

## **Older Workers and Innovation: Insights from a Systematic Literature Review**

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## Abstract

Population aging due to lower fertility and adult mortality configures a society where the workforce will have fewer younger workers coupled with older workers (OWs). Accepting that there is a strong link between innovation and organizations' survival, the aging workforce is a concern in organizations. To find out what academia has published on this issue, this research presents some insights based on a systematic literature review. The results indicate that the number of publications on the topic is scarce. The most frequent discussions deal with ageism, the impact of innovation and new technologies on aging workers, and managerial measures related to OWs and intergenerational working groups. This review contributes to academia by drawing attention to the need for further research, as the presence of OWs in organizations is likely to grow from here on out. To practitioners, this study also brings awareness and insights into the need for planning to manage organizations with an intergenerational workforce.

**Keywords:** aging workforce, innovation, older workers.

## Introduction

Population aging due to lower fertility and adult mortality configures a society where the workforce will have fewer younger workers coupled with older workers (OWs) (Nagarajan, et al., 2019; Ross, 2010). Concerns about the aging process of the organizational workforce and its consequences have been stressed in academia since the end of the nineties (e.g., Arrowsmith and McGoldrick, 1997; McCool, 1988).

The Covid-19 pandemic has accelerated changes in the world of work enormously: its future is predicted as a technological world (Alcover et al., 2021; Singh, 2021), where OWs might be perceived as the main part of human capital obsolescence (Alcover et al., 2021; Singh, 2021). The perception of OWs as an obstacle rather than an asset to business success seems to be the dominant paradigm in Western societies even though the number of OWs increases, as the retirement age in many countries has been gradually postponed (Nagarajan et al., 2019; Ross, 2010).

Existing research has underlined the strong link between innovation and business survival (Baregheh et al., 2009; Nandal et al., 2020; Zhang et al., 2022). When defined as a process, innovation deals with how organizations transform ideas into novelties (Baregheh et al., 2009), and a concerning issue is the performance of aging workers in innovation processes in organizations (Frosch, 2011). Reversely, a concern is the impact of innovation (e.g., new technologies) on OWs' performances.

The available literature reviews concerning OWs and innovation (e.g., Frosch, 2011; Marshall, 2001; Ng & Feldman, 2013; Parsons, 2015; Ypsilanti et al., 2014) do not provide an overview of themes. Therefore, we propose a systematic literature review that aims to discover the main research themes on the topic to gain new insights that could inform future research. We state the following research questions: RQ1: how does the scientific production about older workers and innovation situate in organizational studies? RQ2: what themes/directions are presented and discussed in the literature concerning the link between OWs and innovation in organizational studies?

The paper is structured as follows. Next, a brief introduction to the key concepts of this research is provided. This is followed by a description of the methodology, and after that,

results, analysis, discussion, and future research are presented. The paper ends with a conclusion highlighting the paper's contribution to the literature and practitioners.

## **Theoretical background - Main concepts**

### *Older workers*

Existing literature suggests that the definition of “older workers” has been changing according to the retirement age set by government policies, which depends on the age distribution of a population at the time (Nagarajan et al., 2019), social process, history, or context (Riach, 2007; Ross, 2010). For instance, in the nineties, the American Association of Retired Persons (AARP) defined older workers as encompassing a wide age range of persons over 40 years old (McCool, 1988; Ng & Feldman, 2013b). Some authors (e.g., Axelrad et al., 2017; Frosch et al., 2011) considered people over 50 as OWs in their studies. On average, based on work performance criteria, an older worker is someone aged between 50-59 years old, despite some countries more recently postponed to 65 years and above (Choi, 2016; Nagarajan et al., 2019; Singh, 2021; Wissemann et al., 2022). Currently, the definition of being an older worker tends to consider multidimensional dimensions (e.g., motivation and readiness to adapt to novelties) instead of looking solely at the chronological aspect (De Felice et al., 2022; Wissemann et al., 2022).

### *Innovation*

Innovation in the managerial field can be understood either as a result of a process or a process itself (Crossan & Apaydin, 2009). Innovation as a process consists of selecting ideas, transforming them into new or improved products, services, or processes, and implementing them in the market with better performance (Baregheh et al., 2009; Koen et al., 2001). Hence, innovation as a process, according to McCool (1988, p. 368), includes workers' productivity, which is defined as “employees' attendance, loyalty, and their contribution to work...”. Another construct associated with innovation is “creativity” as a prerequisite for innovation (Binnewies et al., 2008; Taylor, 2017). Creativity is defined as the production of new and useful ideas (Ng & Feldman, 2013a) and this individual ability of a worker may decrease with age. Therefore, an aging workforce may affect innovation (De Lange, 2021; Pfeifer & Wagner, 2014).

## **Methods**

The systematic literature review was based on several phases which are detailed in the following. In a group discussion in 2022, practitioners expressed the need to have an overview of the topic (Table I – Phase 0), which was endorsed by an academic opportunity for conducting a literature review to cover a gap (Table I – Phase 1). We adapted the steps proposed by Tranfield et al. (2003) for a systematic review employing the research protocol (Table I – Phase 2) on the Scopus database. We chose Scopus because of its larger coverage of journals in the field of business and management (Singh et al., 2021). Sixty-two papers were collected in Scopus (Table I – Phase 3) and 49 articles were selected for the data corpus by applying exclusion criteria based on abstract reading (Table I – Phase 4). The 49 articles were submitted to Biblioshine software, to obtain quantitative information from the data-corpus and an answer to RQ1 (Table I – Phase 5) (e.g., the number of publications/year, the main publication journals, the main institutions that researched the topic, and the most cited

authors) to situate the topic in the organizational research field. To answer the RQ2, a thematic analysis was applied to the data-corpus (Braun & Clarke, 2020), and 42 accessible papers (from 49) were read in the integrality (Table I – Phase 6). In this phase, four articles could be identified as being outside the scope and were excluded. The remaining 38 articles were coded according to Saldaña (2009). The codes were grouped and synthesized into categories, which built the themes (the answer to the RQ1) (Table I – Phase 7).

Table I – Methodological procedures

Stage I - Planning the review	
Phase 0 - Identification of the practical need for a review	Discussions about the subject, in 2022, in a non-academic study group about older workers, presented the necessity to map the subject in academia.
Phase 1 - Identification of the academic need for a review	The existing reviews do neither offer a broad panorama of the research object, nor a state-of-art of the selected topic in the organizational field to identify future research directions.
Phase 2 - Development of a review protocol	Selection of scholarly peer-reviewed articles on Scopus as a database. String: TITLE-ABS-KEY ("old* worker* " OR "AGING WORKER*") AND innovat* AND (LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "ECON") OR LIMIT-TO (SUBJAREA, "BUSI")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO ( DOCTYPE, "re")).
Stage II - Conducting a review	
Phase 3 - Identification of research	Data collecting in October 2022 and updated in March 2023 according to the review protocol. Result: 62 articles.
Phase 4 - Selection of studies	Exclusion of studies applying criteria on abstracts: a) studies outside of organizational or laboral market context for OW; b) older workers as customers or healthcare patients. 49 articles remained in the data portfolio.
Phase 5 – Assessment of the portfolio's bibliometric overview	Application of the Biblioshine software on the 49 articles to have bibliometric outcomes of the portfolio. Aim: to find an answer to RQ1
Phase 6 – Assessment for qualitative analysis of the portfolio	A full reading of 42 (from 49) accessible articles. In this phase, we excluded studies outside our scope that we did not identify by reading the abstracts (e.g., Cavanagh et al., 2013; Washko et al., 2011; Pritchard, 2011), without author identification (Na Na, 2009), and an opinion essay (Zamorano, 2000). As a result of this phase, 38 articles remained for qualitative thematic analysis (Braun & Clarke, 2020). Aim: to find an answer to RQ2.
Phase 7 – Thematic analysis	Structural coding of the content of the 38 articles generated categories based on similarity (Saldaña, 2009). Result: 23 codes and 3 categories.
Stage III -Reporting and dissemination	
Phase 8 – Elaboration and presentation of the report.	Selection of some bibliometric information from 49 articles of the portfolio, followed by a thematic analysis (Braun & Clarke, 2020) of the 38 final accessible articles. Presentation of the results.

Source: Adapted from Tranfied et al. (2003)

## Results

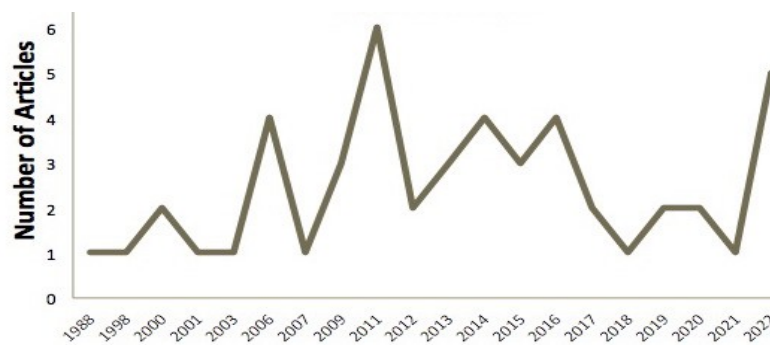
In this section, first, we present bibliometric information to situate the research topic in organizational studies (concerning RQ1). Then, the main themes that are discussed in the reviewed papers are presented (concerning RQ2).

## Bibliometric information

### *Publications numbers*

Figure 1 evidences the scarcity of publications of peer-reviewed articles about OWs and innovation. The Scopus database offers outcomes from 1988. In one decade (1988-1998), two papers expressed concerns about the aging of the population and the workers. McCool (1988) published about the employability of older workers; ten years later, Maier (1998) raised the question about their capabilities in innovation processes. The number of publications does not exceed six articles/year (2011). Despite the increasing number of publications from 2022 and onwards, there is no indication that the annual quantity will exceed 2011.

Figure 1 – Annual scientific production on innovation and older workers



Source: Biblioshine based on Scopus (2023)

### *Main publication journals*

The main journals that publish articles on OWs and innovation are those specializing in aging and gerontology. (e.g., *Zeitschrift für Gerontologie und Geriatrie*, *Journal of Aging and Social Policy*, *Generations*, *European Journal for Aging*). Alongside, journals in education, economics, and business have at least one publication since 1988 (e.g., *International Journal of Management Reviews*, *International Journal of Learning*, *Human Resource International Digest*, *European Journal of Training and Development*, *Engineering Economics*.)

### *Authors' affiliation(s)*

Research institutions show where the interest in a subject lies. The researchers' main affiliations of the studied articles are Maastricht University, Saxion Hogeschool, Tel Aviv University, University of Georgia, University of Hong Kong, University of Vienna, University of Warwick, Wellesley College, Ben-Gurion University of Negev, and Boston College. European Universities lead the ranking, followed by US-American and Israeli institutions. An Asian representative is also among the universities that seem to be interested in the topic.

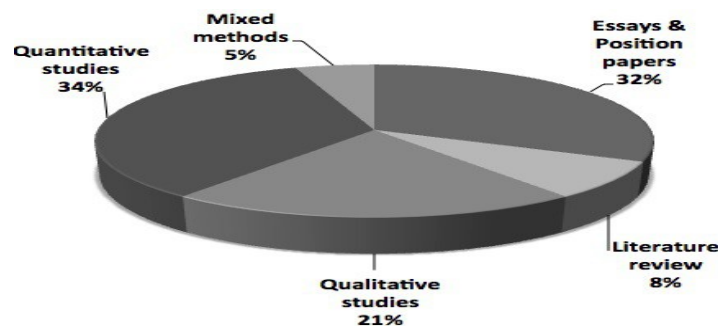
### *Most cited articles*

The number of citations shows the perceived relevance of a paper. The top five of the most cited articles included in the review investigated the relationship between aging and innovation behavior (Ng & Feldman, 2013a; 2013b, in this order), the impact of technological development on older workers in organizations (Aubert et al., 2006a), the impact of an aging workforce on innovation (Frosch, 2011), and the age management strategies (Earl & Taylor, 2015).

### *Most frequent methodologies*

In the reviewed articles, different types of research methods are covered, as presented in Figure 2.

Figure 2 – Types of research



Five of the 38 articles are descriptive narratives depicting the situation of the aging population with the challenges for organizations as well as for older workers (e.g., Heisler & Bandow, 2018; Lehr & Kruse, 2006; Kröll, 2003; McCool, 1998; Thang, 2011). Three articles are position papers claiming against ageism in workplaces (Halvorsen & Yulikova, 2020; Lagacé et al., 2016; Singh, 2021). Lavoie (2009) and Pritchard (2011)'s essays present propositions to better manage the reality of aging workers in the context of innovation in organizations, and Inayatullah (2006) offers an approach based on future methods. Four articles were based on different types of literature reviews: narrative review (Frosch, 2011; Marshall, 2001; Parsons, 2015; Ypsilanti et al., 2014) and meta-analysis (Ng & Feldman, 2013a).

The papers that used a qualitative research strategy employed interviews (Axelrad, et al., 2021; Cebulla & Wilkinson, 2019; De Felice et al., 2022; Earl & Taylor, 2015; Flynn, 2011) and desk research (Choi, 2016; Frerichs et al., 2012; Wissemann et al., 2022) employing secondary data available often online from third parties (e.g., Governments, and agencies).

Quantitative papers used primary data (Froehlich et al., 2016); Ng & Feldman (2013b); Stypinska & Turek (2017) and secondary data from third parties (Aubert et al., 2006, a,b; Behaghel et al., 2014; Dimian et al., 2016; Frosch et al., 2011; Guerrazzi M., 2014; Pfeifer & Wagner, 2014; Schubert & Andersson, 2015; Tan et al., 2022). The most often used data analysis technique of these papers was the econometrics model; regressions and structural equation modeling were also used for data analysis.

Two articles employed mixed/multiple methods. Axelrad et al. (2017) conducted a cross-sectional survey. The findings were analyzed by means of regression analysis and

econometric modeling. This was followed by a second survey to qualify the quantitative results. Barusch et al. (2009), on the other hand, did a cross-sectional survey, which was followed by a qualitative research method.

### **The main themes**

The thematic analysis of the papers created three categories: 1) Older workers in Organizations; 2) Innovation, technology, and OWs; and 3) Management policies of an aging workforce. They are presented following.

### **Older Workers in Organizations**

This category, present in all the articles, expresses concerns about the increasing number of OWs in organizations. The main discussions are on the pros and cons of the presence of OWs in organizations, ageism, and motivation for OW to stay in the workplace, as summarized next.

#### *Old workers: pros and cons of their presence in organizations*

Their presence in organizations calls up two opposite views. Some authors advocate that the current society cannot relinquish older workers' contributions (Heisler & Bandow, 2018; Kröll, 2003; Lehr & Kruse, 2006; Tan et al., 2022). For instance, experienced workers are crucial to avoid the loss of organizational memory, which can be unfavorable for organizational success (Frosch et al., 2011; Lavoie, 2009; Kröll, 2013). Older workers have high-crystallized competencies as well as metacognition abilities to deal with complex thinking, which could help new ideas generation for innovation (Lavoie, 2009; Parsons, 2015). Moreover, their practical expertise and tacit knowledge (Kröll, 2013; Lagacé et al., 2016; Ng & Feldman, 2013a; Tan et al., 2022) allied with higher loyalty and commitment than their younger counterparts (Axelrad et al., 2021; McCool, 1988) and better communication skills make OWs suitable for leadership positions and strategic activities (Behaghel et al., 2014; Lehr & Kruse, 2006). Finally, emotional maturity and less seeking higher positions make OWs considered stable colleagues to count on (Axelrad et al., 2021).

Nonetheless, some authors express a different view. They remind us that the societal changes due to technological advances may put a question mark on the aforementioned arguments. For instance, OWs might contribute to innovation in knowledge-based firms (Flynn, 2011; Frosch et al., 2011) but not much in manufactured industries (Frosch et al., 2011). In this direction, the disadvantages to keep OWs in working teams are not to be minimized. To mention, biological transformations after 60 years old cannot be ignored: psychomotor and psychological skills like adaptation and resilience may decrease (Frosch, et al., 2011; Pfeiffer & Wagner, 2014) as well as divergent thinking, which is important for innovation processes (Frosch et al., 2011), might be challenging for OWs (Lehr & Kruse, 2006). Finally, economic arguments play against the OWs: they have higher salaries and benefits (Aubert et al., 2006a; Barusch et al., 2009). Moreover, elderlies are more susceptible to some diseases (cardiovascular diseases, high pressure, etc.), which may impact in firm's healthcare expenses (Barusch et al., 2009; Singh, 2021).

### *Socially institutionalized ageism*

Some of the aforementioned negative aspects are often connected to ageism, a subject especially highlighted by some authors (e.g., Aubert et al. (2006a,b), Frosch et al (2011); Behagel et al.(2014), Lagacé et al. (2016) Stypinska & Turek (2017), Sigh (2021), among others). Ageism is defined as the “unfair treatment of people because they are considered too old” (Hornby, 2005, p. 29) or “too young”. E.g., biased judgments related to young workers (YWs) attribute their performance or capabilities only due to their ages (Singh, 2021). Ageism generates stereotypes that OWs are obsolete, less innovative, less healthy, and less creative than the YWs, and probably not capable to deal with novelties like new technologies (Ciutine & Railaite, 2014, Lagacé et al., 2016; Pfeifer & Wagner, 2014, Marshall, 2001; Ypsilanti et al., 2014). However, more recently, Wissemann et al. (2022) argue that there is no evidence that OWs impact negatively firms’ performance.

Ageist stereotypes bring several consequences: they are often not considered for promotions, and consequently, training opportunities become scarce for these workers (Lagacé et al., 2016; McCool, 1988). Often OWs’ contributions are not recognized by young managers: they consider themselves better educated and updated (Nagarajan et al., 2019). These beliefs have been reinforced through generations: the younger the individual, the stronger the age prejudice (Lehr & Kruse, 2006).

As ageism is a socially constructed discriminative view (Cutcher et al., 2022; Riach, 2007) and is deeply internalized in societies, the OWs themselves act accordingly. Under this paradigm of the retirement mindset (Flynn, 2011) OWs start to gradually isolate themselves from the dynamics of the workplaces as long as they approach the retirement ages set by government policies (Barusch et al., 2009; Flynn, 2011; Pritchard, 2011). Thus, OWs reinforce ageism: when invited to training programs, many refuse to learn new things, either because they prefer to give place to a YW or because they believe they will not remain long in the firm (Nagarajan et al., 2019). There is institutional ageism (Flynn, 2011), a cultural assumption that OWs should leave to give place to the new generation. For instance, ageist statements like “we have to renew and rejuvenate our personal” are common in most organizations (Lagacé et al., 2016). In this rationale, unions are against the postponement of retirement, as OWs may act as a carrier blockage for the YWs (Flynn, 2011).

The activity sector also influences the intensity of ageism. Innovative firms tend to hire people up to 40 years old (Aubert et al., 2006b). High-tech, financial, and tourism sectors also tend to hire younger workers (Axelrad et al., 2021; Stypinska & Turek, 2017), while traditional industrial sectors and public sector tend to better consider OWs (Axelrad et al., 2021; Flynn, 2011).

### *OWs’ demotivation to keep working*

Many aging workers want to retire as soon as they fulfill their legal conditions. Three main reasons are presented by the authors. First, the lack of perspective to advance in their careers through promotion or new challenges (Axelrad et al., 2021; Froelich et al., 2016) restrains their commitment to the organization. Second, the decreasing cognitive skills and less orientation to professional performance may accelerate the OWs exiting from the workplace (Frosch, 2011; Singh, 2021). Third, digital marginalization demotivates the OWs to engage in intergenerational cooperation and impels them to quit the workplace (Lagacé et al., 2016). These reasons are reinforced by the already mentioned retirement mindset, which may gradually demotivate workers to keep engaged in their self-development processes, even when they are offered by the firms (Flynn, 2011).



## **Innovation, technology, and OWs**

34% of the reviewed papers address this category presenting two main issues: first, how OWs are perceived in organizations concerning their productivity in innovative projects and their ability to adapt to the influence of new technologies and work methodologies on OWs. Second, the benefits of new technologies and innovative work methodologies to keep OWs productive and engaged. Following, we summarize these emerging topics.

### *OWs, innovation, and new technologies: perceptions in organizations*

Researchers seek to find out whether there is a relationship between aging and innovation. Despite the general perception of OW being as less creative and sometimes a hindrance to organizational innovation processes (Binnewies et al., 2008; Pfeiffer & Wagner, 2014), in countries with a relevant aging population like Finland, Japan, and Sweden innovation tax is still high, and there is no evidence that aging negatively affects innovation (Lavoie, 2009).

One often-mentioned indicator of a worker's innovative competence is innovation-related behavior - IRB (Ng & Feldman, 2013 a, b; Pfeiffer & Wagner, 2014), which measures the worker's competence to implement new ideas or to help the organization to do so (Ng & Feldman, 2013a,b). Ng & Feldman (2013a) pointed out that it might exist a positive correlation between IRB and innovation depending on the context and the worker's characteristics. Proactive OWs present high IRB and are very active in presenting new ideas, disseminating, and implementing them, even when lack support from supervisors (Ng & Feldman, 2013b).

Concerning new technologies, knowledge obsolescence is one of the most cited barriers for OWs to be employable in the current society (e.g., Aubert et al., 2006a; Kröll, 2013). The rapid progress of technology reinforces the negative bias to hire OWs (Behaghel et al., 2014) as they are labeled as resistant to new technologies (McCool, 1988; Schubert & Anderson, 2015; Singh, 2021).

### *Innovation and new technologies as support for OWs*

New technologies and innovation may bring advantages to OWs: ICT may help OWs by promoting their autonomy (e.g., home office and flexibilities) and compensate for their slowness, so that they may spend energy and time on more complex tasks and increase their productivity (De Felice et al., 2022; Wissemann et al., 2022). OWs could profit from the novelties; however, many remain attached to older technologies they learned and mastered, especially if they invested much energy and resources to absorb them (Schubert & Anderson, 2015).

## **Management policies for an aging workforce**

53% of the reviewed papers discuss organizational measures and government policies to manage the aging workforce in organizations and depict the largest interest of researchers in the reviewed papers. The literature review shows that despite the evidence of a growing number of aging workers, few firms anticipate their presence by implementing structured and planned actions (Kröll, 2003). The papers highlight six dimensions that firms should be aware of to promote innovative, engaged, and productive OWs: work infrastructure, organizational

climate, leadership, OW individual competencies, and public policies, as following summarized.

### *Work infrastructure for OWs*

Firms should be aware of the very fact that aging people lose some physical abilities. Therefore, accessibility in buildings, mobility management, and ergonomics in the workplace (Frerichs et al., 2012; Lehr & Kruse, 2006; Marshall, 2001; McCool, 1988) become more relevant with the aging process of workers. Here one includes the different types of adjustment of the work conditions to the OWs' new biological conditions. For instance, time flexibility, hybrid work mode (virtual and on-site) (Barusch et al., 2009; Earl & Taylor, 2015; Kröll, 2003; Lavoie, 2009), inter-firm turnover (Schubert & Anderson, 2015), new activities like mentorship or internal consultant (Axelrad et al., 2021; Heisler & Bandow, 2018) may engage demotivated OWs back to more proactive attitude toward work. A remark: work flexibility may be a strategy to retain workers in firms. However, at the same time, they may lead to discrimination and hamper routine organization in workplaces. (Earl & Taylor, 2015).

### *OWs-friendly organizational climate*

Concerning organizational climate, ageism emerged as a transversal issue in most of the researched papers for this work. Some studies point out ageism as a “fait accompli” and a “problem” that firms should look for means to deal with (e.g., Alcover et al., 2021; Cebulla & Wilkinson, 2019; Singh, 2021, among others). Anti-ageist policies should be implemented to avoid a consolidated bias that technology and innovation do not match OWs (Singh, 2021). The integration of different generations in the firm promotes a positive organizational climate. Intergenerational cooperation and mutual learning can benefit old and young workers by exchanging knowledge and abilities and increasing the innovative skills of a team (Kröll, 2003; Ypsilanti et al., 2014). The metacognitive skills of OWs in partnership combined with the competencies of the YWs in new technologies might be an outstanding asset for the organization (Frerichs et al., 2012; Lavoie, 2009; Singh, 2021; Thang, 2011; Wissemann et al., 2022). In this direction, Frosch (2011) argues that OW may contribute with tacit knowledge while YWs may transform it into something suitable to receive a new product patent. Moreover, OWs are inclined to teach and train YWs (Ng & Feldman, 2013a): intergenerational learning and multi-age perspectives may change attitudes and behavior in the workplace (Lagacé et al., 2016).

### *The role of the leadership*

Leadership in organizations plays a central role to fight against ageism, change cultural paradigms, and promote OWs' integration in the work environment (Earl & Taylor, 2015). In general, managers and supervisors are not prepared to face the reality of the growing number of OWs in their workplaces (Kröll, 2003). Supervisors' socially undermining behavior in the workplace may reinforce the negative stereotypes of OWs and demotivate the OW to present new ideas risking his/ her reputation (Ng & Feldman, 2013b).

Lagacé et al. (2016) state that most leaders believe in the negative stereotypes of OWs. As mentioned, especially the young ones (Heisler & Bandow, 2018) may not even consider OWs for promotion and training programs accelerating OWs' exit from the firms (Lagacé et al., 2016). Thus, trust in the leaders should be developed to engage and retain OWs in the workplace (Heisler & Bandow, 2018). Another challenge is for young leaders to face OWs'

difficulties with new technologies since many OWs do not easily accept the authority of someone younger (Axelrad et al., 2021). The above-mentioned issues suggest a need to build a training program for leaders specifically on how to manage an intergenerational workplace as well as to prepare them to act as a bridge between generations and facilitate their interactions (Axelrad et al., 2021).

### *The OW's competencies, acknowledgment policies, and lifelong learning*

Most authors mention training programs to update OWs' knowledge as a management measure to motivate, qualify, and keep older workers productive (Guerrazzi, 2014; Pritchard, 2011; Thang, 2011). Learning could add new technological competencies to their acquired experience of a long carrier to (De Felice et al., 2022; Frosch et al., 2011; Tan et al., 2022). Thus, instead of neglecting OWs from training programs (Stypinska & Turek, 2017), organizations should seek means to mitigate the challenges of an aging workforce. Training programs for OWs might focus on two points: first, to develop an OW-friendly environment by promoting an anti-ageist culture by integrating OWs and YWs (Heisler & Bandow, 2018). Second, to promote training to attract OWs (De Felice et al., 2022; McCool, 1988) by offering them acknowledgments (Behaghel et al., 2014), awards (Parsons, 2015), financial advantages (Halvorsen & Yulikova, 2020), and other encouraging measures to motivate OWs to learn continuously. Intergenerational learning (IGL), in which OWs and YWs learn in cooperation and partnership (Ypsilanti et al., 2014), may tailor suitable training methods for OWs in new technologies (Singh, 2011). For instance, video games may be employed as a tool to integrate the different generations and improve the cognitive functions of OWs (Ypsilanti et al., 2014). This way, the strength of the different generations can be combined, which may promote innovation (Frosch et al., 2011; West, 2009).

### *Public policies to engage OWs*

Besides organizational management efforts, national public policies could be established to retain healthy and productive OWs and motivate them to transfer their knowledge to the next generation (Kröll, 2003). After all, public policies influence when an OW exits the work market through mandatory retirement public policies (Barusch et al., 2009; Flynn, 2011). Assuming ageism as a socially constructed and promoted paradigm (Riach, 2007; Cutcher et al., 2022), we should not accept it as an unavoidable destiny of a generational issue: on the contrary, we should re-signify aging to the new demographic reality that most countries have to face from now on (Cutcher et al., 2022). In this direction, the educational system should also be reviewed to prepare young generations for the aging phenomenon in society (Ciutene & Railaite, 2014).

### **Analysis, discussion, and future research**

Concerning RQ1, the literature review revealed that the number of scientific production about older workers and innovation is modest. An average of solely one publication per year does not portray a strong interest of researchers in the topic. Moreover, despite the global aging workforce, the existing publications do not cover Latin America or Africa. Researchers that investigate the subject concentrate in USA and Europe. This might mean that some countries with younger populations have not awakened yet to the relevance of a problem that will affect them sooner or later.

Although the type of research is well distributed among non-empirical (40%) and empirical studies (60%), these last ones work mostly with secondary data. Of the papers that collected primary data from OWs the majority employed surveys. Primary data by interviews were carried out with managers or experts in age management. This may indicate that more interviews with OWs could be conducted to give them a voice to express their perceptions and experiences. Axelrad et al. (2021) asked in their paper how employers think about older workers. The next step could be to ask OWs how they perceive themselves in their workplaces or how they could contribute to intergenerational management.

Reporting RQ2, hereafter we bring some insights from the main themes presented in the reviewed articles, i.e., older workers in organizations; innovation, technology, and OWs; and management policies of an aging workforce.

Ageism appears as a central concern in five academic papers about OWs (Aubert et al., 2006a,b; Schubert & Anderson, 2015; Singh, 2021; Axelrad et al., 2021) but most of the papers mention the issue. So far, OWs are perceived according to the ageist paradigm: after 45 or 50 years old the worker becomes useless to the organization, and investing in their training is not worthwhile, as they will exit soon (Guerrazi, 2014; Schubert & Anderson, 2015). This mindset is established in society, and some articles highlight the reinforcement of ageist thinking by OWs themselves (Flynn, 2011). We could explain the mindset constructed by government retirement policies, which for decades have established a mark (age or work years) for a worker to go to retreat (Barusch et al., 2009; Flynn, 2011; Pritchard, 2011). Hence, it is predictable that the closer comes the worker to such a mark, the less engaged in the work he/she might become.

However, the situation seems to change gradually: even the end of retirement is considered (Inayatullah, 2006) due to a trend of postponing retirement age and emerging retention policies in different countries (e.g., Choi, 2016; Guerrazzi, 2014; Heisler & Bandow, 2018; Singh, 2021). In spite of some progress, policies about OWs remain concerning for organizations.

While the majority of articles mention the impact of technology and innovation on OWs' employability, different view concerning OWs and technology is presented by Wisseman et al. (2022) and De Felice et al. (2022): they analyze the benefits conveyed by new technologies to OWs, helping them to increase their productivity. This new approach to the topic is a constructive way to bring technology and OWs together and promote OWs' employability for a longer time.

Most articles mention managerial measures to be taken by organizations and public policies to include OWs. Twenty from thirty-eight articles deal with organizational measures to offer positive work conditions to OWs (e.g. flexibility of work plan, ergonomics, accessibility in building, promoting intergenerational joint learning and working, preparing the leadership to fight ageism, among others). Without disregarding such an approach, which is very relevant in the current aging society, we highlight the role of OWs as active stakeholders to overcome ageism by challenging the currently disseminated paradigm. The two most cited papers in the review – Ng and Feldman (2013a,b) discuss the OW's proactive behavior facing changes in the organization. This might indicate researchers' growing interest in OW's individual specificities to fight ageism.

If, on one hand, several authors claim at organizations for constructive management policies of OWs in workplaces (e.g., McCool, 1988; Kröll, 2003; Halvorsen & Yulikova, 2020; Lagacé et al., 2016; Singh, 2021), on the other hand, we remind that OWs should be implicated in management processes by expressing their views about aging workers in their workplaces. Research in this direction could collect their suggestions to enrich management measures to optimize intergenerational teams.

The rare studies dealing with OWs' competencies on innovation (e.g., Ng & Feldman, 2013a, b; Ypsilanti et al., 2014) instigate to seek more investigation in this direction. For instance, being the learning process crucial to update the innovation competencies of OWs (Aubert et al., 2006b), deeper studies about the specificities of OWs' learning process would be welcome. Just as there are pedagogy and andragogy, "gerontology" offers research possibilities.

The present literature review also suggests a further study on the contribution of new technologies or innovative work methods on older workers' productivity (Wissemann et al., 2022; De Felice et al., 2022). Moreover, studies on the influence of the national culture on ageism and innovation, motivation for OWs to keep high IRB at the workplace in different contexts, and intergenerational cooperation for innovation in organizations are also themes to be studied in depth.

Finally, as mentioned, few organizations implement structured and proactive measures (Kröll, 2013). Therefore, more empirical research dealing with innovation policies and OWs can contribute to the construction of practical applicable models and frameworks for intergenerational management.

## **Conclusion**

This study conducted a systematic literature review to situate the scientific production about older workers and innovation in academic publications and to find out what themes are discussed by authors on the topic. In so doing, this paper offers contributions to the academy by evidencing the scarcity of publications and the need for more research on subjects that will implicate most organizations at the global level, sooner or later.

Concerning the main discussed subjects the papers present ageism, the impact of innovation and new technologies on aging workers, and managerial measures at organizational and government levels to deal with intergenerational working groups. The preceding section indicates suggestions for future research. As mentioned, the scarcity of publications demands the interest of researchers to embrace the theme.

To practitioners, the main contribution of this work is to bring them awareness to seek to structure management strategies about the topic discussed in this paper. The population aging in a global trend of fewer younger workers with required competencies seems to be inexorable. Therefore, a group of intergenerational researchers in the academy and intergenerational managers in firms are invited to embrace and optimize the presence of OWs in workplaces.

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