Journal of Chinese Human Resources Management
2023, VOL. 14, NO. 1, 3-37
DOI: 10.47297/wspchrmWSP2040-800501.20231401

The Key Competencies for the Future of Work—A Bibliometric Study

Laura C Conceição[1], Leandro F Pereira[2]*, Álvaro L Dias[3]

1 ISCTE–Instituto Universitário de Lisboa, Portugal

2 Business Research Unit, ISCTE-Instituto Universitário de Lisboa, Portugal, Portugal

3 Universidade Lusófona de Humanidades e Tecnologias, ISCTE–Instituto Universitário de Lisboa, Portugal

ABSTRACT

The constant technological transformations that have emerged over the last few decades have forced a fast adjustment caused both by the digitalization and automation processes that have revolutionized the job market. Even though the fourth industrial revolution allows the emergence of numerous job opportunities, it brings different restrictions that directly affect the daily lives of professionals and organizations. On the other hand, this implementation requires not only a large financial investment but also, and perhaps the most critical obstacle in this process, the training of human resources to be able to assimilate the complexity of these digital transformations. Thus, the main objective of this research is to try to understand which skills will be most required by the labor market in the future. To achieve this primary objective, a bibliometric study was carried out, based on the World Economic Forum report and two main databases: Web of Science and Scopus.

KEYWORDS

Future of work; Industry 4.0; Technology; Technological transformation; Skills; Artificial intelligence

1 Introduction

This study will be based on the World Economic Forum (WEF) report "*The future of Jobs 2020*". This report "(...) provides key insights to guide labor markets and workers toward the opportunities of both today and the future" (Schwab and Zahidi, 2020).

Therefore, and according to the aforementioned report, the main competences that the labour market will demand over the coming years will be studied. These competences include analytical thinking and innovation; learning strategies; problem-solving skills which, according to Jonassen (2000), represent the cognitive activity with the greatest expression in other professional contexts; critical thinking; creativity and originality; leadership and social influence; the use of technology whether at the level of monitoring or control; resilience, stress tolerance, and flexibility; the ability to think and come up with new ideas; emotional intelligence; programming; the ability to solve problems associated with technology; service orientation; persuasion and negotiation; and, finally, systems evaluation and analysis.

The research will focus on trying to understand how these competencies may, or may not, influence the efficacy and effectiveness of workers' work performance and, in general, the organizational success of an employer. Still, it will be studied how the perception of work will be transformed over the coming

years.

This research is divided into four main chapters: the first chapter, corresponding to the introduction, describes the reasons, i.e., the relevance of the research and the objectives that we intend to achieve with this study. In the second chapter, concerning the theoretical framework, the other competences mentioned in the introduction will be analyzed, explained and contextualized and a framework will be provided for what is the basic expression of the research - "*future of work*". Subsequently, in chapter three, the methodology used for the development of the research is clarified, as well as the definition of the *software* used for the bibliometric study. Then, in chapter four, through the analysis and discussion of results, the conclusions and contributions of the research are presented, as well as any limitations and recommendations for future research, which are described in the fifth and final chapter of this study.

Briefly, the research will have as its main objective to answer the following questions:

1. What will the future of work be like?
2. What will be the main competencies demanded by the labor market?
3. How can professionals adapt to the new demands?

2 Theoretical framework

2.1 Labor market context

Given the dynamism, evolution and transformation of the labor market, in part, a direct consequence of the side effects of the covid-19 pandemic, new impositions of routines, realities and typologies of work were verified, such as, the absence of "(...) physical contact with co-workers, suppliers, business partners and the final consumer, which required many companies to implement innovative tactics to work during this disruptive phase" (Kudyba, 2020).

Undoubtedly, one of the strategies used by other organizations globally, is directly correlated with the rapid technological advancement that was mandatory to exist in order to cope with the adversity faced both at the operational, economic and political levels, and also in view of the urgency in the digitization processes. Therefore, the conditions imposed by the pandemic played a catalytic role in what is now characterized as the digital transformation process (Kudyba, 2020).

If on one hand it was essential to create and enhance an infrastructure that supported the day-to-day needs of an organization, on the other hand, it was vital that this same infrastructure ensured and allowed the remote work methodology (Machado, Silva, and Silva, 2021).

Irrefutably, the forced interruption in regular work norms through the onset of the pandemic allowed organizations, employees and researchers alike to reflect on what would become their predictions for the future of the labor market (Ganapathy and Bennett, Cybernetics and the Future of Work, 2021).

All this new conjuncture has forced the adoption of remote working in the vast majority of industries. After the most critical peak of the covid-19 pandemic, it was found that employees mostly preferred the hybrid working model (i.e., half of the working time working from home and the other half, carried out in the physical space of the employer). Consequently, this new work methodology will clearly be a reality that will be accentuated over the coming years, and awareness of work balance and flexibility will be two crucial factors for good employee performance (Salary Benchmark - HAYS Vortal).

Thus, the concept of balance is crucial in the sense that it recognizes that the forces derived from both work and family can be incompatible and discrepant, thus influencing a worker's productivity and performance levels. (Kreiner, 2006) thus, influencing a worker's productivity and performance levels.

Regarding the concept of flexibility, it can be characterized as the ability that employees have to choose the physical space where, when and how they want to perform their work tasks (Kim, 2020).

Better saying, the existence of flexibility provides greater autonomy to workers, allowing them to adjust their work schedules to their lifestyles and, consequently, at the professional level, achieve the maximum productivity feasible.

According to Zarafian (2001), for an employee to be autonomous and responsible for the performance of his or her daily tasks and activities, it is essential that there is approval and agreement from his or her direct superior. Autonomy in work organization and planning gives employees greater freedom to reconcile their personal and professional lives and, undoubtedly, higher levels of efficiency and commitment to their organizations (Tung and Chang, 2011).

Nevertheless, several adversities associated with this transition period of the labor market propitiated by the covid-19 pandemic have arisen, namely the imposition of new labor typologies. As for the adversities, one can mention, for example, the difficulty in trying to preserve and consolidate the organizational culture, since all employees are physically away from the workplace, thus hindering the communication process between teams and departments (Tang and Gao, 2012); from another perspective one can mention the leadership process between leader-worker as having been one of the biggest adversities faced during this period.

If a few years ago employees favored factors such as salary package components, career progression within the same employer, job stability, and interpersonal relationships, nowadays, employees essentially value the balance between personal life and work life, and a healthy relationship with their direct bosses, the work environment in general, the organizational culture, the project in which they are inserted, the geographical location of the company (as well as the work model - hybrid system), the salary package (valuing benefits above all), internal communication, the training plan, the performance bonuses, the prospects for advancement, and their contractual situation (HAYS, 2022).

All of these reasons contribute to and support the theme of how the future of work will be and is affected, either by the intensified use of information technology in other everyday tasks, or by how workers use technology to "(...) communicate, create, connect, transfer information, and define ideas for strategic initiatives, which often involve the use of evolving technologies (e. g., Artificial Intelligence)." (Kudyba, 2020).

Therefore, it is important to clarify one of the most significant technologies for the labor market, this being called Artificial Intelligence (AI). AI is characterized as being a "(...) a broad transdisciplinary field with bases in logic, statistics, cognitive psychology, decision theory, neuroscience, linguistics, cybernetics and computer engineering." (Howard, 2019). Just as the emergence of the *internet*, for example, impacted a generation and led to the introduction of new methodologies, realities and activities the same will happen with the intensification of AI as it will take on a major responsibility in the economic, political and social structures of the future of organizations and the notion of work in a generic way (Caruso, 2017).

Regarding the concept of the future of work, this was first studied by Handy (1984) in which he stated that there would be an "(...) emerging revolution in employment, work relationships and work-life balance" (Nolan and Wood, 2003) as well as work in the remaining traditional industries would disappear because "(...) labor and manual skills were shrinking in the face of knowledge as the basis for new businesses and new jobs" (Handy, 1984) as well as, work in the remaining traditional industries would disappear because, "(...) labor and manual skills were declining in the face of knowledge as the basis for new businesses and new jobs" (Handy, 1984 cited by Nolan and Wood, 2003).

According to Kudyba *et al.* (2020), it is inevitable that organizations invest in the continuous increase of their intellectual capital, ensuring that the internal knowledge of the organizational structure is always enriched. This knowledge progress results in the direct correlation between Knowledge Management (KM) and the future of work, insofar as knowledge "(...) and the ability to create and use knowledge are considered to be an organization's most important source of sustainable competitive

advantage" (Nonaka, 1990, 1991, 1994; Nelson, 1991; Leonard-Barton, 1992, 1995; Quinn, 1992; Drucker, 1993; Nonaka and Takeuchi, 1995; Grant, 1996; Sveiby, 1997 cited by Nonaka and Toyama, 2003).

On the other hand, Information Technology (IT) symbolizes the potential possibilities and opportunities for progress either at the level of productivity, economic situations and even facing the very concept of the future of work, this is because, with the introduction and evolution of emerging technologies, such as "(...) the interconnected collaborative robots; *machine learning*; artificial intelligence; 3D printers; the simulation of interconnected machines; the integration of the flow of information along the value chain; the multidirectional communication between production processes and products (*Internet of Things*)" (Caruso, 2017) it will be possible to achieve better production levels and, consequently, better organizational results.

In a more concrete analysis of the concept of the future of work, and based on the World Economic Forum which, over the last few years, has been monitoring the implications of what constitutes the "Fourth Industrial Revolution" [1](Caruso, 2017), through research regarding the "(...) identification of a potential scale of worker movement, of autonomy strategies in the processes of transition to emerging roles" (Schwab and Zahidi, 2020), it is concluded that two of the greatest adversities of the labor market are the complexity that organizations currently experience in the process of job creation, particularly for those workers who are most disadvantaged; and, also, how employers have and must retain their talent, especially when individuals have an interest in seeking a new project or, on the other hand, when they begin to train for what are called "*jobs of tomorrow*" (Schwab and Zahidi, 2020).

Although this revolution can, from the outset, improve the quality of life of the population as a whole, it brings with it multiple adversities. If, for example, it allows workers to benefit in the event of a talent shortage (especially of skilled professionals) by extending the working lives of the most knowledgeable workers; on the other hand, the side effects of IT "(...) on unemployment, working conditions and work organization are not predictable" (Farrell and Greg (2016) cited by Caruso, 2017), which makes it difficult to identify its real impact on productivity and efficiency levels, both by the employee and by the employer.

2.2 Skills valued by the labor market

Considering the demands and needs of workers when they analyze what they consider indispensable in their work, it becomes peremptory to analyze the labor market from the perspective of employers.

According to the World Economic Forum's report "*The future of Jobs 2020*" and Table 1, it is possible to list and explain the importance and notoriety of these skills in the labor market over the next few years.

Many of these skills will be highly valued by organizations both because the market will demand it and because of the huge impact that the covid-19 pandemic has brought to organizations and their employees. If on the one hand, employers had to act quickly in the way they would work, employees had to adapt to a new work methodology, new routines and a completely unique reality. Therefore, several skills were highly valued and, in some cases, enhanced.

Assuming that in 2025 the resources and automation processes will be more efficient and viable, it is expected that, on average, "(...) about 15% of an organization's workforce is at risk of disruption" (Schwab and Zahidi, 2020) and, as a way to solve this obstacle, organizations have been investing in "

1 The notion of both concepts - Industry 4.0 and "*Fourth Industrial Revolution* " (FIR) - are corroborated both by public institutions, such as the National Governments of several countries, and by private institutions and literature (Edwards and Ramirez 2016; Hirsch-Kreinsen 2016; Kelly 2015). These concepts reflect the process of transformation of production systems for goods and services arising from emerging technologies (Caruso, 2017).

Table 1 Top 15 skills for 2025

Skills that will be demanded by the job market in 2025	
1. Analytical Thinking	7. Resilience, Stress Tolerance and Flexibility
2. Learning Strategies and Active Learning	8. Thinking Skills, Problem Solving and Suggestion of New Ideas
3. Critical Thinking	9. Emotional Intelligence
4. Creativity and Originality	10. Service Orientation
5. Leadership and Social Influence	11. Persuasion and Negotiation Skills
6. Technological Innovation, Programming and Technological Problem Solving	12. Systems Evaluation and Analysis

(...) training and qualification for most of their workers (73%)" (Schwab and Zahidi, 2020). Corroborating the premise that in the year 2025, about 44% of the skills that employees will have to possess are completely different from those they currently have (Schwab and Zahidi, 2020), it is therefore important to analyze, reflect, and understand the purpose of these skills.

That said, the competencies described in Table 1 will be further developed.

2.2.1 Analytical thinking and innovation

Given that the concept of thinking is somewhat enigmatic and complex, it is crucial to analyze why analytical thinking is a competence that in the coming years will be highly valued in the professional context.

The concept of analytical thinking can be explained as a process through which it is imperative to use the ability of "(...) relational similarity" (Esa, 2005; Gentner and Kurtz, 2006; Hofstadter, 2001 cited by Kao, 2015), this is because, the notion of analytical thinking encompasses four essential skills such as the ability to (a) fragment a problem and try to understand its origin and/or reasons (b) clarify a given system so that it is possible to determine the cause of the problem and also identify its methods of resolution (c) compare two or more events, objects, and/or situations (d) the ability to evaluate the particularities and properties of something(Sternberg, 2002, 2006 cited by Kao, 2014).

Based on case studies, Carroll (1993) reports that cognitive reasoning ability encompasses both deductive and inductive reasoning ability as well as quantitative reasoning ability. Still, reasoning agility constitutes a unique condition in the domain of cognitive speed since "(...) the structure of cognitive speed can be as complex as the structure of cognitive ability" (Carroll, 1993 cited by Goldhammer and Entink, 2011).

As for the concept of innovation and according to Carroll (1993), it contains two basic factors: the fluency, which is directly related to the dimension of the ideas generated, i. e., when it assumes a quantitative focus and therefore corresponds to the individual capacity of an individual to conceive varied idealizations; and the originality factor, which consists of a more abstract and qualitative aspect in relation to the evaluation of the typology of the idea generated - being, therefore, more correlated with personality factors - i.e., if the idea generated is considered innovative, unusual and/or progressive (Kao, 2014).

Thus, firms to achieve growth in innovation capabilities "(...) must have the ability to continuously explore and use various social resources that contribute to technological innovation and be able to respond quickly to the changing internal and external environment" (Jiao, Wang and Liu, 2019).

In this way, the contribution of an employee who is able to suggest, propose and/or advise new methods, processes, and criteria, arising from his or her thinking capacity, will be endless and, consequently, will consist of a fundamental asset to any organizational structure.

2.2.2 Learning strategies and active learning

Nowadays, we live in a stage where the intellectual capabilities of the employees allow and constitute an engine for the growth and positioning of a company against its competitors. However, and although technological innovations have brought greater democratization to learning processes, it is rare for knowledge learning and professional development processes to be aligned with either the strategic definition of an organization or its business objectives (Ben-Hur, Jaworski, and Gray, 2015).

The learning process of a professional when inserted in an organizational structure is immensely relevant in terms of its potential contribution. Based on some studies regarding the adult learning method, it was found that there is a positive correlation between the individual's learning and four main strategies: testing/evaluation, interpersonal help, control of emotions and motivation (Warr and Downing, 2000).

As for learning strategies, four learning methods are essentially distinguished: (1) active learning - " (...) generally defined as any method of instruction that involves students in the learning process" (Prince, 2004). According to Prudencio *et al.* (2017) this methodology can be divided into two main approaches: the agnostic approach - when no assumptions are made regarding the decision boundary defined by the learner's predictive model - and the non-agnostic one, which consists in a strategy more dependent on the decision process estimated by the learner (2) the collaborative learning method - "(...) can refer to any method of instruction through which learners work together in small groups and toward a common goal" (Prince, 2004) (3) the cooperative learning methodology which can be defined as being "(...) a structured form of group work in which students pursue common goals while being individually assessed" (Prince, 2004) (4) and finally, the problem-solving centered learning method - " (...) major problems are introduced early in the learning cycle and used to provide the context and motivation for the entire learning process" (Prince, 2004). This last method is characterized by being active learning and possibly having a collaborative and/or cooperative learning aspect.

Nevertheless, it is essential to mention that in addition to learning strategies there are other mechanisms that influence, albeit indirectly, the learning process from behavioral, cognitive and self-regulation strategies that can be referred to as "supportive" or "affective" strategies according to Dansereau (1985) and Weinstein and Mayer (1986), respectively (Warr and Downing, 2000).

In summary, organizations should invest in personalized and specific learning strategies according to the various needs of each employee, with the purpose of ensuring that the workers' contribution is in line with the organizational strategies and goals and, inevitably, that the employees have better productivity levels.

2.2.3 Critical thinking

Over the years, organizations have been facing, albeit progressively, complex issues that require concrete and effective responses.

The restructuring of teams and the investment in employees with strong critical thinking skills is one of the strategies practiced by employers (Fiore *et al.*, 2002). Professionals who display this competence will have a continuous progression in what is characterized as their "(...) professional development and in social and interpersonal contexts (...)" benefiting not only decision-making processes but also problem solving (Dwyer and Walsh, 2019).

Thus, the contribution of a worker's critical thinking skills is fundamental to organizational success since it has a direct impact on an individual's work performance and, undoubtedly, on the organization's results. This competency can then be defined as being a "(...) metacognitive process that, through purposeful, self-regulatory reflective judgment; skills of analysis, evaluation, and inference; and a willingness to think, increases the possibility of producing a logical conclusion to a given argument or solution to a certain problem" (Dwyer and Walsh, 2019). On the other hand, it can be stated that the

meta-cognitive process is characterized as the ability an individual has to use their knowledge to enhance their thinking and thinking skills (Magno, 2010).

From another perspective, the same concept can be more simply defined as being "(...) the identification and evaluation of ideas, particularly implicit assumptions and values, that guide the thinking, decisions, and practices of oneself and others" (Yanchar *et al.*, 2008).

Considering the continuous technological advances, it becomes vital that there is an adaptation of individuals' critical thinking skills since information sources on virtual platforms gradually assume greater relevance, that is, workers must be able to be able to " (...) judge the credibility and accuracy of information presented in different formats, evaluate the author's intent and meaning (...)" (Scheibe's, 2004 cited by O'Halloran *et al.*, 2017).

According to Magno (2010), critical thinking skills include not only the ability of an individual to recognize a problem but also to be able to analyze and validate truthful evidence. Gathering all these characteristics and particularities, the worker will be, therefore, a basic element in contributing to the organizational success.

2.2.4 Creativity and originality

Given the problems that have arisen due to rapid technological growth, organizations have had to adapt to this new pace and focus on creativity, originality, and innovation (Talat and Chang, 2017).

Creativity and originality of thought by a worker are seen as a basic condition "(...) for organizational survival and effectiveness (...)" (Dong *et al.*, 2017), and are therefore one of the main skills required by the labor market. In view of this process, it can be stated that there are several factors that influence and affect organizational creativity, such as: personality, cognitive factors, intrinsic motivation and knowledge itself (Palmon and Illies, 2004).

With regard to the competence associated with creativity and originality, this is essentially based on an individual's ability to generate high-quality, original and efficient solutions to problems that are considered complex and incorrectly defined (Mumford *et al.*, 2012). According to Csikszentmihalyi (1999), cited by Mumford *et al.* , (2012), creative thinking skills only emerge when a problem definition is verified.

Still, it should be mentioned that the capacity for creative thinking is clearly enhanced when individuals "(...) apply appropriate strategies to perform each of the main processes involved in the creative thinking process" (Mumford *et al.* , 2012). These processes are equally elementary in creative problem solving, namely in "(...) identifying and constructing the problem, identifying relevant information, creating new ideas, and evaluating those ideas" (Palmon and Illies, 2004).

According to Choi (2004), creative capacity refers to skills or competencies that are relevant to creative performance. Corroborating this same author, one may state that the ability to analyze problems from different perspectives is directly related to individual creativity. As for an individual's creative ability, it is possible to differentiate two types of creativity: Individual Creativity and Team Creativity (Dong *et al.*, 2017), both of which are vital to organizational success insofar as they enhance performance through the introduction of new services, products, and/or methodologies (Shih *et al.* , 2011).

That said, it is important not to neglect that the creative process occurs in incorrectly defined conjunctures and, for this reason, it is in this "(...) ambiguous nature (...) that creativity occurs" (Simon, 1978 cited by Palmon and Illies, 2004).

Knowing the life cycles of companies, it is possible to deduce that although there are periods of success and organizational success, there will be complex and extremely difficult stages, and although the contribution of creative thinking is always essential, in times of greater adversity, its contribution

will be vital.

2.2.5 Leadership and social influence

The Leadership and Social Influence competency becomes important in today's job market because the leadership typology[2] (Tang, Tang and Li, 2013) has a strong influence on an employee's performance, as "(...) followers may be more easily attracted to leaders who exemplify groups to which they belong or want to join" (Weber *et al.*, 2009). On the other hand, the leadership style used in an employer is directly correlated with the stability of organizational strategic competitiveness (Ireland and Hitt, 1999 cited by Elenkov *et al.* , 2005).

Considering the traditional definition of leadership, it is possible to explain the concept as being " (...) a social process or system in which leaders interact with each other and are exposed to social influence (...)" (Graen and Uhl-Bien, 1995; Hollander, 1980, 1992 cited by OC and Bashshur, 2013). Thus, the process of social influence assumes an important role in how "(...) followers can shape leadership processes (...)" (OC and Bashshur, 2013).

However, leaders by being recognized as influential members, with high power and seen as both a source of resources and rewards - which turn out to be highly attractive elements for their followers - have the possibility to "(...) exert significant influence over their followers" (Hinkin and Schriesheim, 1989; Yukl and Falbe, 1990, 1991 cited by OC and Bashshur, 2013).

According to French and Raven (1959), the concept of social influence can be defined as the amount of social pressure felt by a given target. This pressure felt by individuals is called the *Resultant Force* (OC and Bashshur, 2013). Thus, the process of selecting the elements that will assume leadership positions in a given organizational structure must necessarily consider the factor of social influence as a significant condition in what, later, will be the relationships, interactions and dealings between the elements of a team.

Currently, the literature and studies focus not only on the role of the leader, but also on the importance that "followers", peers, supervisors and even the work context have on the leadership process (Weber *et al.* , 2009). In a more objective analysis of the impact that leadership assumes in the organizational context and, consequently, in its success, it can be proven that "(...) strategic leaders are able to see the trends that affect the future of the organization and provide more effective solutions (...) that allow achieving higher levels of organizational innovation" (Papadakis and Bourantas, 1998 cited by (Weber *et al.*, 2009).

2.2.6 Technological innovation, programming and technological problem solving

Over the last few years, it has been confirmed that the constant technological evolution has been affecting all areas of daily life. Strengthened and reinforced by the effects of the covid-19 pandemic, technology assumes an enormous relevance when it comes to organizational success.

Regarding the labor context, technological innovation has been enabling both the emergence of new jobs and facilitating the automation of multiple processes (Green, 2012). Nevertheless, this evolution brings with it two main adversities: the first one can be described as "(...) the increase in technological unemployment" (Silva and Lima, 2017), that is, workers who are not able to professionalize in the

2 In the present study, the various Leadership styles will not be studied. Leadership styles essentially consist of the relationship between "(...) leader-follower, setting goals, giving directions and support, and reinforcing behaviors" (Weber *et al.*, 2009, p. 428). Nevertheless, and according to Anderson and Sun (2017), the following typologies of Leadership styles exist: Charismatic Leadership; Transformational Leadership; Transactional Leadership; Ethical Leadership; Authentic Leadership; Servant Leadership*;* Ideological and Pragmatic Leadership; Spiritual Leadership; Public Integrative Leadership and Distributed Leadership.

more technological aspect will not be able to find opportunities given their *skills and,* thus, will enter a situation of continuous unemployment or, on the other hand, will have to submit themselves to precarious jobs. As Frey and Osborne (2013), cited by Valenduc and Vendramin (2017), stated about 40% of current jobs will be threatened by the digital transformation process; the second obstacle identified is related to the constant change in technological *skills* required by the labor market, making it difficult for professionals who do not have any kind of knowledge in the technological area to keep up (Silva and Lima, 2017).

According to Bresnahan *et al*., (2002), the concept of information technology encompasses all kinds of "(...) innovations related notably to organizational change and product innovation (...) that require more skilled labor" (Boothby *et al.* , 2010).

With regard to technology use competence and knowledge of programming languages it becomes essential to highlight the concept "*Internet of Things*" (IoT). This concept represents the idea of technological impact on the numerous routine tasks of everyday life (Atzori *et al.* , 2010). The notion of IoT is therefore considered "(...) the next logical evolution, providing comprehensive services in manufacturing, (...) security, health, engineering, education and electronic consumption" (Want *et al.* , 2015).

In summary, the digitization process is increasingly considered a key strategic resource for the organizational success of other employers in various sectors, as it makes a colossal contribution to both the modernization of techniques, processes, and methodologies and fosters levels of innovation and productivity (Valenduc and Vendramin, 2017).

2.2.7 Resilience, stress tolerance and flexibility

Besides the competencies previously mentioned, resilience, stress tolerance, and flexibility will also be a set of *skills*, highly demanded by the labor market.

The preference for a professional who is resilient, flexible, and who adequately deals with *stressful* situations is something that employers seek for their structures and teams. Therefore, a worker is considered resilient when he or she is subjected to a demanding situation and still manages to demonstrate not only the ability to solve it, but also to grow in a positive way and also to implement positive changes (Britt *et al*., 2016). Allied to this resilience competency, the individual must be able to be tolerant of adverse events that intensify *stress* levels.

With regard to the concept of *stress*, it can be defined as being "(...) (a) a characteristic of the external environment acting on an individual, (b) the psychological, physiological and behavioral responses of the individual in the face of environmental demands, threats and challenges, or (c) the interaction of the two situations" (Ganster and Perrewé, 2011; Kahn and Byosiere, 1992 cited by Ganster and Rosen, 2013).

Flexibility is a competence that, despite being strongly valued by employers, it is up to these institutions to play an important role in its development since it is the responsibility of organizations to develop processes and methodologies to enhance the level of flexibility of their employees, i.e., "(...) the higher the level of flexibility of a company, the more likely employees are to perform better" (Gibson *et al.* , 2005).

On the other hand, the different levels of flexibility that take place in an organization, define and allow the demands of the employer to be met by promoting a work environment characterized by being both competitive and dynamic (Sanchez, 1995 cited by Gibson *et al.* , 2005).

As for the ability of individuals to be behaviorally flexible, this can be described as "(...) the ability of individuals to adapt to changing situations or to exhibit certain behaviors in different situations" (Gibson *et al.* , 2005). Therefore, a worker who is characterized by being behaviorally flexible and who can gather all these skills will become a key element for an organization since he/she will act in a

rational, coherent, and peaceful manner, repeatedly cherishing the values and principles of his/her employer.

2.2.8 Thinking skills, problem solving and suggestion of new ideas

Thinking, problem-solving, and the ability of an employee to suggest new ideas comprise a set of skills that are nowadays required and valued by organizations, whose aim is to strengthen and improve existing organizational knowledge and, consequently, to retain as much talent as possible.

Knowing that the effective resolution of a problem is directly dependent on the knowledge of the structure of the problem in question (Funke, 2001 cited by Goode and Beckmann, 2010), it is hardly possible to control and manipulate the system in order to acquire knowledge because the ability "(...) to solve complex problems (...) can be seen as a result of the amount of information available related to the ability to use such information" (Goode and Beckmann, 2010).

However, the idea of fluid intelligence characterized as the ability that an individual has to be able to reason abstractly and, deducing that there are differences in what is the process of applying knowledge (Cattell, 1971 cited by Goode and Beckmann, 2010), one concludes that inequalities at the level of this intelligence influence both the use of available information and the very application of the assimilated knowledge.

Regarding the ability of an individual to think and suggest new ideas, whether these ideas are incremental or radical, both contribute to the development of the various types of innovation (Jiao, Wang and Liu, 2019). Therefore, idea creation can influence job performance and how "(...) *managers* should aim at the idea conception phase" (Gurtner and Reinhardt, 2016). However, the innovation process is considered complex since it requires "(...) the analysis of assumptions, the forgetting of previous behaviors and the overcoming of substantial obstacles" (Senge, 1990 cited by Elenkov *et al.*, 2005), which sometimes ends up fostering conflicts between teams and/or organizational departments that "(...) tend to slow down and interrupt the innovation process" (Elenkov *et al.* , 2005).

The restructuring of teams and the investment in employees with strong critical thinking skills is one of the strategies practiced by employers (Fiore *et al.*, 2002) in order to solve a problem since the "(...) collective influence to obtain and use resources (...) can facilitate its resolution. (Gima, 2003).

According to Sheremata (2000), cited by Gima (2003), there are multiple problem solving processes, such as: the solutions identified; the speed of problem solving; the quality of the solutions presented; the cost of problem solving; and the quality of the *trade off* decision.

From an organizational perspective, the practice of generating ideas - both incremental and radical - in an active and agile way should be a crucial purpose in the strategic vision of organizations, having a direct and positive contribution in innovation levels and, consequently, in organizational productivity levels (Gurtner and Reinhardt, 2016).

2.2.9 Emotional intelligence

Taking into account the pandemic situation experienced since the beginning of 2020, it can be seen that the level of emotional intelligence of employees was one of the factors that required more prudence in the face of the situation. This is because the concept of emotional intelligence can be explained as being "(...) the ability to control one's feelings (...) and to use information to guide one's thoughts and actions" (Salovey and Mayer (1990) cited by Salovey and Grewal, 2005).

Still, Salovey and Grewal (2005) argue that the concept of emotional intelligence recognizes that

emotions[3] are validated as crucial sources of information to subsist in the face of the demands of the social context. Complementing these definitions, it can be corroborated that emotional intelligence results, then, from the union of three main psychological domains: the cognitive domain, the emotional domain, and the social domain.

Emotional intelligence is characterized as "(...) a set of interrelated abilities that allows people to process emotionally relevant information efficiently and accurately" (Mayer *et al*, 1999 cited by Salovey and Mayer, 1990) enables an individual who presents considerable levels of emotional intelligence to benefit positively from several fields of action, such as: the health-related aspect, the more clinical, social, educational and organizational part (Schutte and Malouff, 2016).

However, the criteria for measuring emotional intelligence competence differ both in the definition of the concept itself, in the use of distinct typologies and dimensions, and also in the formats of response to be assessed, that is, both self-report and skill and approaches are used (Conte, 2005). Based on the case studies conducted by Conte (2005), it can be stated that the most commonly used criteria concerning the concept of emotional intelligence resort to the 5 Factors model (Rooy and Viswesvaran, 2004 cited by Conte, 2005).

In the particular case of workers who assume leadership positions, their emotions and their level of emotional intelligence skills contribute beneficially not only to their job performance (George, 2000 cited by Antonakis *et al.* , 2009) but also to the job satisfaction of their work team since they will be able to help those who lack "(...) self-awareness, self-regulation, empathy, and interpersonal skills, i.e., emotional intelligence" (Tram *et al.* , 2006).

Therefore, workers with high levels of emotional intelligence identify feelings of both frustration and emotional distress (Wu and Shie, 2017) more readily and, consequently, are able to reduce their levels of *stress,* which enables them to be resilient individuals because "(...) they are able to understand the causes of *stress* and develop coping strategies to deal with the negative consequences of *stress*" (Cooper and Sawaf, 1997 as cited in Tram *et al.* , 2006).

2.2.10 Service orientation

Today, organizations imperatively seek individuals who have excellent levels of service orientation as employees are increasingly seen as a potential competitive advantage who objectively contribute to organizational success (Alge *et al.* , 2002).

Organizations must therefore prioritize the needs of customers in order to achieve their long-term goals (Donavan et al. , 2004) and thus be able to retain and attract employees with high levels of performance in both service and customer orientation.

The concept of service orientation can then be defined as being the combination of " (...) three basic personality traits (i. e., adjustment, sociability, and friendliness) and finding that these traits are predictive of supervisor service performance ratings" (Brown *et al.* , 2002). Regarding the concept of customer service orientation, it can then be defined by Cran (1994) cited by Alge *et al.* (2002), as being a set of "(...) basic individual predispositions and an inclination to provide service, to be polite and helpful when dealing with customers (...)".

In contrast, customer orientation defined as being “(⋯) an important personality trait that enables employees to carry out their tasks in the workplace” (Wu and Shie, 2017) will also be much more advantageous and fruitful for job satisfaction itself, as for the employee's performance and commitment to their service since these result from the time spent in the direct relationship with customers (Donavan *et al.* , 2004).

3 The concept of emotions can be defined as a set of "(...) multifaceted, biologically mediated (experiential, cognitive, behavioral, expressive) reactions regarding relevant survival events" (Lerner *et al.*, 2015, p. 799).

However, it is important to mention that there are two types of customer service: the external customer service orientation that occurs when the customer is not part of the organization in question; and the internal customer service orientation when it involves serving elements of the same entity but from other departments, for example (DuBrin, 1997 cited by Martin and Fraser, 2002).

Taking into account the review of the existing literature on this topic it is possible to highlight the model that manages to elucidate how a "(...) *service-worker*'s orientation towards his/her customer affects several issues (...) including perceived job fit, job satisfaction, commitment to the company, and organizational citizenship behaviors" (Donavan *et al.*,2004).

Thus, workers who have good service-orientation skills for both external and internal customers, and who show a long-lasting and loyal relationship with their customers, will be in high demand in the job market.

2.2.11 Persuasion and negotiation skills

Both persuasion and negotiation skills are some of the most sought after skills in the labor market given the challenges and obstacles faced by organizations.

From the perspective of employers, in addition to seeking highly competent, skilled and specialized individuals to perform their more technical functions, they also seek certain behavioral characteristics, i. e., if on the one hand they want a professional who is persuasive - someone who is able to "(...) influence others to change their views and/or behaviors in order to achieve personal goals" (Artinger *et al,* 2015) - on the other hand, they value someone who also has efficient negotiation skills or a certain social influence (Malhotra and Bazerman, 2008).

Regarding the ability to persuade, this involves two highly significant factors: self-control and resistance to persuasion itself, and this second factor depends on both the existing resources of self-control as it consumes these same resources, that is, if an individual reaches its point of exhaustion and maximum fatigue can lead to an unfair situation of persuasion which ends up directly influencing the ability that the individual has to refuse persuasive speeches (Burkley, 2008).

Regarding the notion of social influence, and as Kelman (1958), cited by Malhotra and Bazerman (2008) argues, social influence recognizes three main consequences: conformity which occurs when a certain change in what is the individual's conduct towards a given action is confirmed; internalization which requires "(.... a long-term commitment to the course of action adopted by the influencer" (Malhotra and Bazerman, 2008); and, finally, identification which refers to the change "(...) in the target's attitude toward the influencer's desired course of action" (Malhotra and Bazerman, 2008).

In the case of negotiation skills, this concept can be defined as the process in which the parties involved in a given circumstance do not agree (Bazerman and Neale 1994 cited by Artinger *et al.* , 2014). Better put, individuals will only reach consensus and consequently achieve their goals when there is a scenario of cooperation between the parties involved (Thompson *et al.* 2010 cited by Artinger *et al.* , 2014).

The technological advances that have taken place over the past few years have had a colossal impact on negotiation processes and their repercussions. Therefore, a new method for exercising negotiation skills has emerged, a method that is called *e-negotiation.* In this new methodology, there is neither verbal nor non-verbal language which in a usual negotiation process promoted both "(...) relationship development, strengthened the basis of trust and helped those involved to reach an agreement that was mutually beneficial" (Galin *et al.* , 2004).

Therefore, in an *e-negotiation* process all decisions and judgments are made exclusively based on a text that conveys the information in question, which can easily result in "(...) misunderstandings, misjudgments and undesired results" (Galin *et al.* 2004). However, in an *e-negotiation* process the fact that there is no face-to-face language of any kind allows the level of conflict to be minimal when

compared to the traditional negotiation process (Carnevale *et al.* 1981; Lewis and Fry, 1977 cited by Galin *et al.* , 2004).

On the other hand, the negotiation process when done electronically has a relatively longer duration *versus* when done face-to-face (Carnevale and Probst, 1997 cited by Galin *et al.* , 2004), which has irrefutably contributed to both higher levels of satisfaction and more beneficial outcomes in environments characterized as competitive (Landry, 2000 cited by Galin *et al.* , 2004).

In short, employees who master both the traditional negotiation process and the process at the technological level (*e-negotiation)* are extremely relevant and noteworthy elements for organizations seeking a reference position in the market.

2.2.12 System evaluation and analysis

Finally, the competence of systems evaluation and analysis, which is directly related to decision-making ability and judgment as explained in the WEF report, comprises a competence highly valued by employers.

Given that the notion of systems assessment consists of "(...) identifying measures or indicators of system performance (...)" (Schwab and Zahidi, 2020) as well as identifying actions that are critical in order to improve organizational performance, it is incumbent upon organizations to seek professionals capable of not only assessing but also analyzing systems, i. e., to prioritize individuals capable of "determining how a system should function and how changes in conditions, operations, and environment can affect organizational outcomes" (Schwab and Zahidi, 2020).

According to Lerner et. al (2015), decision-making ability is strongly influenced by emotions and, for this reason, they can contribute both negatively and positively in the decision-making process because emotions allow for a certain prediction of the decisions to be made by individuals (Lerner et. al. , 2015).

Although the decision-making process is influenced by emotions, emotions may or may not be influenced by judgment, which depends directly on "(...) interactions between the cognitive and motivational mechanisms triggered by each emotion (...) and the standard mechanisms that drive any judgment or decision" (Lerner *et al.* , 2015).

This new concept of judgment is studied in greater detail in Forgas' (1995) model in which the various ways in which the notion of affect influences social judgment are studied (Lerner *et al.* , 2015).

In general, personality judgment corresponds to a competence that is essential for what is called "social survival" (Funder, 2012). Characterizing the concept of judgment can then be explained as the ability to "(...) act intentionally and where there is an important nexus in which theory of mind and moral judgment meet" (Leslie *et al.* , 2006).

3 Methodology

The present research is based on quantitative methodology. Therefore, a bibliometric analysis of the data will be performed.

In order to conduct an extensive, comprehensive and properly grounded analysis three primary sources were used: the *Web of Science Database (WoS)*, the *Scopus Database* and the VOSviewer *software* (version 1.6.18). In both Databases the same search criteria was used - "*Future of Work*" - however, all articles published in the year 2022 were excluded for the present investigation and therefore the criteria became:

"TITLE-ABS-KEY ("future of work") AND (EXCLUDE (PUBYEAR, 2022))"

The VOSviewer *software* makes it possible to analyze the correlation of data collected from the two databases: *Web of Science* and the *Scopus database.* Regarding the basic benefit of using this *software*,

one can enumerate the possibility of creating maps based on bibliometric datasets entered by the user. In other words, the VOSviewer *software* consists of a technological tool that, through the "(...) construction and visualization of bibliometric maps, paying special attention to the graphical representation of the maps" (Cobo *et al.*, 2011), enables a simplified data analysis.

Thus, the election of this *software* had as a primary objective to make the evaluation of the various articles collected for the literature review of this study and thus perform a meaningful bibliometric analysis.

From another perspective, the VOSviewer *software* allows the creation of bibliometric maps based on a co-occurrence matrix. Thus, for the elaboration of these maps there are three fundamental steps that have to be considered: "(...) in the first step, a similarity matrix is calculated based on the co-occurrence matrix. In the second step, the VOS mapping technique is applied to the similarity matrix. And finally, in the third and final step, the map is translated[4] , rotated[5] and reflected[6] " (Eck and Waltman, 2009).

As for the information, references, and data that were extracted from the two previously mentioned databases, a brief appreciation was made regarding the information gathered from both *Scopus* and WoS, through the graphs revealed by these same entities.

3.1 Scopus database analysis

As mentioned earlier, the *Scopus database* - developed in the year 2004 - was used to collect articles related to the research topic since this database is characterized as "(...) the largest multidisciplinary database of literature (...) in social science research" (Bartol *et al.* , (2014) Norris and Oppenheim (2007) cited by Donthu *et al.*, 2019). Still, it is important to mention that the *Scopus database* is highly regarded when conducting quantitative data studies and analysis.

Using *Scopus* in order to perform a bibliographic search for the expression "*Future of work*" it was found that there was a sample of about 957 articles related to the theme under study. However, it was defined that the search period would be until 2021, so it was necessary to exclude all publications from the year 2022, thus verifying a total of publications equivalent to 897.

From the 897 articles from the most diverse areas, years and authors it is possible to draw some conclusions: the first conclusion to be analyzed is that in 2021, the expression "*Future of work*" has assumed an exponential growth in terms of the number of publications on this topic. As Chart 1 shows, since 2016, research and curiosity about this topic has been increasing considerably. In 2021, around 214 articles were published worldwide.

Evidently, the significant increase in the number of articles published on this subject is due to the fact that it was a year in which the covid-19 pandemic was experienced. During this same year, a variety of opinions, concepts, and reflections about the meaning of work emerged, because over the years this concept has been redefined.

In line with the previous analysis and bearing in mind that this study takes place after the peak of the

4 "The solution is translated in such a way that it is centered on the origin" (Eck and Waltman, 2009, p. 532).

5 "The solution is rotated such that the variation in the horizontal dimension is maximized. This transformation is known as principal component analysis" (Eck and Waltman, 2009, p. 532).

6 "If the median of X11,...,Xn1 is greater than 0, the solution is reflected on the vertical axis. If the median of X12,...,Xn2 is greater than 0, the solution is reflected on the horizontal axis." (Eck and Waltman, 2009, p. 532).

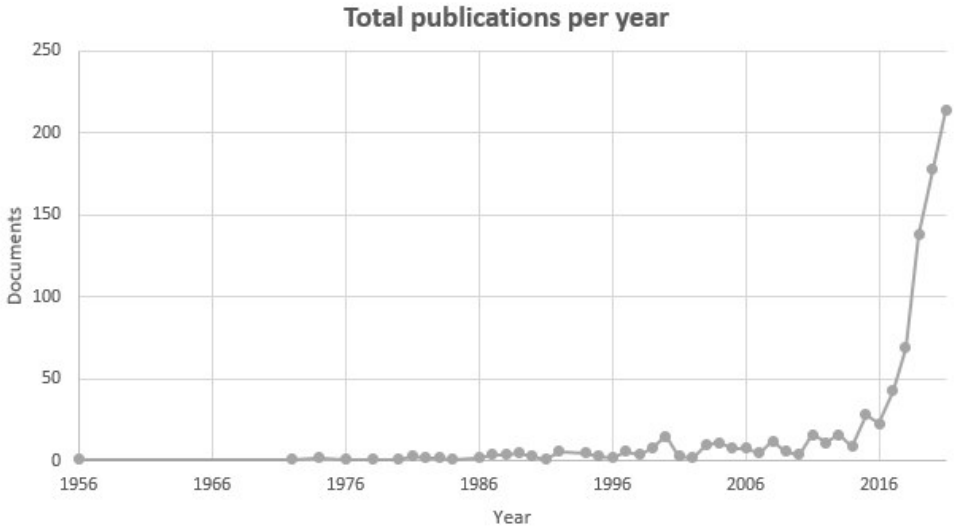

Chart 1 Total publications per year

covid-19 pandemic, it is possible to state that the countries that have studied this topic the most were the United States of America (USA) with about 254 publications, England with 179, and Australia with 82 published articles.

Nevertheless, many other countries have also made active and notable contributions both in the publication of articles and in the reflection of premises and arguments (Chart 2).

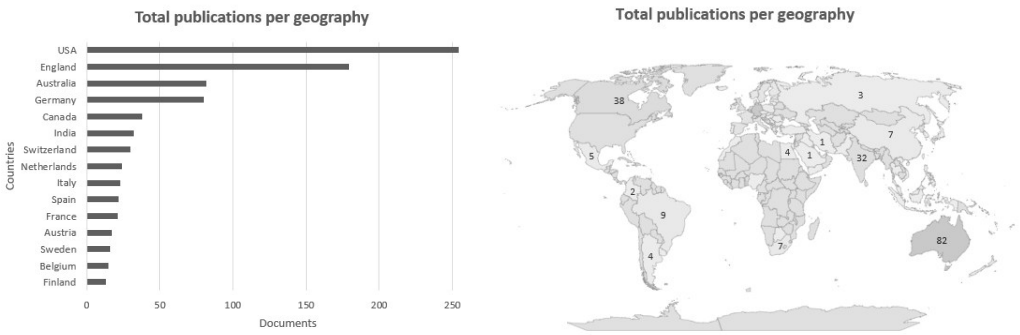

Chart 2 Total publications per geography

Still, it is important to mention that the author who has most contributed to the study of the "*Future of work*" criterion has been Professor Colin C. Williams of the University of *Sheffield*, with about 7 articles published to date (Chart 3).

With regard to their three publications with the highest number of citations and that, inevitably, have a greater preponderance about this theme are: the 2012 publication, "*The Pervasive Nature of Heterodox Economic Spaces at a Time of Neoliberal Crisis: Towards a "Postneoliberal" Anarchist Future"*, with about 56 citations; followed by the publication "*A critical evaluation of competing representations of the relationship between formal and informal work";* and the publication of the year 2004, *"Beyond commodification: Re-reading the future of work*", the latter two having an analogous number of citations equivalent to 11.

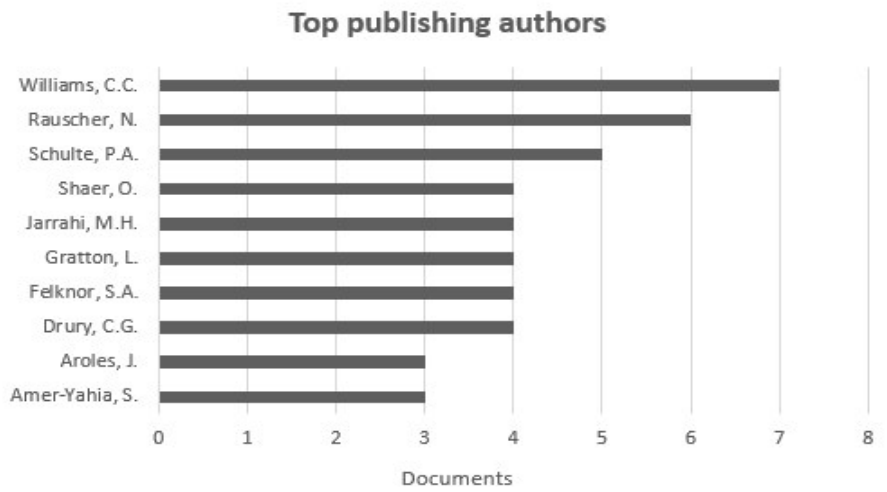

Chart 3 Top publishing authors

So far, the *International Labor Organization*[7] , a tripartite agency belonging to the United Nations, is the entity that has published the most articles on the issue of the future of work with around 14 publications (Chart 4). Still, it is important to mention two other equally relevant sources in contributing to the study of the future of work - the *Massachusetts Institute of Technology*, with 13 publications, and the *National Institute for Occupational Safety and Health* with 11 published articles.

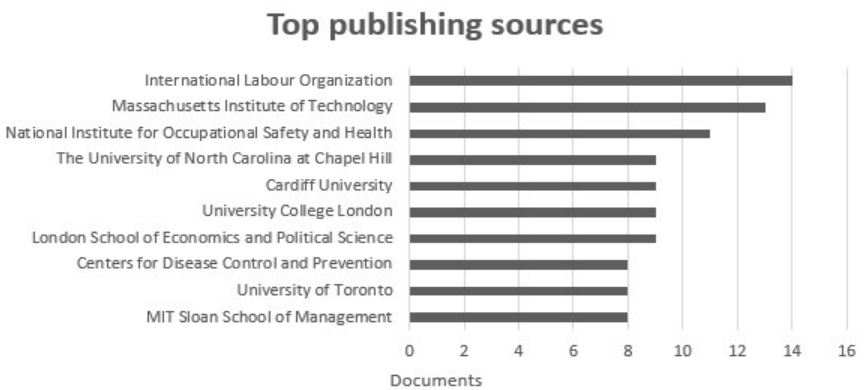

Chart 4 Top publishing sources

In the following table, Table 2, it is possible to analyze both the title, the year and the authors of the publications that have been made by the *International Labour Organization* regarding the study of the future of work.

Considering the various fields of study, it is possible to conclude that the field that has published the most on this subject is the social sciences (24.5%), followed by management (21.8%) and computer science (13.2%). The remaining 40.5% are distributed among various fields of study as shown in Chart 5.

7 A body that brings together both governments and employers from 187 member states and is focused on setting and enforcing labor standards and policies.

Table 2 Publications of the *International Labour Organization*

Author	Title	Publication Year
Addati L.	Transforming care work and care jobs for the future of decent work	2021
Gereffi G., Posthuma A.C., Rossi A.	Introduction: Disruptions in global value chains - Continuity or change for labor governance?	2021
Harayama Y., Milano M., Baldwin R., Antonin C., Berg J., Karvar A., Wyckoff A.	Artificial Intelligence and the Future of Work	2021
Rantanen J., Muchiri F., Lehtinen S.	Decent work, ILO's response to the globalization of working life: Basic concepts and global implementation with special reference to occupational health	2020
Greenfield D.	Safety and health at the heart of the past, present, and future of work: A perspective from the international labor organization	2020
Ernst E., Merola R., Samaan D.	Economics of Artificial Intelligence: Implications for the Future of Work	2019
Behrendt C., Nguyen Q.A., Rani U.	Social protection systems and the future of work: Ensuring social security for digital platform workers	2019
Behrendt C., Nguyen Q.A.	Ensuring universal social protection for the future of work	2019
Sakamoto A.	Reconceptualizing skills development for achieving inclusive growth: the horizon of a new generation of skills policy	2019
Roelants B., Eum H., Eşim S., Novkovic S., Katajamäki W.	Cooperatives and the world of work	2019
Islam I.	Growth, New Technology and the Future of Work: International Evidence and Implications for India	2019
Schwettmann J.	Cooperatives and the future of work	2019
Comyn P.J.	Skills, employability and lifelong learning in the Sustainable Development Goals and the 2030 labor market	2018
Ryder G.	The International Labour Organization: The next 100 years	2015

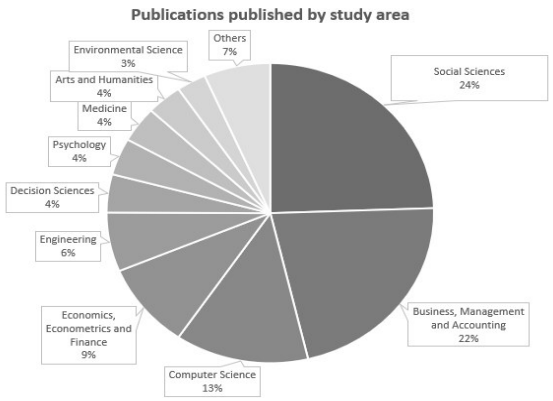

Chart 5 Publications published by study area

3.2 Web of Science WoS

The WoS database was developed by Eugene Garfield in 1964 at the Institute for Scientific Information and is now owned by *Clarivate Analytics*.

According to the most recent information available on the *website*[8] , the WoS database has more than 74.8 million academic data, 1.5 billion cited references (dating back to 1900) in a total of about 254 fields of study.

Performing a new search but using the same expression *"Future of work*" and using another database - *Web of Science* - it was found that there are about 915 articles related to this theme.

For this research, and as was done in the *Scopus database*, it was necessary to exclude all publications from the year 2022 and therefore it was found that there are 873 publications contributing to this study.

Of these 873 articles, about 138 are directly related to the field of management, 130 to an industrial relations aspect, and about 99 articles refer to the field of economics, as represented in Figure 1.

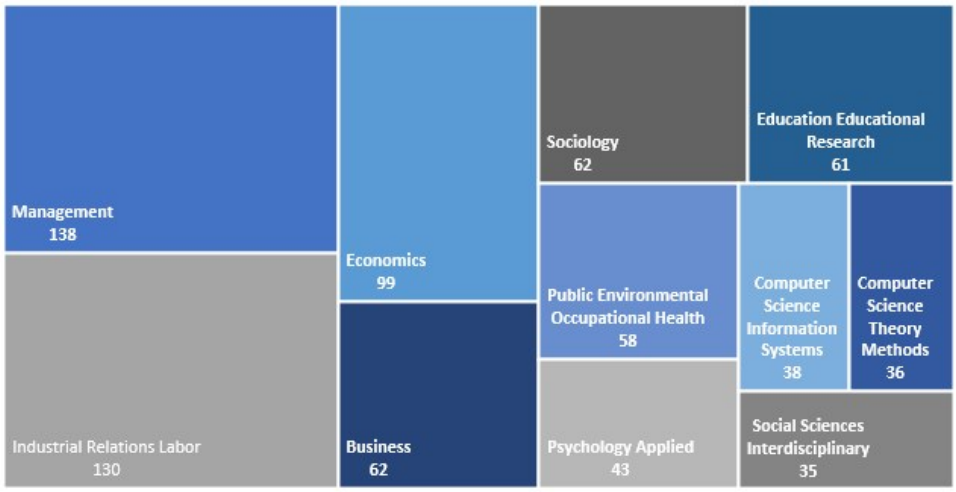

Figure 1 *Web of Science* documents by area of study

4 Analysis and discussion of results

By aggregating the information collected from both the *Web of Science Database* and the *Scopus Database* in the VOSviewer software (version 1.6.18), it is possible to perform an effective, clear and concrete analysis against the totality of the data collected from both databases, since this software facilitates bibliometric mapping and, consequently, bibliometric analysis.

The VOSviewer *software* then allows the visualization of "(...) maps that contain at least a moderately substantial number of items (at least 100 items) whereas the vast majority of computer programs used for bibliometric mapping do not allow for such satisfactory analysis of these same maps" (Eck and Waltman, 2009). To build these maps, the *software* uses a technique called the mapping technique, in which VOS stands for "visualization of similarities" (Van Eck and Waltman (2007) cited by Eck and Waltman, 2009) or, on the other hand, the technique using multidimensional scaling.

As for the graphs presented and resulting from the use of the VOSviewer *software*, there are

8 https://clarivate.com/webofsciencegroup/solutions/web-of-science-core-collection/

essentially two types of maps: the distance-based maps, through which it is possible to analyze the strength of the relationship between items based on their effective distance; and the graph-based maps, which do not necessarily translate the strength of the relationship between items but rather, the existing relationship using lines connecting several points.

Therefore, the VOSviewer *software* resorts to using "(...) two standardized "weights" such as the number and total strength of *links*, to graphically visualize the nodal network. The size of the nodes and the interconnecting lines connecting the nodes denote the relevance and strength of these same *links*" (Donthu *et al.* , 2019).

Briefly, any analysis performed using the VOSviewer *software* can be done using five main analysis typologies, several analysis units, and using two relevant counting methods, either full calculation or partial calculation, as detailed in the following table (Table 3).

Table 3 VOSviewer analysis typologies

Analysis Typology	Units of Analysis	Calculation Methods
Co-authorship	Authors Organizations Countries	Integral Calculus Partial Calculus
Co-occurrence	Keywords Keywords for Authors Key words index	
Quote	Documents Sources Authors Organizations Countries	
Bibliographic Link	Documents Sources Authors Organizations Countries	
Co-citation	References Cited Sources Cited Authors Cited	

Nevertheless, it is also important to define the concept of *cluster* since it will be mentioned several times throughout this research. Thus, a *cluster* can be explained as a set of elements/items that are grouped or that occur together, having therefore some kind of connection.

For this study and ensuring that the analysis is in accordance with the objectives of the study, three types of analysis, five units of analysis, and a baseline counting method will be selected in order for the research to be as comprehensive, complete, and rigorous as possible. On the other hand, the use of the VOSviewer *software* enables a complementary understanding of the literature review concerning the future of the work.

Considering the previously mentioned analysis typologies, it was defined that the analyses to be performed would be based on Typology 1 - Co-authorship (Authors; Organizations; Countries) which consists in understanding the relationship of the various items in relation to the number of documents; on Typology 2 - Co-occurrence (Keywords), that is, what is the relationship between the items according to the number of documents; and, finally, on Typology 5, the Citation (Sources), that is, through this analysis it will be possible to understand the relationship of the items according to the number of times they are cited. For all these analyses, the selected counting method will be the Integral Calculus (Table 2).

Table 4 Selected analysis typologies

Analysis Typology	Units of Analysis	Calculation Methods
Co-authorship	Authors Organizations Countries	Integral Calculus
Co-occurrence	Keywords	Partial Calculus
Quote	Sources	

4.1.1 Co-authorship analysis - Authors

Regarding the analysis of Co-authorship - Authors, a minimum value, 2, was determined for the number of documents per author, that is, of the 1819 authors identified only 166 were aligned with the previously defined criteria. For each author analyzed, the number of documents, the number of citations, the "*total link* strength" - the existing relationship of co-authorship - and the average year of publication were calculated (Table 4).

In Figure 2, it is possible to analyze the results obtained in line with the criteria defined for this analysis: at the "*weight*" level the citations criterion was defined and at the "*scores*" level the average year of publication.

It is also important to note that some of the authors mentioned in Figure 2 are not related in any way, and that the largest set of connected items is composed of 10 items, belonging to *cluster* 1.

During this analysis about 88 *clusters* were identified, being that the one with the largest dimension, in a virtualization perspective, is the one that translates the largest number of citations. On the other hand, the closer the authors were to each other (in terms of colored region), the greater their level of connection regarding both citations and number of publications.

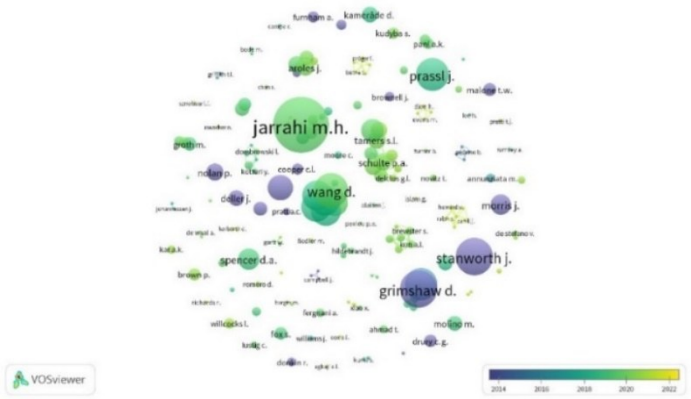

Figure 2 Analysis co-authorship / Authors

Regarding the three authors who stand out when analyzed more closely in Figure 2, we can gather some relevant information for this study, such as: the first author mentioned in Table 5, Jarrahi, with only four published documents has more than 336 citations. Next, the author Grimshaw also published about four papers in 2013, however, his number of citations is smaller, with 176 in total. Stanworth, on the other hand, has only two published papers, but has been cited about 179 times.

4.1.2 Co-authorship analysis - Organizations

As for the Co-authorship - Organizations analysis, a minimum of 2 documents per organization was

Table 5 Authors with highest number of citations

Author	Number of Documents	Number of Citations	Total link strength	Publication Year (on average)
Jarrahi m.h.	4	336	8	2019
Stanworth j.	2	179	0	1989
Grimshaw d.	4	176	2	2013

established and, thus, there was an *output of* 71 organizations that matched the defined criteria. These 71 results were grouped into 53 *clusters, and* the last 59 *clusters* contained only 1 item, as can be seen in figure 3.

For this analysis, the *overlay* virtualization method was selected, which allows us to study, through a scale defined from blue, which represents the lowest score, to yellow, which translates into the highest score, which organizations have the highest number of citations on the theme in question - "*future of work*".

In a broader view, it can be seen that the greater the number of items in a given area as well as in the region surrounding a given point, and the greater the weight of the items, the greater the yellow tint of the area in question. In contrast, the existing distance between two *clusters* makes it possible to analyze the existing correlation between organizations vis-à-vis citations (Eck *et al.*, 2017).

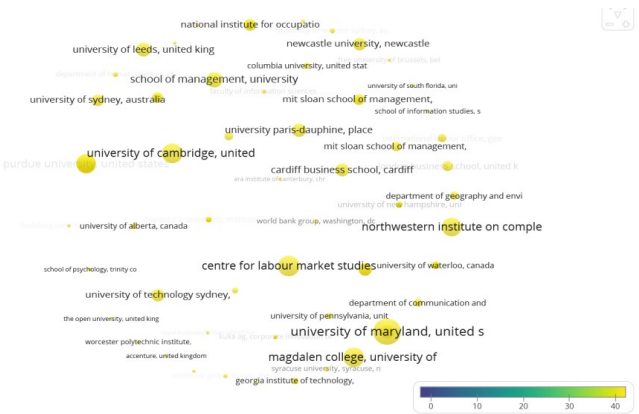

Figure 3 Citations per organization

In the following table, the organizations with the highest number of citations are represented; however, it is important to mention that for the present investigation only those with a total of more than 125 citations out of the 71 existing organizations defined by the research criteria were extracted.

Regarding the organizations with the highest number of citations, then, the University of *Maryland* can be highlighted, with about 312 citations with only 2 published papers; then, the University of *Leicester* with 2 papers and 160 citations arising from those same two articles and, in third, the University of *Oxford*, also with 2 papers but with only 145 citations.

Table 6 Top 5 Most quoted organizations

Organization	Documents	Citations
University of Maryland	2	312
Centre for labor market studies, University of Leicester	2	160
Magdalen college, University of Oxford	2	145
University of Cambridge	2	139
Northwestern institute on complex systems, Northwestern University	2	125

4.1.3 Co-authorship analysis - Countries

In a more concrete analysis of the relationship between co-authorship and countries, 7 *clusters* with about 29 items were created, these items consisting of the countries to be studied. Nevertheless, it is important to mention that none of the following graphs will show all the countries presented by the database, since a minimum criterion of having at least 5 articles published by each country was applied in order to be eligible for the study. Thus, of the 138 countries only 29 - exemplified in Table 7 - were analyzed and are present both in the tables and in the following figures.

Table 7 Items (Countries) belonging to the 7 Clusters

Cluster	Country
Cluster 1	Australia China Croatia Israel New Zealand Singapore England United States of America
Cluster 2	Austria Denmark Finland Netherlands Norway Spain
Cluster 3	Belgium Brazil Portugal South Africa Switzerland
Cluster 4	Canada Mexico Sweden
Cluster 5	Germany Poland
Cluster 6	Ireland Italy
Cluster 7	India

Regarding the countries that present the highest levels of *total link strength of* the countries mentioned in table 7, the USA, England, Germany, Australia, and Switzerland stand out, all of them with values higher than 30, as it is possible to confirm through the information described in table 8.

For the virtualization analysis of the criterion "Co-authorship - Countries" two main *outputs* were

Table 8 Top 5 countries based on *Total Link Strength*

Country	Documents	Citations	Total Link Strength
United States of America	255	3075	95
England	177	2400	72
Germany	80	933	55
Australia	82	472	36
Switzerland	30	303	31

studied (Figure 4 and 5). In Figure 4, it is represented, in the form of a map, the average number of publications, annually, of each country until the year 2021.

Analyzing this same figure, it can be concluded that the areas with greater significance in terms of the average number of publications per year are characterized by having a larger shaded area. For example, just by visual analysis of Figure 4, one can conclude that the US and the UK are the two countries with the greatest significance in terms of the average number of publications since they assume two of the largest shaded regions of the map. Consequently, by analyzing the scale of the map in Figure 4, one can infer which year, on average, presents the highest number of publications.

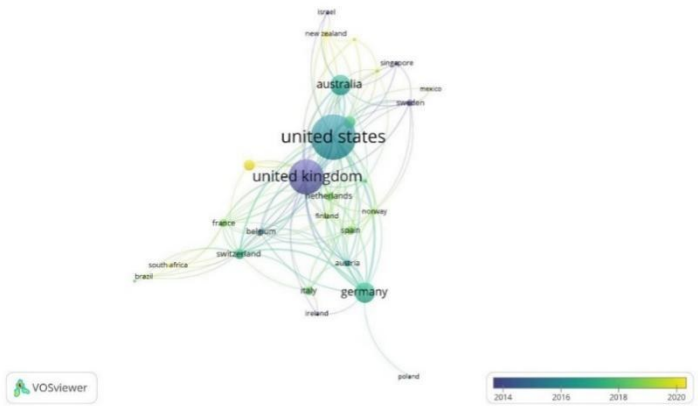

Figure 4 Average publications

In Table 9 we describe in a more succinct and concise way the information concerning the five countries that show the highest average number of publications correlated with the criterion of this research - "*future of work*".

In the particular case of the USA, the year that, on average, more documents were published was 2016. As far as England is concerned, 2014 was the year with the most publications and, for both Australia and Germany, the year in which there was a greater intensification in what concerns the publication of documents was 2017. Finally, in 2018, Canada published about 38 documents, thus contributing to the study of the theme.

Table 9 Top 5 countries with highest average number of publications

Country	Cluster	Link	Total link strength	Documents	Average publications per year
United States of America	1	22	95	255	2016
England	1	23	72	177	2014
Australia	1	15	36	82	2017
Germany	5	16	55	80	2017
Canada	4	10	22	38	2018

As for Portugal, it is in 28th place, ahead of Romania, with only 5 published papers and about 10 citations, which recognizes the importance, urgency and scarcity of national literature regarding the study of the theme of the future of work.

In Figure 5 is presented, as in the previous figure, a map that translates from the analyzed countries, which ones show greater relevance in terms of average citations.

In accordance with the information that table 10 conveys, it is possible to rank the five countries with the highest average citation level.

In first place, with 7 published papers and about 115 citations, is China with an average of 16.43;

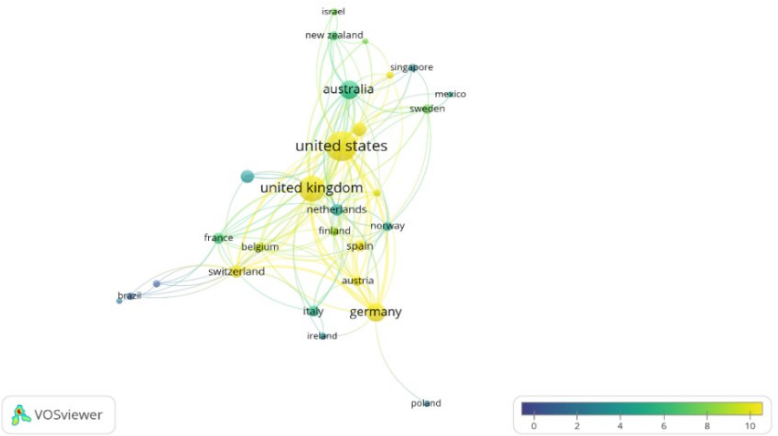

Figure 5 Average citations

second, with 13.56 citations, on average, is England with 2400 citations in 177 published papers; immediately following, with approximately 13.39 citations, is Canada with about 38 papers; in fourth position is the USA with an average of citations equivalent to 12.06; and last, although with an average of citations very close to the USA, is Germany with about 11.66 citations, on average.

Table 10 Top 5 countries with highest number of citations on average

Country	Cluster	Link	Total link strength	Documents	Citations	Average Citations
China	1	7	9	7	115	16.43
England	1	23	72	177	2400	13.56
Canada	4	10	22	38	509	13.39
United States of America	1	22	95	255	3075	12.06
Germany	5	16	55	80	933	11.66

4.1.4 Co-occurrence analysis - Keywords

The Co-occurrence / Keyword analysis resulted in a total of 2583 keywords. After a criterion of 4 occurrences per word was implemented and defined - i.e., the word must be present at least 4 times in a given document - it was found that only 187 items matched the stipulated criterion (Figure 6).

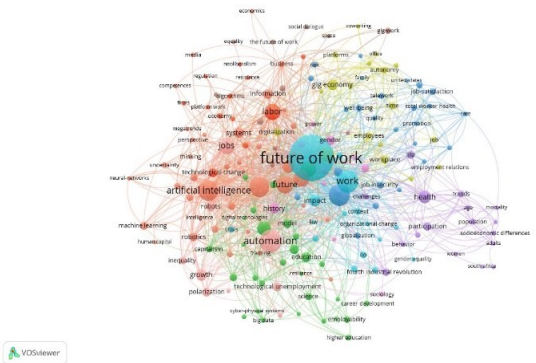

Figure 6 Keywords

Therefore, these 187 items were grouped along 10 key *clusters* for the analysis. The first three clusters are those with the most items grouped together, of which 39 are in cluster 1, 29 in the second cluster, and in the third cluster about 26 items. The remaining 120 items are distributed among the rest.

If on the one hand it is possible, through figure 6, to observe both the relationship between the various keywords, and what their connection and level of proximity is, on the other hand, one can easily identify which are the three main *clusters* by the density of items in certain regions.

Following the network visualization map of figure 6, and in order to simplify the central *clusters*, all information regarding the keywords were grouped through the following table. In this way, it is possible to depict in a schematic and summarized way the designation of each of the *clusters as* well as the exposure of some of their items (Table 11).

Table 11 Cluster designation

Cluster	Keyword
Cluster 1	Artificial Intelligence Machine Learning Communication Thinking Knowledge Systems Complexity
Cluster 2	Covid-19 / Pandemic Leadership Innovation Stress Industry 4.0 Resilience Scan
Cluster 3	Teleworking Family Job Satisfaction Mental Health Motivation Meaningful Work Globalization
Cluster 4	Platforms Autonomy Time Labor Relations Precarious Work Identity Gig Economy
Cluster 5	Youth Challenges Socio-economic differences Population Security Age Behaviors
Cluster 6	Work Environment Laws Organizational Change Sustainable Development Gender equality Crises Marketplace

Table 11 Cluster designation (Continued)

Cluster	Keyword
Cluster 7	Economy Technological Changes Regulation Precariousness Sustainability
Cluster 8	Climate Change Creativity Learning Processes Gig Work Transformation
Cluster 9	Internet Sociology Expectations History Information Technology
Cluster 10	Polarization Investment Robots Technological Unemployment Growth Inequalities

Figure 7 depicts the top five keywords in the search conducted, these being: the "future of work" with 203 occurrences; followed by the word "automation" with 62 occurrences; in third place, the word "work"; in fourth place, with 57 occurrences, the word "employment" and in fifth place, both with about 51 occurrences, the words "technology" and "artificial intelligence".

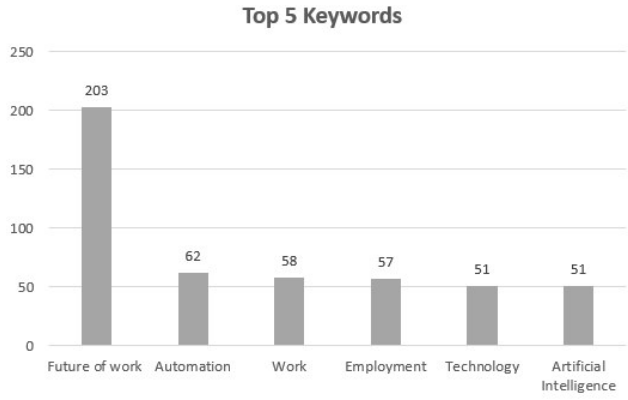

Figure 7 Top 5 keywords

4.1.5 Analysis of citations - Source

Finally, in the analysis regarding the citation-sources of the two databases, a minimum criterion of 4 published documents per source was applied.

Thus, only 52 out of 558 results matched the established criterion. However, as can be seen in figure 8, not all items in the network present a connection or, rather, a relationship.

In the following figure (Figure 8), it is possible to analyze both the relative weight of each source

and which newspapers had the most impact for the theme of the future of work.

For these results, 35 main *clusters* were created, with the first 3 *clusters* containing 4 items each, the next 2 *clusters* containing 3 items, and *clusters* 6 through 9 containing only 2 items. After *cluster* 9, there is no relationship between the items since there is no link *strength*.

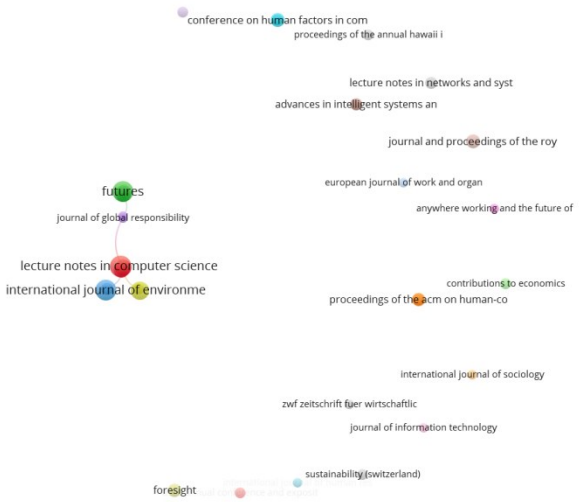

Figure 8 Newspapers with published documents

Still with regard to the analysis concerning the citations - sources and, according to table 12, we can ascertain which are the five most important newspapers with regard to the future of work.

Thus, and in first place, with about 16 published documents and 77 citations is the *Lecture Notes in Computer Science*. Soon after, although with a higher number of citations, 128, is the *Futures Journal* and the *International Journal of Environmental Research and Public Health*, both journals with 15 published documents.

Table 12 TOP5 Newspapers with the most published papers

Source	Documents	Citations
Lecture Notes in Computer Science (including subseries lecture notes in artificial intelligence and lecture notes in bioinformatics)	16	77
Futures Journal	15	128
International Journal of Environmental Research and Public Health	15	69
International Journal of Environmental Research and Public Health	12	51
New technology, Work and Employment (NTWE)	10	219
IFIP Advances in Information and Communication Technology	9	27

Considering the results obtained in the bibliometric survey conducted using the VOSviewer *software and* corroborating them with both the literature review and the information gathered from the report "*The future of Jobs 2020*" of the World Economic Forum, *the* following conclusion may be drawn: the vast majority of the competences explained in the WEF report were analyzed and validated by the bibliometric survey conducted in this study. Nevertheless, some additional concepts mentioned, related to the theme of this research, assume equal prominence and relevance to the contribution of the future of work.

Reflecting, now, on the notion of the future of work and, being this concept characterized by being something complex and dynamic as it encompasses the ideas of "(...) globalization, digitalization, qualification and job protection (...)" (Ganapathy and Bennett, 2021) as well as it comes from the commitment and motivation of the various *stakeholders* involved in this process, be they "governments, organizations, think tanks, policy makers, economists, social scientists, environmentalists, among others (...)" (Ganapathy and Bennett, 2021) makes the study of this theme extensive and intriguing.

Taking into account the main keywords arising from the bibliometric research, the following terms can be highlighted: automation, artificial intelligence and the concept of technology. It is possible, then, to infer that these areas are extremely pertinent in what concerns the study of the future of the labor market, insofar as they represent domains with effective growth and of great magnitude. From another perspective, both emerging technologies and automation and digitalization processes comprise what comprises the notion of the future of work.

Knowing that technological advances have allowed not only a greater efficiency in the operations, tasks, and responsibilities of employees, but have also played an important role in increasing production capacity and management of human resources and key business assets, it is essential to note that employers, by investing in technology and employees with specific technological knowledge, will have a direct and positive impact on their organizational success, since they will be able to effectively maximize their profits, thus applying an integrated and effective management in their structures.

According to the World Economic Forum report, it is likely that there will be a requalification of thousands of jobs, since during the next few years we will witness the extinction of many jobs as a result of robotization and automation processes, a direct consequence of rapid technological development. Therefore, digital transformation processes play a key role in redefining strategies, business models, and even in the management of other *stakeholders* (Govindarajan and Kopalle, 2006).

Knowing that the concept of AI was one of the words identified, during the bibliometric analysis, as being central to the study of the "future of work", it becomes imperative to mention that artificial intelligence is equally important in so many other domains besides its remarkable contribution with regard to efficiency on the production stage and profit optimization since there is a reduction in production costs. Concisely, AI is indispensable in relevant decision making situations/processes.

Undoubtedly, decision-making processes are not exclusive only to the elements that constitute the top management of an organization but rather, to the vast majority of employees as they "(...) constantly find themselves in unusual situations (characterized, specifically, by uncertainty and equivocation) and therefore require the ability of visionary and intuitive thinking" (Jarrahi, 2018) which can be facilitated using AI. Nevertheless, elements that do not belong to the management layer can naturally "(...) occupy central positions in the informal network of organizational influence and (...) play an irreplaceable role in obtaining support to deal with the equivocation of decision making" (Jarrahi, 2018).

As for individuals who are currently working and, in particular, for those who do not perform any information technology-related activities, it is imperative that they explore their knowledge in this field. The shortage of skilled employees within this field will be one of the biggest obstacles faced by employers over the next few years to the extent that many of the functions considered more routine (those that, as a rule, are performed by low-skilled labor) will be easily replaced by machinery, i.e. "(...) the evolution of AI imposes that there is a symbiotic relationship between man-machines (...)" (Jarrahi, 2018). In this way, there will be a need to retrain these professionals to perform more functional tasks that will end up requiring both analytical thinking skills and technical knowledge related to technological advances or even specific digital knowledge, such as, for example, the mastery of various programming languages.

The responsibility in this requalification process is not only up to the professionals, but also to the organizations that want to retain talent and avoid spending on recruitment processes or on the increase of employee turnover in their structures. Therefore, investing in more specific technical training may be

something to be considered and discussed within the various entities in order to understand how they can maximize their assets, whether in terms of intellectual capital - because there is a certain conviction that "(...) developments in technology will allow a reduction in work" (Brynjolfsson and McAfee, 2014; Ford, 2015 cited by Spencer, 2018) - or at the financial level, trying to optimize organizational success.

Nevertheless, it is important to mention that if on the one hand there will be the disappearance of some jobs in compensation, there will be the appearance of so many others. These two specific situations essentially result from "(...) the introduction of new technologies however, they occur in varying proportions and in distinct periods" (Howard, 2019).

According to Spencer (2018), during the next few years, organizations will invest heavily in hiring and purchasing equipment rather than prioritizing the recruitment of professionals. This phenomenon is directly correlated with the fact that there is a prospect of automation that will gradually decrease the number of job opportunities. As an example, about 50% of the existing workforce in both England and the US will undergo a profound period of transformation that will lead to half of current jobs being automated (Frey and Osborne, 2017; Haldane, 2015 cited by Spencer, 2018).

Considering the result obtained in the bibliometric research carried out in this study, it is curious to note that although these two countries will lose about 50% of their current jobs, as a direct consequence of the exponential technological growth, they are also those that contribute most to the level of publications on the theme of the future of work, as can be seen in table 10.

If on the one hand, organizations look for professionals who have *soft* skills such as: analytical thinking, critical thinking, creativity and originality, resilience, stress tolerance, flexibility, emotional intelligence, service orientation, persuasion and negotiation skills, and problem-solving skills - as seen in table 11 - on the other hand, employers increasingly value and look for professionals with IT skills.

In summary, and considering that we currently live in a period of great dynamism in the labor market, there is a problem faced by organizations that relates to "(...) the demand for skills by employers is not matched by the supply of talent with the desired qualifications". (Ferreira, 2022) Thus, it is incumbent upon governments to "(...) seek a holistic approach that creates active linkages and coordination processes between education, skills, workers, and employers, thereby ensuring effective collaboration between diverse agencies whether they be employment and/or national governments" (Schwab and Zahidi, 2020).

4.2 Chinese context

In the particular case of China and taking into account its socio-economic and socio-political context during the 1980s, which severely affected the economy of this country, it also contributed to what has been a growing rate of economic development. On the other hand, the almost "(...) unlimited supply of rural surplus labor" (Lewis, 1954, 1972 cited by Qu and Cai, 2011) existing in China as well as a precarious labor force contributes to one of the biggest challenges faced by organizations in the sense that it becomes crucial and urgent the technical development of many workers in order to cope with the process of technological evolution.

Considering the Chinese economic development and, even if under rather precarious conditions, it has allowed China an interesting global positioning that directly contributes to its financial growth.

According to Smith (2007), and ensuring competitiveness among global markets, Chinese organizations have been increasingly concerned with retaining their employees, ensuring that they can deal with the constant socioeconomic changes and mutations.

The bibliometric analysis of China shows that although they have only published (until 2021) about 7 papers on the future of work, there is a total of 115 citations. These citations constitute the highest average number of citations globally. That is, given the geographical size of the country, its

contribution to the theme under study is highly valued since over the past decades China "(...) has witnessed dramatic socioeconomic and organizational transformations (Tsui, 2004; Zhang and Keh, 2010 cited by Sun and Wang, 2011). Consequently, there has been a great concern on the part of entities with regard to studying the future of work in China.

Considering, now, the process of digital transformation and technological evolution that has been seen over the last years globally, it is imperative that the existing human capital "(...) is able to adapt to the new requirements and demands" (Cai, 2013) and for this reason, it is up to Chinese employers "(...) to improve the quality and knowledge of their workforces through technical training" (Cai, 2013).

In summary, it is important to mention that according to Szierbowski-Seibel (2018) and taking into account the mimetic isomorphism mechanism, we can assume that Chinese organizations will adopt the most efficient HR configurations used by organizations in other western countries ensuring that they will also be prepared to face future challenges and thus contribute to the success and development of both their structures and their employees.

5 Conclusion and contributions of the study

The world has witnessed copious processes of constant evolution, particularly those resulting from technological advances. However, the capacity for innovation and the restructuring of methods, systems, and methodologies have caused an extreme transformation of the labor market, bringing with it enormous political, social, economic, and ethical challenges.

The pandemic experienced since the beginning of the year 2020 has not only changed the world in a generalized way but has also vigorously affected the labor market. If the concept of remote work was already seen as a measure to be studied and later applied, with the emergence of the pandemic and its periods of confinement and social distance, these only contributed to accelerate this process. That said, there was an exponential increase in the number of employees working from home and, therefore, this measure was forced to be applied.

As a result of this period, a strong exercise of trust and freedom had to take place both by the employers, since "(...) without an office and without the pressure of the bosses in the same physical space, work schedules can become a problem" (Machado P. , 2022) but also the process of motivating employees had to be readapted because "rewarding productivity is one of the ways to maintain and promote motivation". (Machado P. , 2022).

The employees testified to the need for a relationship of extreme trust between the members of the various work teams. In the leader-worker relationship, it was essential to ensure that the work goals of each member were met and that they remained motivated and committed to their duties.

Although the fifteen key skills that the labor market will demand after the year 2025 have been studied in more depth, according to the WEF, it is clear that some of these skills are already in high demand today. In contrast, many others may emerge over the next few years as indispensable for organizations, due to rapid technological development.

In order to ensure organizational success, it is imperative that the needs of both employers and professionals in today's labor market are met, that is, if on the one hand organizations seek and aim to retain the best talent possible in their structures, on the other employees prefer a healthy workplace where they can have a good work-life balance. The combination of these two criteria will contribute both to the success of the employer and to the motivation, satisfaction, and commitment of employees to their companies.

Throughout this research it was possible to understand how the digital transformation has definitively impacted the labor market and, in particular, the workforce; it was also possible to study the skills that will be valued by employers and how these *skills are* becoming increasingly relevant

given the constant technological advances that have been seen over the past few years; finally, a bibliometric analysis was carried out in order to corroborate the World Economic Forum that allowed not only to validate the literature review but also to add more knowledge and wisdom to the theme of the future of work.

In what concerns a problem identified in the course of the research, it can be elucidated by the polarization of employment, that is, the polarization of employment represents a phenomenon that can explain the gradual disappearance of the middle classes in society, given the technological evolution that, with automation and digitalization processes, has been replacing intermediate functions (those more routine ones) and that makes possible an exponential growth of unskilled jobs with poor remuneration levels, as well as a vast increase in the number of skilled jobs.

This will lead to a considerable increase in social inequalities. One problem that may result from this first obstacle is that jobs requiring skills but with average pay will continue to decline, which will not only create political instability but may also threaten the viability of the welfare state. It is therefore up to governments, labor market regulatory institutions, trade unions, and employers to fight these inequalities.

Not only the concept of work, but also the notion of the future of work must be studied, making sure that it is continually reformulated and restructured, prioritizing global economic growth and trying to cope with the immeasurable inequalities and social injustices that have arisen with the pandemic and technological developments.

In sum, and keeping in mind the notion that globally "(...) millions of workers face the prospect of mass layoffs and a future without work" (Spencer, 2018) it is paramount that both "(...) companies, governments, and workers organize a way to work together so that a new vision for the global workforce is implemented" (Schwab and Zahidi, 2020), in other words, it is critical that there is a thorough focus on how measures can be implemented that can address this issue.

5.1 Limitations of the study and recommendations for future research

The topic of the fourth industrial revolution (Industry 4.0) must continue to be actively and thoroughly studied, since it is directly related to what the labor market will be in the coming years, as well as to which professions will emerge in the future or, on the other hand, which ones will have to adapt - given the various automation processes - or which will end up being extinguished due to new professional opportunities.

This research covers a set of limitations that need to be acknowledged. First of all, it is important to mention that one of the main limitations has to do with the number of publications used, i.e., about 1770 articles were used for the bibliometric study and, for this reason, the study is somewhat conditioned because no publication was analyzed for the current year, 2022. From another perspective, although the present study was not conducted during the most critical period of the covid-19 pandemic, it was prepared using numerous publications focused on the limitations that the pandemic brought *ad aeternum* to the labor market.

Additionally, it is proposed for possible future research related to the theme of the future of work, to study, for example, what will be the best methodology to develop the competencies studied throughout this research however, in a remote work context. On the other hand, studying the average level of maturity of organizations with regard to the competencies listed in this research is a gap in the literature.

In conclusion, and in agreement with the WEF report, the "(...) technological innovation that defines the current era can be harnessed to unleash human potential. We have all the means to retrain and upskill individuals in unprecedented numbers, implement precision safety nets that protect workers ... and create tailored maps that guide displaced workers to the jobs of tomorrow, where they can thrive" (Schwab and Zahidi, 2020).

About the Author

1. Laura Conceição, MSc from ISCTE Business School, Portugal, and her research is Human Resources Management. Email: laura_conceicao@iscte-iul.pt

2. Leandro Pereira, PhD, from ISCTE Business School, Portugal and Senior Researcher from BRU-Business Research Unit, and his research areas are Strategy and Project Management. Email: leandro.pereira@iscte-iul.pt

3. Alvaro Dias, PhD, from ISCTE Business School, Portugal and Senior Researcher from BRU-Business Research Unit, and his research areas are Marketing and Tourism. Email: alvaro.dias@iscte-iul.pt

Conflict of Interest

The author declares no conflict of interest.

References

[1] Alge, B. J., Gresham, M. T., Heneman, R. L., Fox, J., and McMasters, R. (2002). Measuring customer service orientation using a measure of interpersonal skills: A preliminary test in a public service organization. Journal of Business and Psychology, 16: 467-476.

[2] Anderson, M. H., and Sun, P. Y. (2017). Reviewing leadership styles: Overlaps and the need for a new 'full-range' theory. International Journal of Management Reviews, 19(1): 76-96.

[3] Antonakis, J., Ashkanasy, N. M., and Dasborough, M. T. (2009). Does leadership need emotional intelligence?. The Leadership Quarterly, 20(2): 247-261.

[4] Artinger, S., Vulkan, N., and Shem-Tov, Y. (2014). Entrepreneurs' negotiation behavior. Small Business Economics, 44: 737-757.

[5] Atzori, L., Iera, A., and Morabito, G. (2010). The internet of things: Asurvey. Computer networks, 54(15): 2787-2805.

[6] Ben-Hur, S., Jaworski, B., and Gray, D. (2015). Aligning corporate learning with strategy. Massachusetts: MIT Sloan Management Review.

[7] Boothby, D., Dufour, A., and Tang, J. (2010). Technology adoption, training and productivity performance. Research Policy, 39(5): 650-661.

[8] Britt, T. W., Shen, W., Sinclair, R. R., Grossman, M. R., and Klieger, D. M. (2016). How much do we really know about employee resilience?. Society for Industrial and Organizational Psychology, 9(2): 378-404.

[9] Brown, T. J., Mowen, J. C., Donavan, D. T., and Licata, J. W. (2002). The customer orientation of service workers: personality trait effects on self-and supervisor performance ratings. Journal of Marketing Research, 39(1): 110-119.

[10] Burkley, E. (2008). The role of self-control in resistance to persuasion. Personality and Social Psychology Bulletin, 34 (3): 419-431.

[11] Cai, F. (2013). Human resource challenges in China after the leadership transition. Journal of Chinese Human Resource Management, 4: 137-143.

[12] Carroll, J. B. (1993). Human Cognitive Abilities: A survey of factor-analytic studies. New York: Cambridge University Press.

[12] Caruso, L. (2017). Digital innovation and the fourth industrial revolution: Epochal social changes? Ai & Society, 33: 379-392.

[14] Cobo, M., López-Herrera, A., Herrera-Viedma, E., and Herrera, F. (2011). Science mapping software tools: Review, analysis, and cooperative study among tools. Journal of the American Society for Information Science and Technology, 62(7): 1382-1402.

[15] Conte, J. M. (2005). A review and critique of emotional intelligence measures. Journal of Organizational Behavior, 26 (4): 433-440.

[16] Donavan, D. T., Brown, T. J., and Mowen, J. C. (2004). Internal benefits of service-worker customer orientation: Job satisfaction, commitment, and organizational citizenship behaviors. Journal of Marketing, 68(1): 128-146.

[17] Dong, Y., Bartol, K. M., Zhang, Z. X., and Li, C. (2017). Enhancing employee creativity via individual skill development and team knowledge sharing: Influences of dual-focused transformational leadership. Journal of Organizational Behavior, 38(3): 439-458.

[18] Donthu, N., Kumar, S., and Pattnaik, D. (2019). Forty-five years of journal of business research: A bibliometric analysis. Journal of Business Research, 109: 1-14.

[19] Dwyer, C. P., and Walsh, A. (2019). An exploratory quantitative case study of critical thinking development through adult distance learning. Association for Educational Communications and Technology, 68: 17-35.

[20] Eck, N. J., and Waltman, L. (2009). Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics, 84(2): 523-538.

[21] Elenkov, D. S., Judge, W., and Wright, P. (2005). Strategic leadership and executive innovation influence: An international multi-cluster comparative study. Strategic Management Journal, 26(7): 665-682.

[22] Ferreira, J. N. (2022). Portugal is the second country in the world with the greatest talent shortage. https://eco.sapo.pt/2022/05/30/portugal-e-o-segundo-pais-do-mundo-com-maior-escassez-de-talento/.

[23] Fiore, S. M., Cuevas, H. M., Scielzo, S., and Salas, E. (2002). Training individuals for distributed teams: Problem solving assessment for distributed mission research. Computers in Human Behavior, 18(6): 729-744.

[24] Funder, D. C. (2012). Accurate personality judgment. Psychological Science, 21(3): 177-182.

[25] Galin, A., Gross, M., and Gosalker, G. (2004). E-negotiation versus face-to-face negotiation what has changed—If anything?. Computers in Human Behavior, 23(1): 787-797.

[26] Ganapathy, A., and Bennett, M. T. (2021). Cybernetics and the future of work. Canberra: IEEE Conference on Norbert Wiene.

[27] Ganster, D. C., and Rosen, C. C. (2013). Work stress and employee health: A multidisciplinary review. Journal of Management, 39(5): 1085-1122.

[28] Gibson, D. E., Bhattacharya, M., and Doty, D. H. (2005). The effects of flexibility in employee skills, employee behaviors, and human resource practices on firm performance. Journal of Management, 31(4): 622-640.

[29] Gima, K. A. (2003). The effects of centrifugal and centripetal forces on product development speed and quality: How does problem solving matter?. Academy of Management Journal, 46(3): 359-373.

[30] Goldhammer, F., and Entink, R. H. (2011). Speed of reasoning and its relation to reasoning ability. Intelligence, 39(2/3): 108-119.

[31] Goode, N., and Beckmann, J. F. (2010). You need to know: There is a causal relationship between structural knowledge and control performance in complex problem solving tasks. Intelligence, 38(3): 345-352.

[32] Govindarajan, V., and Kopalle, P. K. (2006). Disruptiveness of innovations: Measurement and ana assessment of reliability and validity. Strategic Management Journal, 27(2): 189-199.

[33] Green, F. (2012). Employee involvement, technology and evolution in job skills: A task-based analysis. Industrial and Labor Relations Review, 65(1): 36-67.

[34] Gurtner, S., and Reinhardt, R. (2016). Ambidextrous idea generation-antecedents and outcomes. Journal of Product Innovation Management, 33(S1): 34-54.

[35] Handy, C. (1984). The future of work. Oxford: Blackwell.

[36] HAYS. (2022). Labor market guide. Lisbon: HAYS.

[37] Howard, J. (2019). Artificial intelligence: Implications for the future of work. American Journal of Industrial Medicine, 62(11): 917-926.

[38] Jarrahi, M. H. (2018). Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making. ScienceDirect, 61(4): 577-586.

[39] Jiao, H., Wang, Y., and Liu, M. (2019). The effect of the social network of the top management team on innovation in cultural and creative industries. Journal of Chinese Human Resource Management, 10: 4-18.

[40] Jonassen, D. H. (2000). Toward a design theory of problem solving. Educational Technology Research and Development, 48: 63-85.

[41] Kao, C. Y. (2014). Exploring the relationships between analogical, analytical, and creative thinking. Thinking Skills and Creativity, 13: 80-88.

[42] Kao, C. Y. (2015). Analogy's straddling of analytical and creative thinking and relationships to big five factors of personality. Thinking Skills and Creativity, 19: 26-37.

[43] Kim, J. H. (2020). Workplace flexibility and worker well-being by gender. Journal of Marriage and Family, 82(3): 892-910.

[44] Kreiner, G. E. (2006). Consequences of work-home segmentation or integration: A person-environment fit

perspective. Journal of Organizational Behaviour, 27(4): 485-507.

[45] Kudyba, S. (2020). Covid-19 and the acceleration of digital transformation and the future of work. Newark: Information Systems Management.

[46] Kudyba, S. (2020). Covid-19 and the acceleration of digital transformation and the future of work. Information Systems Management, 37(4): 284-287.

[47] Kudyba, S., Fjermestad, J., and Davenport, T. (2020). A research model for identifying factors that drive effective decision-making and the future of work. Journal of Intellectual Capital, 21(6): 835-851.

[48] Lerner, J. S., Li, Y., Valdesolo, P., and Kassam, K. S. (2015). Emotion and decision making. Annual Review of Psychology, 66: 799-823.

[49] Leslie, A. M., Knobe, J., and Cohen, A. (2006). Acting intentionally and the side-effect effect—theory of mind and moral judgment. Association for Psychological Science, 17(5): 421-427.

[50] Machado, C., Silva, B., and Silva, B. (2021). Salary benchmark-vortal. Lisbon: HAYS.

[51] Machado, P. (2022). Work from Centro de Portugal. Expresso, 3-34.

[52] Magno, C. (2010). The role of metacognitive skills in developing critical thinking. Springer Science, 5: 137-156.

[53] Malhotra, D., and Bazerman, M. H. (2008). Psychological Influence in Negotiation: An introduction long overdue. Harvard Business School, 34(3): 509-531.

[54] Martin, L. A., and Fraser, S. L. (2002). Customer service orientation in managerial and non-managerial employees: An exploratory study. Journal of Business and Psychology, 16(3): 477-484.

[55] Mayer, J. D., Caruso, D. R., and Salovey, P. (2016). The ability model of emotional intelligence: Principles and updates. Emotion Review, 8(4): 290-300.

[56] Mumford, M. D., Medeiros, K. E., and Partlow, P. J. (2012). Creative thinking: Processes, strategies, and knowledge. Journal of Creative Behavior, 46(1): 30-47.

[57] Muraven, M. (2010). Building self-control strength: Practicing self-control leads to improved self-control performance. Journal of Experimental Social Psychology, 46(2): 465-468.

[58] Nolan, P., and Wood, S. (2003). Mapping the future of work. British Journal of Industrial Relations, 41(2): 165-174.

[59] Nonaka, I., and Toyama, R. (2003). The knowledge-creating theory revisited: Knowledge creation as a synthesizing process. Japan: Knowledge Management Research & Practice.

[60] O'Halloran, K. L., Tan, S., and K. L. E, M. (2017). Multimodal analysis for critical thinking. Learning, Media and Technology, 42(2): 1-24.

[61] OC, B., and Bashshur, M. R. (2013). Followership, leadership and social influence. Institutional Knowledge at Singapore Management University, 26(4): 1-17.

[62] Palmon, R. R., and Illies, J. J. (2004). Leadership and creativity: Understanding leadership from a creative problem-solving perspective. The Leadership Quarterly, 15(1): 55-77.

[63] Prince, M. (2004). Does active learning work? A review of the research. Journal of Engineering Education, 93(3): 223-231.

[64] Prudencio, R. B., Carvalho, A. C., and Santos, D. P. (2017). Empirical investigation of active learning strategies. Neurocomputing, 326-327: 15-27.

[65] Qu, Y., and Cai, F. (2011). Understanding China's workforce competitiveness: A macro analysis. Journal of Chinese Human Resource Management, 2(1): 8-22.

[66] Salovey, P., and Grewal, D. (2005). The science of emotional intelligence. American Psychological Society, 14(6): 281-285.

[67] Schutte, N. S., and Malouff, J. M. (2016). Most findings indicate that trait emotional intelligence is beneficial in a variety of domains including clinical, health, social, educational, and organizational. A Broad Perspective on Trait Emotional Intelligence. Emotion Review, 343-344.

[68] Schwab, K., and Zahidi, S. (2020). The future of jobs report 2020. World Economic Forum.

[69] Shih, H. A., Yeh, Y. C., and Chen, C. J. (2011). Individual initiative, skill variety, and creativity: the moderating role of knowledge specificity and creative resources. The International Journal of Human Resource Management, 22(17): 3447-3461.

[70] Silva, H. C., and Lima, F. (2017). Technology, employment and skills: A look into job duration. Research Policy, 46 (8): 1519-1530.

[71] Spencer, D. A. (2018). Fear and hope in an age of mass automation: Debating the future of work. New Technology, Work and Employment, 33(1): 1-12.

[72] Sternberg, R. J. (2002). Raising the achievement of all students: Teaching for successful intelligence. Educational Psychology Review, 14: 383-393.

[73] Sternberg, R. J. (2006). The rainbow project: Enhancing the sat through assessments of analytical, practical, and creative skills. Intelligence, 34(4): 321-350.

[74] Sun, J. Y., and Wang, G. G. (2011). Integrating disparate literatures on voluntary career transition and voluntary turnover. Journal of Chinese Human Resource Management, 2(1): 23-42.

[75] Szierbowski-Seibel, K. (2018). Strategic human resource management and its impact on performance – do Chinese organizations adopt appropriate HRM policies. Journal of Chinese Human Resource Management, 9(1): 62-76.

[76] Talat, U., and Chang, K. (2017). Employee imagination and implications for entrepreneurs Inspiration from Chinese business enterprises. Journal of Chinese Human Resource Management, 8(3): 129-152.

[77] Tang, C. S. M., Tang, T. L. P., and Li, X. Y. (2013). Chinese core self-evaluations and job performance entrepreneurs in private small and medium enterprises. Journal of Chinese Human Resource Management, 4(2): 151-170.

[78] Tang, C., and Gao, Y. (2012). Intra-department communication and employees' reaction to organizational change. Journal of Chinese Human Resource Management, 3(2): 100-117.

[79] Tram, S., Sy, T., and O'Hara, L. A. (2006). Relation of employee and manager emotional intelligence to job satisfaction and performance. Journal of Vocational Behavior, 68(3): 461-473.

[80] Tung, H. L., and Chang, Y. H. (2011). Effects of empowering leadership on performance in management team mediating effects of knowledge sharing and team cohesion. Journal of Chinese Human Resource Management, 2(1): 43-60.

[81] Valenduc, G., and Vendramin, P. (2017). Digitalisation, between disruption and evolution. Belgium: European Trade Union Institute.

[82] Want, R., Schilit, B. N., and Jenson, S. (2015). Enabling the internet of things. IEEE computer society.

[83] Warr, P., and Downing, J. (2000). Learning strategies, learning anxiety and knowledge acquisition. The British Psychological Society, 91(3): 311-333.

[84] Weber, T. J., Avolio, B., and Walumbwa, F. (2009). Leadership: Current theories, research, and future directions. Annual Review of Psychology, 60: 421-449.

[85] Wood, A. J., and Graham, M. (n.d.).

[86] Wu, X., and Shie, A. J. (2017). The relationship between customer orientation, emotional labour and job burnout. Journal of Chinese Human Resource Management, 8(2): 54-76.

[87] Yanchar, S. C., Slife, B. D., and Warne, R. (2008). Critical thinking as disciplinary practice. Review of General Psychology, 12(3): 265-281.

[88] Zarifian, P. (2001). Objetivo competência: Por uma nova lógica. Atlas. São Paulo.