism or concern.

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