Workforce Agility: A systematic Literature Review and a Research Agenda Proposal

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Abstract: Workforce agility has been described as a management strategy that allows companies to respond quickly and effectively to threats and opportunities arising from a competitive and unstable business environment. In the current literature, there is still a lack of efforts to systematically review the state of the art on this subject. The aim of this paper is to address this gap by studying the academic progress on workforce agility. A systematic literature review was carried out to analyze the academic articles within the workforce agility topic that were published online until the end of June 2020 in three electronic databases: Web of Science (WoS), Scopus, and Science Direct. The bibliometric indicators present how the field has developed and which actors (authors, institutions, countries, journals) are the most relevant. Regarding the conceptual aspects, the findings allowed us to identify that an agile workforce consists of four interrelated and interdependent dimensions: proactivity, flexibility and adaptability, resilience, and competence. These attributes can be promoted through strategies related to i) learning and training, ii) forms of work organization, iii) human resource management; and iv) culture and organizational structure. Our findings also allowed us to propose an agenda for future studies on workforce agility and other related topics. This paper contributes by promoting a debate on a subject still incipient in the literature, especially in Latin America, and by highlighting the potential competitive advantage associated with workforce agility for companies.

Introduction

In the political-economic scenario of today's capitalist society, companies are increasingly operating under global competition and market dynamics based on uncertainties, unpredictability, and constant and fast-paced changes with direct and indirect impact on their activities (Munteanu *et al.*, 2020; Teece *et al.*, 2016; Varshney & Varshney, 2020).

The business environment has historically been influenced by widely known factors that may be potential opportunities or threats, such as new technologies, new business models, new ways of dealing

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with competition, digitalization, market deregulation and fragmentation, economic uncertainties, changing demographics, and ongoing social and political turbulence (Björkdahl, 2020; Felipe *et al.*, 2020; Holbeche, 2018; Žitkienė & Deksnys, 2018). Moreover, customers are no longer mere receivers of products, rather they play a crucial role in the production process (Yang & Liu, 2012). Therefore, companies have the challenge to adapt continuously to their demands, quickly and exclusively (Munteanu *et al.*, 2020).

Based on the above, the big question within the academic and business environments is how to successfully handle and respond to these factors (Appelbaum *et al.*, 2017). On this regard, different actions and models have been proposed and implemented over the years, such as reengineering, business networks, modular organizations, flexible production, and just in time workforces (Sherehiy *et al.*, 2007).

One of the most recent strategies is the concept of agility, which first became popular in the early 1990s among North American scholars (Qin & Nembhard, 2015). Since then, many researchers have dedicated their time to study its related concepts, measures, and functions (Nouri & Mousavi, 2020), arguing that with the advances in information technology and the changes in paradigms and production strategies, agility would be a potential opportunity to boost the productivity and profitability of industrial capital, partly replaced by the increasing financial dominance. Above all, agility would be a strategy that allows organizations to survive on a borderless battlefield (Carvalho *et al.*, 2019; Holbeche, 2018; Storme *et al.*, 2020).

Agility is generally described as the ability to gain effective advantage, exploit opportunities and withstand threats derived from frequent and sometimes unexpected changes, responding quickly by reconfiguring resources, strategies, and people in an efficient and effective manner (Baškarada & Koronios, 2018; Holbeche, 2018; Qin & Nembhard, 2010; Walter, 2020; Yang & Liu, 2012).

Despite the numerous studies and frameworks describing agility, building common understanding on the matter remains a challenge (Appelbaum *et al.*, 2017; Baškarada & Koronios, 2018; Nouri & Mousavi, 2020; Walter, 2020; Wendler, 2013). Studies are scattered in both diverse and specific aspects, such as agile organization/enterprise (Goldman & Nagel, 1993; Yang & Liu, 2012), agile manufacturing (Gunasekaran, 1999; Yusuf *et al.*, 1999), agile supply chain (Shashi *et al.*, 2020; Tarafdar & Qrunfleh, 2017), agile software development (Gupta *et al.*, 2019; Misra *et al.*, 2012), and agile workforce (Breu *et al.*, 2002; Storme *et al.*, 2020).

Workforce agility is a complex multidimensional approach and a broad field of study (Muduli & Pandya, 2018), generally included in the domain of organizational and manufacturing agility, with greater emphasis on studies in the field of operations management and, more specifically, on the factory floor (Qin & Nembhard, 2015). Despite the acknowledgment that it is people who are the main source of competitiveness as well as the main promoters of agility and anticipators of change (Holbeche, 2018; Munteanu *et al.*, 2020), workforce agility is among the least studied aspects to date (Harsch & Festing, 2020; Muduli & Pandya, 2018; Storme *et al.*, 2020), as observed in the lack of efforts to systematically review the state of the art of this subject. In this sense, this paper aims to analyze and systematically

review the academic progress on workforce agility in order to identify its main aspects and ongoing gaps and to propose an agenda for future research. Specifically, our main study questions are:

a) How is the literature on workforce agility in terms of publications?

b) What qualities and characteristics of the workforce make it agile?

c) What kind of policies, actions, and strategies could foster workforce agility?

As a contribution, our paper explores, revises, and systematizes information regarding workforce agility, highlighting its relevance to the academic-scientific community and encouraging companies and managers to see workforce agility as a competitive business advantage. The next section discusses the methodology deployed for this study. After that, we present an overview of the papers comprising this study. Subsequently, we will discuss results and provide directions for future research. The last section presents the main conclusions from this study.

Methodology

Our study is a systematic literature review developed according to the model provided by Tranfield *et al.* (2003), chosen for being one of the most widely adopted and cited in management literature. According to their model, systematic literature reviews consist of three stages: planning, conducting, and reporting (figure 1).

1 Planning	• Identification of the need for a review • Goal setting and search problem • Development of a review protocol
2 Conducting	• Selection of studies • Study quality assesment • Data extraction and synthesis
3 Reporting	• Presentation and dissemination • Final Report

Figure 1. Stages of systematic literature review. **Source:** Tranfield *et al.* (2003).

Our planning stage began with a preliminary review of the scope and state of the art of agility/workforce agility in order to define our study questions and review protocol (table 1). We also verified that this review article was feasible, as well as needed. To the best of our knowledge, there are no systematic reviews on workforce agility to date. This is a new interdisciplinary topic commonly inserted in general research on agile enterprises and agile manufacturing.

The surveys took place on July 25, 2020 (conducting stage). The systematic search used three electronic databases: Web of Science (WoS), Scopus, and Science Direct. To obtain a comprehensive set of papers, we used the string "workforce agility" OR "employee agility" OR "agile workforce." Our study encompasses academic research papers including at least one of the terms in the abstract, title, or keywords, and published online before late June 2020.

Our search resulted in 73 papers from Scopus, 40 from Web of Science, and 10 from Science Direct. The first screening process excluded all papers considered not eligible for analysis (NE) based on the

following exclusion criteria: published in books, book chapters or conference proceedings (NE1), and not written in English (NE2), as described in table 1.

Table 1.

Review protocol.

Study questions	• SQ1: How is the literature on workforce agility in terms of publications?
	• SQ2: What qualities and characteristics of the workforce make it agile?
	• SQ3: What kind of policies, actions, and strategies can foster workforce agility?
Databases and strings	• Scopus: TITLE-ABS-KEY("workforce agility" OR "employee agility" OR "agile workforce").
	• Web of Science: TS = ("workforce agility" OR "employee agility" OR "agile workforce").
	• Science Direct: Title, abstract, keywords: "workforce agility" OR "employee agility" OR "agile workforce."
Exclusion criteria	• NE1: Not published exclusively in journals.
	• NE2: Not published exclusively in English.
	• NE3: Full text unavailable for free.
	• NR1: Workforce agility mentioned as a requirement or a consequence of a given context, without deepening on the subject.
	• NR2: Related to other themes; workforce agility is only an example or part of its future directions.
	• NR3: About other aspects of agility; just cite workforce agility.
Inclusion criteria	• PR1: Address agility from a variety of perspectives, including workforce agility, in depth.
	• PR2: Address issues, consequences, trends, challenges, and other specific aspects related to workforce agility.
	• CR: Theoretical or methodological research efforts directly and explicitly related to at least one of the problem questions.

Source: authors.

The remaining references were exported to *Start – version* 3.03, a tool to assist researchers in the use of the SLR technique developed by the Laboratory of Research on Software Engineering (LaPES) at the Computing Department of the Federal University of São Carlos, Brazil.

After removing duplicates and articles that did not provide free access to their full text (NE3), 55 papers were studied in detail. The second screening process excluded papers considered little related or not related at all (NR1, NR2, and NR3), Papers considered partially (PR1 and PR2) or closely related (CR) to our objectives were included (table 1). Our final portfolio comprised 31 papers for analysis in stage 3 (reporting). Although our inclusion and exclusion criteria were clear and straightforward, eligibility was still subjective. Therefore, we cannot rule out the hypothesis that other relevant studies might have been ignored. Figure 2 presents a summary of our methodological approach.
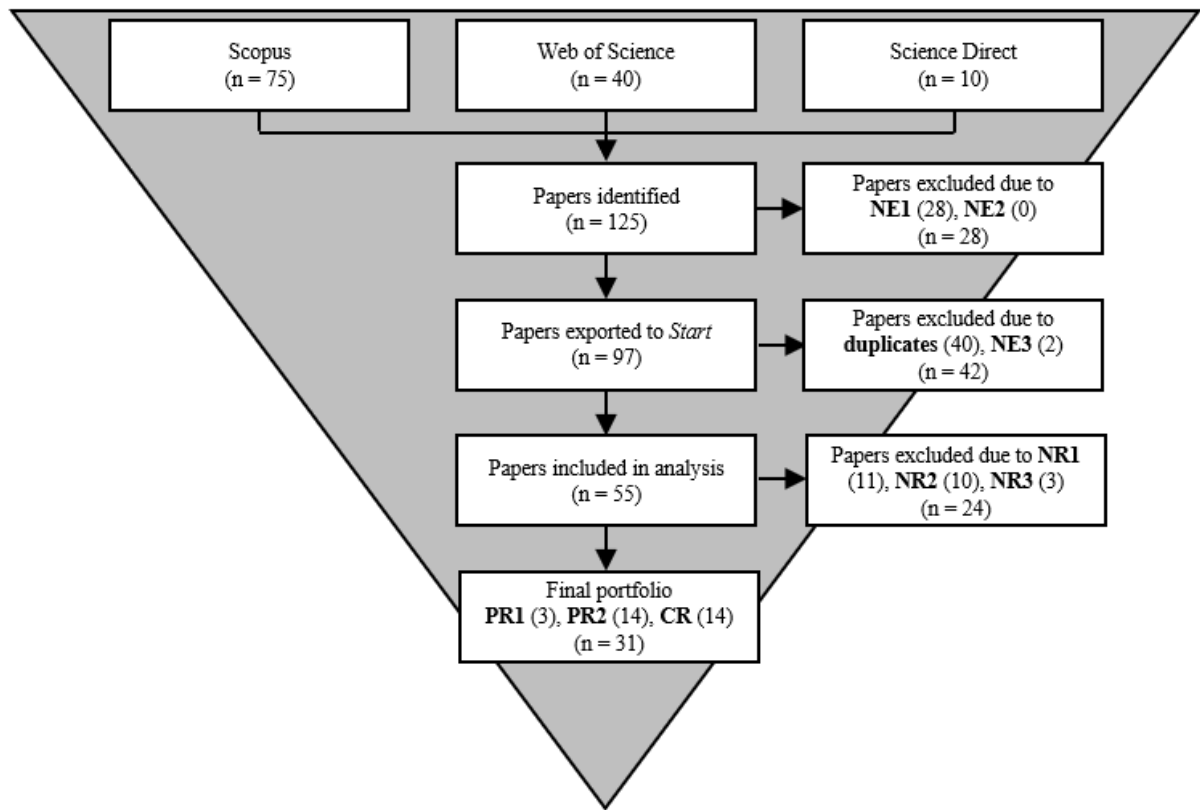
Figure 2. Methodological development. **Source:** authors.

Characterization of current research on workforce agility

Regarding our first study question, the literature on workforce agility is scarce, indicating that this field of study is still maturing. Our review presents an overview of the selected papers to understand how the field has developed and which actors (authors, institutions, countries, journals) are the most relevant. Figure 3 compares the number of publications and citations. As observed, the first paper was published in 2001 and the number of papers published per year has remained stable ever since. Additionally, the number of citations grew exponentially from 2010, peaking in 2019 (n = 150 Scopus; n = 95 WoS).
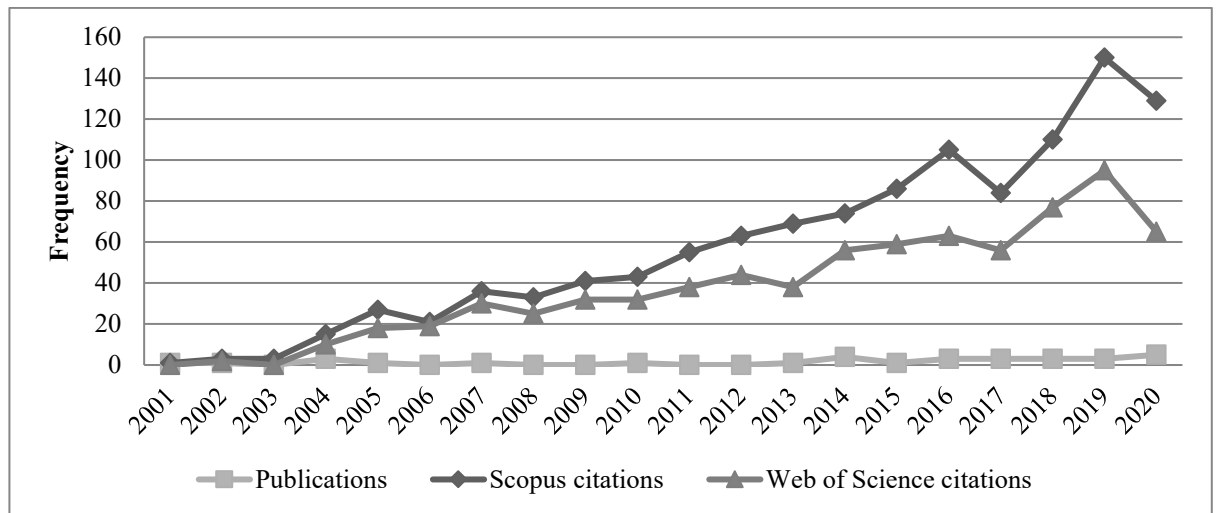
Figure 3. Evolution of publications and citations. **Source:** authors.

The papers published during this period have been cited 1,148 times in Scopus and 759 times in WoS. Three papers were responsible for more than 70% of the total citations in both databases. Six papers had not been cited until the end of this study. Table 2 presents the top 5 papers according to the number of citations.

Table 2.

Top 5 cited papers.

Author(s)	Title	Scopus Citations	WoS Citations
Sherehiy *et al.* (2007)	A review of enterprise agility: Concepts, frameworks, and attributes.	276	195
Hopp *et al.* (2004)	Benefits of skill chaining in serial production lines with cross-trained workers.	186	156
Hopp & Van-Oyen (2004)	Agile workforce evaluation: A framework for cross-training and coordination.	183	137
Van-Oyen *et al.* (2001)	Performance opportunity for workforce agility in collaborative and noncollaborative work systems.	111	92
Breu *et al.* (2002)	Workforce agility: The new employee strategy for the knowledge economy.	120	57

Source: authors.

The 31 papers included in our final portfolio were published by 69 different authors from 46 different universities or research centers. Only twelve authors published twice or more (figure 4), while only six universities published twice or more: Pandit Deendayal Petroleum University (n = 3), Northwestern University (n = 3), University of Science and Technology of China (n = 3), Pennsylvania State University (n = 2), Missouri University of Science and Technology (n = 2), and Loyola University of Chicago (n = 2). Considering these institutions, the papers published come from 15 countries, mainly the United States (n

= 14) and Iran (n = 6), as seen in figure 5. In contrast, there are no research studies from Oceania and Latin America, with studies concentered in North America and Asia.
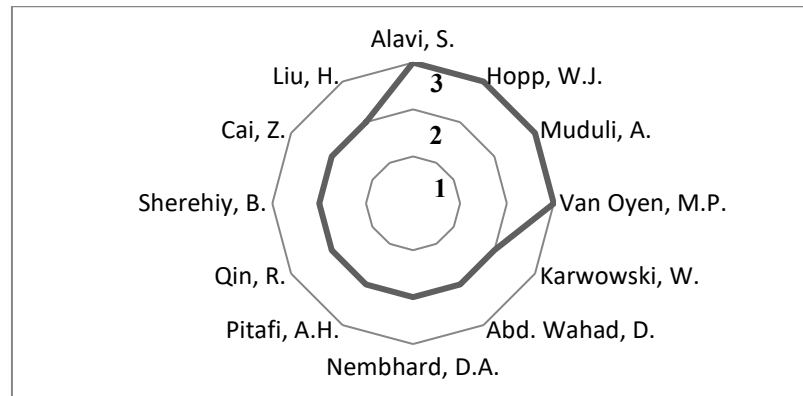

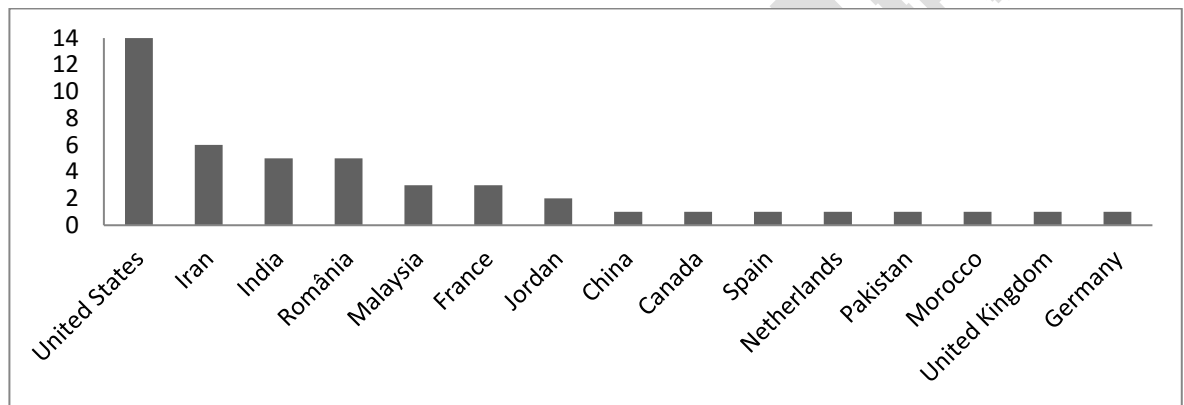**Figure 4.** Researchers that have published the most. **Source:** authors.

Figure 5. Countries with the most papers published. **Source:** authors.

Our data indicates that no researchers nor institutions are largely involved in the study of agility from the workforce perspective. However, it is possible to assert the existence of collaborations between some authors to incorporate workforce agility into their core and specific research topics. For example, the three papers published by W. J. Hoop and M. P. Van-Oyen (two of the most cited authors) are collaborative and investigate cross-training workers on the factory floor. The same goes with Z. Cai and H. Liu, who published twice together on the relationship between enterprise social media and agile workforce. In relation to the countries of origin of the institutions in which the researchers are affiliated, the United States was expected to be at the top of the ranking, since studies on workforce agility originally derived from studies on enterprise or manufacturing agility, which first became popular in the early 1990s among North American scholars.

As for journals, results show that 26 different journals published on the subject during the studied period. However, only 3 of them published twice or more: Global Business and Organizational Excellence (n = 3), IIE Transactions (n = 3), currently known as IISE Transactions, and International Journal of Industrial Ergonomics (n = 2). Despite its scarcity and low geographic dispersion as a topic, workforce agility has found space in journals with high impact factors and different scopes, demonstrating its

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interdisciplinarity. Based on the Scopus journal categorization system, figure 6 illustrates the subject areas for each of these 26 journals. Given their interdisciplinary scope, some journals are categorized in more than one area, such as the International Journal of Industrial Ergonomics, which is included in both Medicine and Social Sciences.
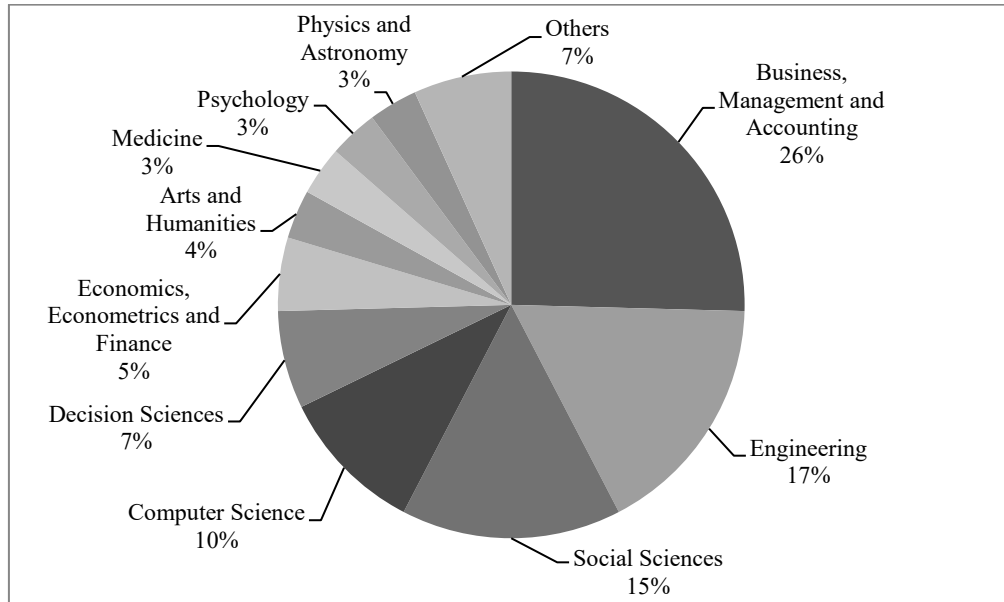

Figure 6. Journal categorization. **Source:** authors.

In terms of methodology, each paper was classified according to three categories:

- Discussion/review: Provides a literature review on workforce agility and its contents.
- Theoretical framework: Provides a theoretical or conceptual model to explain a given aspect of workforce agility, without empirical validation.
- Empirical research: Includes hypotheses and models tested and analyzed through field data collection.

All empirical studies were quantitative and collected research data through surveys; the only exceptions were the studies by Van-Oyen *et al.* (2001), which includes modeling and simulation, and Harsch and Festing (2020), which adopts an exploratory and qualitative approach through a semi-structured interview. Our search also signaled a high incidence of statistical analysis through structural equation models for examining relations between multiple variables, as observed in the works of Alavi *et al.* (2014), Sherehiy and Karwowski (2014), Alavi (2016), and Sumukadas and Sawhney (2004). Table 3 summarizes each paper included in our study.

Table 3.

Papers considered for analysis.

Author(s)	Category	Aim/focus
Alavi (2016)	Empirical research	The role of workforce agility in production flexibility in small and medium-sized enterprises.

Alavi and Abd-Wahab (2013)	Theoretical framework	Reviews the components of workforce agility and proposes a model to help managers count on more agile workers.
Alavi *et al.* (2014)	Empirical research	Impact of two organizational characteristics —organizational learning and organic structures— on workforce agility.
Al-Faouri *et al.* (2014)	Empirical research	Impact of workforce agility on organizational memory in the mobile phone industry in Jordan.
Al-Kasasbeh *et al.* (2016)	Theoretical framework	Proposes model to verify the influence of information technology (IT) practices associated with human resource management on workforce agility and organizational performance.
Braun *et al.* (2017)	Empirical research	Development, validation, and practical application of an employee agility and resilience measurement scale as part of a program to support an alternative approach to managing organizational change.
Breu *et al.* (2002)	Empirical research	Studies how organizational agility pressures, especially IT-related, impact workforce agility.
Cai *et al.* (2018)	Empirical research	Enterprise social media and its relationship with workforce agility.
Chonko and Jones (2005)	Theoretical framework	Proposes model to analyze the agility of sales professionals based on a discussion and the adaptation of the workforce agility concepts adopted in operations management.
Doeze-Jager-van-Vliet *et al.* (2019)	Empirical research	Ascertaining how goal setting, action taking, and feedback by means of a development portfolio process will enhance employee agility.
Ghasemi *et al.* (2017)	Empirical research	Impacts of organizational culture and knowledge management mechanisms on workforce agility in a banking institution in Iran.
Harsch and Festing (2020)	Empirical research	Explores how talent management can shape talents as key human resources, according to company-specific agility needs.
Hopp and Van-Oyen (2004)	Theoretical framework	Proposes frameworks to assess and classify manufacturing and service operations in terms of their suitability for use of cross-trained workers.
Hopp *et al.* (2004)	Empirical research	Cross-training architectures for increasing workforce agility in production lines.
Muduli (2016)	Empirical research	Impact of different organizational practices on workforce agility.
Muduli (2017)	Empirical research	Impact of specific organizational practices and psychological empowerment on workforce agility.
Muduli and Pandya (2018)	Empirical research	Relationship between psychological empowerment and workforce agility.
Munteanu *et al.* (2020)	Empirical research	Practices to increase the workforce agility and to develop a sustainable and competitive business.
Patil and Suresh (2019)	Empirical research	Enablers of workforce agility in Internet of Things (IoT) projects.
Pitafi *et al.* (2018)	Empirical research	Relationship between workplace conflict and employee agility in firms that adopt enterprise social media (ESM).

Pitafi *et al.* (2019)	Empirical research	Studies communication quality and its role in developing workforce agility in the context of enterprise social media.
Qin and Nembhard (2015)	Discussion/review	Reviews and classifies the workforce agility literature from the perspective of operations management.
Qin and Nembhard (2010)	Theoretical framework	Understanding workforce agility in stochastically diffuse environments using the real options method.
Sherehiy and Karwowski (2014)	Empirical research	Examines how agility strategies affect work organization and how, in turn, adjusting work organization in companies that have adopted such strategies affects workforce agility.
Sherehiy *et al.* (2007)	Discussion/review	Origins and theoretical basis of ideas about organizational agility and workforce agility.
Sohrabi *et al.* (2014)	Empirical research	Relationship between workforce agility and organizational intelligence.
Storme *et al.* (2020)	Empirical research	Psychological antecedents of workforce agility.
Sumukadas and Sawhney (2004)	Empirical research	Impact of various employee involvement practices on workforce agility.
Tamtam and Tourabi (2020)	Empirical research	Identifies the enablers of workforce agility in a Moroccan manufacturing company.
Van-Oyen *et al.* (2001)	Empirical research	Study and test of descriptive and prescriptive models of work flexible in serial production systems for greater workforce agility.
Varshney & Varshney (2020)	Empirical research	Relationship between workforce agility, emotional intelligence and workforce performance in small businesses in India.

Source: authors.

Discussion

Workforce agility: In search for an understanding

The construction of a common definition of workforce agility is still a challenge for researchers since the matter has been seen from different perspectives. While some authors define workforce agility from abilities and work skills, others consider this phenomenon as the attitudes and behaviors demonstrated or required by workers in a global and volatile business environment (Muduli, 2017). Regardless of the standpoint, all definitions refer to how employees deal with and adapt to change (Alavi *et al.*, 2014). However, workforce agility is not only a matter of responding to change, since proactivity, initiative and anticipation to problems are also attributes of an agile workforce (Alavi & Abd-Wahab, 2013; Sherehiy & Karwowski, 2014; Sohrabi *et al.*, 2014).

Based on the approaches presented by Breu *et al.* (2002), Chonko and Jones (2005), Alabi *et al.* (2014), Sherehiy and Karwowski (2014), Al-Kasasbeh *et al.* (2016), and Muduli (2017), we understand that workforce agility relates to workers' ability to adjust to a fast-changing, flexible and uncertain work environment through proactive and adaptive knowledge, skills, behaviors, and attitudes. More than that, it also refers to the ability to benefit from these changes.

Few studies have sought to identify the potential consequences of a more agile workforce. For example, Alavi (2016) assessed the influence of workforce agility in performance flexibility based on indicators of a company's ability to introduce new products in the market and vary its product mix and production volume. This author's findings suggest that workforce agility is a greater predictor of such indicators, considering that agile workers tend to be more creative and better at solving problems and dealing with task diversity and task-related stress. Also in the industrial sector, Van-Oyen *et al.* (2001) demonstrated that highly varied production processes with volatile demands may benefit from workforce agility strategies, especially cross-training.

In an attempt to answer the second question posed by this study, we elaborated four interrelated and interdependent classifications, which are shown in table 4.

Table 4

What is workforce agility?

Dimensions	Aspects	Author(s)
Proactivity	Problem anticipation	Sherehiy and Karwowski (2014); Storm *et al.* (2020).
	Independent decision-making	Breu *et al.* (2002).
	Autonomy, self-motivation, self-efficacy and curiosity	Qin and Nembhard (2015); Tamtam and Tourabi (2020); Muduli and Pandya (2019); Storm *et al.* (2020); Patil and Suresh (2019).
	Engagement	Sherehiy and Karwowski (2014); Tamtam and Tourabi (2020).
	Solution of change-related problems	Sherehiy and Karwowski (2014).
	Collaboration	Qin and Nembhard (2015); Muduli (2016).
Flexibility and adaptability	Rapid response to changes in customer needs and market conditions	Breu *et al.* (2002).
	Ability to quickly adjust to different tasks and work contexts	Qin and Nembhard (2015).
	Multi-functionality	Sumukadas and Sawney (2004); Qin and Nembhard (2015).
	Competence to work in groups and in simultaneous tasks	Sherehiy and Karwowski (2014).
	Flexibility in work time and location	Qin and Nembhard (2015); Tamtam and Tourabi (2020).
	Adaptive behaviors	Sherehiy and Karwowski (2014); Sohrabi *et al.* (2014); Tamtam and Tourabi (2020).
Resilience	Tolerance to unexpected work environments	Qin and Nembhard (2015); Sherehiy and Karwowski (2014).
	Positive attitudes towards change, new ideas and new technologies	Qin and Nembhard (2015); Sherehiy and Karwowski (2014); Muduli (2016); Patil and Suresh (2019); Muduli and Pandya (2018).

	Ability to work in and deal with potentially stressful situations	Sherehiy and Karwowski (2014); Sohrabi *et al.* (2014).
	Rapid development of new skills and work procedures	Breu *et al.* (2002); Qin and Nembhard (2015); Sherehiy and Karwowski (2014); Sohrabi *et al.* (2014); Muduli (2016).
Competence	Ability to deal with different and complex IT	Breu *et al.* (2002), Muduli (2016); Patil and Suresh (2019).
	Ability to work with different tools and resources	Qin and Nembhard (2015).
	Continuous development	Sherehiy and Karwowski (2014); Muduli (2016).
	Level of knowledge and skills	Qin and Nembhard (2015).

Source: authors.

Proactivity relates to the level of engagement in activities that benefit the organization and workers themselves. This attribute depends greatly on self-motivation, self-efficacy, and autonomy to make important decisions and anticipate and solve problems (Breu *et al.*, 2002; Muduli & Pandya, 2018; Sherehiy & Karwowski, 2014; Tamtam & Tourabi, 2020). Motivated and curious workers are better at detecting and responding to change (Storme *et al.*, 2020). In addition, collaboration is a strong indicator of proactivity, given that it is essential to share goals and improve the work system, usually composed by people with different skills and attitudes (Qin & Nembhard, 2015).

On the other hand, flexibility and adaptability indicate behaviors, attitudes or skills to accept and engage in changes related to work conditions, tasks, and expectations. At the individual level, flexibility and adaptability refer to i) when or where the work is performed, ii) proactivity and resilience when relating with people from different cultural groups or with different backgrounds, and iii) the variety of tasks performed, even simultaneously (Qin & Nembhard, 2015; Sherehiy & Karwowski, 2014; Sohrabi, 2016; Sumukadas & Sawney, 2004; Tamtam & Tourabi, 2020). At the organizational level, flexibility and adaptability refer to the company's ability to reorganize its workforce to respond to changes in product mix or volume (Qin & Nembhard, 2015).

For its part, resilience is essentially linked to proactivity and it refers to positive attitudes toward change, new technologies, new ideas and new ways of organizing work and production (Muduli & Pandya, 2018). In the context of agility, resilience is opposed to resistance (Qin & Nembhard, 2015). It also refers to the need to work and deal with unexpected and potentially stressful situations (Sherehiy & Karwowski, 2014). Regarding this point, few studies have assessed the impact of workforce agility on health. Addressing such an issue, Braun *et al.* (2017) indicate that demands and pressure for increased organizational agility may lead to high-stress conditions, which could be mitigated by individual resilience. These authors also point out the need of implementing research strategies aimed at developing resilience in order to assess the impact of these interventions on other business indicators, such as absenteeism and resistance to change.

As for competence, it is an indication of technical and cognitive skills that can be assessed by the speed of understanding and developing new ideas, knowledge, technologies and work procedures. The

ability to deal with emerging and complex information technologies and with different resources and tools is also an indicator of competence (Breu *et al.*, 2002; Muduli, 2016; Patil & Suresh, 2019; Qin & Nembhard, 2015). Based on this, it is argued that a worker in continuous development of skills, knowledge, and procedures tends to be more in tune with the precepts of workforce agility (Muduli, 2016; Sherehiy & Karwowski, 2014).

Promoting workforce agility

In addition to the difficulties in conceptualizing workforce agility, it is also hard to understand how promote this business strategy in real life. Many researches have attempted to identify cause-effect relationships between a particular aspect (predictor variable) and workforce agility (dependent variable) (Cai *et al.*, 2018; Muduli & Pandya, 2018; Storme *et al.*, 2020), whereas some others examine workforce agility in specific contexts or workers (Alavi, 2016; Qin & Nembhard, 2010; Tamtam & Tourabi, 2020). However, few studies seek to classify and analyze different ways to obtain greater agility, and they do so only from the perspective of operations management (Alavi & Abd-Wahab, 2013; Qin & Nembhard, 2015).

Table 5 summarizes the different perspectives and the main policies, strategies, and actions identified as potential mediators and promoters of an agile workforce. Our classification is broad, not only for manufacturing but for any organization working in environments of uncertainty and rapid changes.

Table 5.

Aspects that promote workforce agility.

Dimension	Aspects	Author(s)
Learning and training	Cross-training	Van-Oyen *et al.* (2001); Hopp and Van-Oyen (2004); Sumukadas and Sawhney (2004); Qin and Nembhard (2015); Hopp *et al.* (2004).
	Cognitive abilities	Qin and Nembhard (2015).
	Organizational learning	Alavi (2014); Muduli (2016).
	Practical application of knowledge	Sohrabi *et al.* (2014).
Work organization	Control over work and autonomy	Munteanu *et al.* (2020); Sherehiy and Karwowski (2014).
	Teamwork and collaboration	Sherehiy and Karwowski (2014); Munteanu *et al.* (2020); Sumukadas and Sawhney (2004); Muduli (2016, 2017); Qin and Nembhard (2015); Varshney and Varshney (2020).
	Job enrichment, job enlargement and job rotation	Sumukadas and Sawhney (2004); Hopp and Van-Oyen (2004).
	Self-managed teams	Sumukadas and Sawhney (2004).
Human resource management	Skill-based pay	Sumukadas and Sawhney (2004); Muduli (2016, 2017); Qin and Nembhard (2015).
	Team-based production incentives	Sumukadas and Sawhney (2004).

	Feedback	Doeze-Jager-van-Vliet *et al.* (2019).
	Non-monetary rewards	Sumukadas and Sawhney (2004); Muduli (2016, 2017).
	Talent management	Harsch and Festing (2020).
	Agility goal setting	Doeze-Jager-van-Vliet *et al.* (2019).
	Staffing	Qin and Nembhard (2015).
Culture and Structure	Shared goals	Sohrabi *et al.* (2014).
	Empowerment and decentralization of decision-making	Alavi *et al.* (2014); Muduli (2016, 2017); Muduli and Pandya (2018).
	Horizontal structure	Alavi *et al.* (2014).
	Information and communication	Sumukadas and Sawhney (2004); Muduli (2016, 2017); Cai *et al.* (2018); Pitafi *et al.* (2019).

Source: authors.

Learning and training

When external and internal forces related to the business environment affect productive operations and work processes, employees might need to acquire new skills (Qin & Nembhard, 2015) and apply them in a practical and efficient way (Sohrabi *et al.*, 2014).

One of the training practices strongly associated with workforce agility is qualifying workers to perform different tasks, also known as *cross-training.* Cross-training has been studied and implemented in the field of operations management (Qin & Nembhard, 2015), especially in factory floor and serial production lines (Hopp *et al.*, 2004). This practice promotes greater flexibility by allowing workers to perform different tasks when and where they are most needed. Moreover, workers with a larger set of skills tend to be less susceptible to fatigue, boredom, and stress due to repetitive work (Hopp & Van-Oyen, 2004).

Muduli (2016, 2017) also highlights the issue of organizational learning, which relates to i) all that a person can learn by working, either directly or indirectly and ii) the construction of an atmosphere that encourages and facilitates workers' continuous learning to foster self-development and proactive behaviors. Organizational learning then nurtures a suitable environment to acquire new skills and transfer knowledge. Additionally, the development of cognitive skills, such as problem-solving and logical reasoning, is associated with agility through learning (Qin & Nembhard, 2015).

Work organization

Work organization includes multiple aspects which have not been a direct object of study. Sherehiy and Karwowski (2014) are pioneers in the field of work organization, and their findings indicate that i) if a firm implements strategies that boost autonomy and collaboration and reduce uncertainties, workers will be able to become more agile, besides considering that ii) control over one's own work and autonomy are two of the main predictors of workforce agility. The authors also conclude that the combination of work uncertainty and work demands has a significant negative impact on agility.

Although there was no direct mention of the term *work organization*, other studies explore aspects that could be included in this category, as in the case of self-managed teams, which are an organizational model where groups are responsible for a certain stage of the production process and have the necessary autonomy to make decisions about task assignments, work methods, and planning and control over their own work (Munteanu *et al.*, 2020; Sumukadas & Sawhney, 2004). Notwithstanding, it should be noted that this model requires high levels of collaboration and teamwork (Qin & Nembhard, 2015).

Sumukadas and Sawhney (2004) observed that some worker-involvement practices that allow greater power sharing are critical to agility, with emphasis on job enrichment (assigning more complex and challenging tasks) and job enlargement (assigning additional and varied tasks). Such strategies can be implemented through job rotations in association with cross-training practices, so that workers are capable of performing different tasks (Hopp & Van-Oyen, 2004).

Human resource management

One objective approach to achieve an agile workforce is talent management (Harsch & Festing, 2020), which is fostered, for example, by hiring and promoting those workers with the strongest attributes related to workforce agility, such as motivation, attitudes, behaviors, and physical and cognitive abilities (Qin & Nembhard, 2015).

Rewards and incentives can also encourage agility. In a study including several industrial segments that sought to analyze the impact of worker involvement practices on workforce agility, Sumukadas and Sawhney (2004) found that non-traditional approaches (such as skill-based pay), performance enhancement incentives, and non-monetary rewards were more efficient than traditional reward practices, such as participation in profits and results or employee stock ownership plans (ESOPs). Hence, in a skill-based pay system employees are rewarded for the number and depth of the skills they acquired (Muduli, 2016). In addition, the establishment of agility goals, feedback, and reflection upon the provided feedback can increase agility (Doeze Jager-van Vliet et al., 2019).

Organizational culture and structure

The aspects of organizational culture and structure related to workforce agility encompass greater autonomy of workers, decentralization, and sharing power, goals and information. This implies translating the mission statement and strategy for employees in a simple and operational way, establishing feedback systems, promoting quality of work life, providing workers' with managerial training, and involving them in decision-making situations, taking advantage of cultural and demographic diversity (Sohrabi *et al.*, 2014).

In a survey including small and medium Indian industries, Alavi *et al.* (2014) concluded that an organic organizational structure, with decentralized decision-making and reduced hierarchy, has a significant influence on workforce agility.

Empowerment is one of the most studied aspects in the literature. Muduli (2016) suggests that empowerment acts as a significant mediator between organizational practices and workforce agility.

According to this author, it is up to the managers to promote worker empowerment, leading to more meaningful work with greater competence and self-determination. In an expanded study, Muduli (2017) corroborated previous research findings, adding that more than empowering the workforce, managers should be aware of any condition that might undermine intrinsic motivation, such as threats, time pressures, and counterproductive types of competition.

On the other hand, improving the quality of communication and information sharing is also key to promote workforce agility, especially with the help of information technology, information systems and enterprise social media. Better communication and information sharing improve organizational performance and increase collaborative efficiency (Cai *et al.*, 2018; Muduli, 2016, 2017; Pitafi *et al.*, 2019; Sumukadas & Sawhney, 2004).

Implications – A research agenda

After studying the selected articles, we identified gaps, particularities and opportunities, which allow us to propose an agenda for future research papers in order to consolidate the field of workforce agility and respond to its numerous challenges.

a) Empirical studies to date are basically surveys. Therefore, an improvement in theoretical and methodological quality is welcome. Although surveys are excellent data collection methods to explore cause-and-effect relationships (which have been the focus of research so far), they cannot capture more subjective and concealed aspects. The need to combine other essentially qualitative methods to analyze agility from more specific and in-depth perspectives is emerging, thus giving voice to the main stakeholders: workers.

b) Except for the studies carried out by Muduli (2016, 2017), public administration is yet to be studied. Although public services have historically been associated with slowness and bureaucracy, mechanisms that govern private initiatives in the scope of the public administration have become increasingly more common in governmental institutions. Moreover, the incorporation of agility models may significantly improve the quality of service delivery. Micro and small enterprises are also object of few studies (Alavi, 2016; Sherehiy & Karwowski, 2014; Varshney & Varshney, 2020), therefore establishing multiple possibilities for research from the peculiarities intrinsic to business size and the way they relate with customers, suppliers, and employees.

c) Despite the relevance and need of studies in the industrial sector and, more specifically, on the factory floor, it is essential that other professional categories be inserted within the context of workforce agility. The study by Ghasemi *et al.* (2017), for instance, assessed the impact of organizational culture and management of knowledge on bank workers. Unless studies widen their scope, workforce agility may be conceived merely as an agile manufacturing resource, restricting its potential impact.

d) How can the aspects of work organization (e.g. division of labor, control mechanisms, intensification and precariousness of work, flexibilization of labor) affect or be affected by

workforce agility and the strategies adopted by organizations? The answer to this question is that work organization is a broad field of study that requires more scrutiny.

e) What is the role of managers in promoting workforce agility? Little is known, except for the obvious: managers are important and should lead the implementation of strategies and institutional missions. The relevance of managers is unanimous, but this question remains unanswered.

f) Similarly, little is known about the impact of agility on workers' health. Merely stating that the ability to work under stressful situations is one of the aspects of workforce agility is not enough (Sherehiy & Karwowski, 2014; Sohrabi *et al.*, 2014). If an unstable environment leads to organizational pressures for agility, it is only reasonable to assume that psychosocial illnesses, such as stress and burnout, will derive. As demonstrated by Braun *et al.* (2017), it is the organization's role to mitigate these effects and to promote a healthy work environment with better quality of life, in spite of the strong influences of external and internal forces.

g) The relationship between workforce agility, its yielded profits, and the costs involved in its promotion remains unclear. It is necessary to equate the investment (e.g. training, computerization, qualification, organizational improvements) with the expected and achievable returns. This relationship needs to be clear in order to raise awareness and, with this, encourage companies to make investments in agility strategies.

h) Finally, would workforce agility be an actual effective strategy or, like so many others surrounding the business world, just another fad? Practical, applicable and, preferably, reproducible studies, obviously considering the particularities of each organization and contexts, could answer this question. Studies need further criticism on the subject to effectively understand the relevance of workforce agility to business, workers and society.

Conclusions

The ultimate objective of this systematic review was to analyze the academic progress on the topic of workforce agility. Our findings indicate that the challenge to reach a single definition and classification for workforce agility is clear and that this subject remains incipient, with few empirical studies to date and the obvious uniqueness of individual organizations and contexts.

Our main theoretical contributions are the identification and analysis of i) the attributes and characteristics that define workforce agility and ii) the policies, actions, and strategies that allow its construction. We identified that an agile workforce consists of four interrelated and interdependent dimensions: proactivity, flexibility and adaptability, resilience, and competence. These attributes can be promoted through strategies related to learning and training, forms of work organization, human resource management, and organizational culture and structure.

However, the classifications presented in this study should not be seen as conclusive, but rather as a theoretical-conceptual basis for future research and a guide for companies and managers to seek

workforce agility as a way to promote competitive advantage in businesses, as well as a more dynamic and challenging work environment.

The limitations of this work include the fact that our analysis was restricted to articles published in journals indexed in three databases. Therefore, relevant studies indexed in other databases or published in conferences or books may have been out of sight. The subjective nature of the selection process is also a limiting factor. In brief, despite some limitations, this study has reported the current status of workforce agility in the specialized literature and proposed suggestions for some potential directions based the gaps identified. It is also important to highlight that, considering the systematic literature review carried out, this is one of the first papers about workforce agility in Latin America, which broadens the possibility of new research studies and discussions on the subject.

Disclosures

Authors declare no institutional or personal conflicts of interest.

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