The Golden Age of Silver Workers?

The Role of Age in the Perception of Increasing Digital Work Environments

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Abstract. Digitization is progressing intensively, in particular in the world of work. Thereby, intelligent systems, mobile devices, cloud computing, and social media change the development of work and employment by (in parts) replacing employees or changing ways of production. In line with demographic change and in order to face economic, societal, and demographic challenges of a future labor market, it is necessary to consider the integration of aging employees. Therefore, this paper investigates the perception of motivational factors and stress factors triggered by technology in the working context. In addition, factors influencing the individual perception of strains are analyzed. For this purpose, an online survey was conducted (N = 507) asking for agreement to motivational and stressing factors in the context of increasing digital working environments. The results show that the overall motivational factors received a similar evaluation pattern for younger and older participants. However, the younger employees showed stronger agreements to all motivational aspects. Additionally, the results show that the perception of techno-stress factors was significant lower in the older aged group compared to the younger aged group. The study's findings highlight the importance of user diversity for a successful and healthy transformation to a digital work environment putting employees needs and requirements into the center.

Keywords: Digitization · Future of work · Age · Ageing workforce · Techno-stress

1 Introduction

Today we experience a fundamental change of work environments. The turn from industrial work to knowledge based tasks is attended by technological progress. The digitization of the world of work is progressing at a rapid pace. Mobile devices, big data, cloud computing and social media change the development of work and employment fundamentally. Intelligent systems will replace employees, productions will change, professions have to be redefined. This fundamental change leads to challenges for employment, organizational structures, education and social and societal systems. The greatest challenge but also opportunity lies in the shaping of this industrial revolution. In the light of that, research about the rapid changes in the work

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environment is necessary to put the human into center of discussion. Additionally the demographic change will lead to a shift of the population structure, what will additionally influence the future of work. There are more and more people of an advanced age in the working world and less younger people. This leads to several necessary changes in the organization of an aging society, for example with regard to care work, public pension systems but also employment environments. To integrate qualified older workers into organizational structures and planning offers a great potential for society and economy. The strategy to replace older workers by qualified younger workers, as it was and is predominant in economy, is not a functional model for the future of work, if the average age of the workers keeps rising. Although industry already changed partly its view on the potential of advanced aged employees, a focus on the integration of aging employees is necessary, when facing the economic, societal and demographic challenges of a future labor market. Following that it is necessary to understand motivational factors and psychological strains for older employees in the working context – especially with regard to digitization. While in an digitized workspace physical stress factors decrease, psychological stress factors increase. Thus, we will focus in this paper on factors influencing the individual perception of strains by investigating perception of motivational factors and stress factors triggered by technology in the working context.

2 Aging Workforce and the Future of Work

Age and its role in the future of work is coming increasingly into the focus of research. Prejudices about older workers, such as them being no longer productive or having longer absences due to physical limitations in contrast to younger workers, are repeatedly refuted. Studies were able to show that older employees have not more physical issues than younger colleagues in average [1, 2].

Although memory or cognitive processing limitations occur with increasing age, research shows that these can be offset by professional experience, acquired knowledge, and learned problem-solving strategies. Studies showed, there is no negative relationship between job performance and age. Additionally, older workers have better strategies to cope with different forms of age related stress [3]. Thus, there is no disadvantage of an older workforce compared to a younger workforce.

On the contrary, it could be shown that older workers tend to have a stronger commitment to the employer organization and additionally tend to have a better relationship with coworkers [4].

Coping with stress, social skills, expert knowledge and a strong commitment to the employer are vital characteristics when facing the future of work.

Demographic change is exacerbating a shortage of skilled workers in the future of work, a fact, which is already noticeable today. Experienced employees are therefore of great importance. And since they are becoming scarce, employee retention is important

for successful companies. Moreover, in a globalized world, future work teams will become increasingly heterogeneous, which will increase the demands on employees' social skills [e.g. 5].[1]

In addition to physical, mental and cognitive age-related changes in work, studies have also found motivational changes related to age. With increasing age, employees are less driven by motives like career opportunities and personal development. Motivating factors such as a good working environment, security and a good relationship with colleagues and supervisors become more important [6, 7]. This means that the incentives and support measures for employees in the company should vary according to age. Kooij et al. suggest, that because of the more intrinsic motives in job performance, older workforces may appreciate an enrichment of their work tasks by being a mentor, for example [7, 8].

Thoughts about the future of work must always include considerations about the use of technology in the work process and the associated changes for the employee. The role of age and technology adoption has been examined a lot. Studies found, a difference in adoption and use of technology between younger and older adults. Especially the self-evaluation of older people regarding learnability and ability to use, as well as using confidence proved to be less in contrast to younger people.

Elderly people had the perception of needing more time to learn how to handle a technical system and assumed they would have more difficulties than younger persons [9, 10]. They frequently stated they felt uncomfortable with technical systems and were insecure in dealing with it [e.g. 11]. Studies suggest age has a negative relationship with computer knowledge and interest – both aspects that are positively related to confidence in using technology. Additionally age correlates positive with computer anxiety which in turn is correlating negatively with computer knowledge and interest [12].

The differences in attitude and self-perception of technology use between younger and older adults suggest giving older people special training for the use of technology. This will lower anxiety in dealing with technology and reduce stress for older workers [9, e.g. 13, 14].

2.1 Techno-Stress

Looking at the future of work, we see growing chances and changes due to digitization. Physical stress factors will decrease and psychological stress – especially in the transformation phase – will increase. Mental load such as work related-stress is a major factor influencing health at the future workplace. As studies in the past could show, the use of technology to support work processes can lead to stress in the workforce if the user is not taken into account (e.g., [15]). Stress has negative consequences for the employee him- or herself but also to his/her performance at work [16].

[1] It is important to correctly classify all these results on the role of age in the work context. Ageing is a very individual process with many different influencing factors. It is particularly important to keep in mind that individual differences increase with age [e.g. 4].

Stress is a physical and psychological reaction to a situation in which he/she feels or is unable to cope with the task. Techno-Stress describes the inability to find a healthy way to adopt a new technology. This includes the way technology is used, but also the way in which technology changes one's own habitual behavior and environment [17]. For example, the introduction of service mobile phones requires new rules for dealing with accessibility. Employees easily get the feeling they always have to be reachable, because accessibility has become unconnected from the actual working time. The boundaries between leisure time and working time becomes blurred. This is one possible example of techno-stress. It shows oversimplified, that the change of work processes (increased availability for customers, supervisors and colleagues) changes work related rules (times of availability), cultures (is it expected to be available at weekends and evenings or holidays?) and the role of the individual in his working environment (can call customers from home, has to decide when or if to pick up the phone in their leisure time).

The use of technology will make change faster and far more complex in the future. Thus, the study of techno-stress and its effects is of most importance for the perspective of workers (e.g. impairment of well-being and health) and employers (e.g. impairment of productivity and performance).

As explained above, older workers often show better management of work-related stress situations. It has also been shown in relation to technology-induced stress that older people experience less techno-stress than young people in relation to new information and communication technologies in their work environment [17]. Research found that factors as computer knowledge and gender are more relevant for the emergence of techno-stress than age. However, the question is whether this is also similar with regard to the future of work and the associated digitalization, or whether a general digital change has a different effect on stress perception through technology than the introduction of information and communication technologies at the workplace.

Thus, this paper raises the question whether there is a difference between younger and older employees with regard to the perception of techno-stress but also with regard to the perception of motivational factors in relation to the digitalization of the world of work.

3 Methodology

In the following section the methodological approach will be presented. The sample is described hereafter.

3.1 Online Survey

A questionnaire was conducted, including demographics (age, gender, education), perceived techno-stress and motivational aspects of the digitization of the workplace.

Techno-stress was measured by four subscales developed by Tarafdar and colleagues [17]:

Table 1. Overview of used dimensions of techno-stress and their meaning

Dimensions of techno-stress	Creators of techno-stress
Techno-overload	The use of technology at the workplace means more work must be done faster in a shorter time
Techno-invasion	the use of digital work equipment blurs the boundaries between private and professional life
Techno-complexity	learning how to use digital tools is time consuming and complicated
Techno-insecurity	digital work tools and changed processes trigger the concern of not being good enough in the job and perhaps being replaced because of it

In addition, motivational aspects of the digitization of the workplace, based on motivational aspects found in literature, were surveyed.

They have been grouped into seven main aspects, each of which consists of two items. These can be found in the table below. The motivational aspects include aspects of the own performance and work area related quality increase, flexibility of working hours and increase of the work life balance, security of the workplace with changing circumstances (economic or private), as well as communicative aspects such as an improved exchange among colleagues and a faster information flow at the workplace (Table 2).

Table 2. Overview of summarized motive variables

Variable	Cronbachs α
Productivity	.91
Quality	.89
Flexibility	.79
Security	.81
Work life balance	.89
Exchange between colleagues	.81
Flow of information	.85

Items to motivational aspects as well as techno-stress could be answered on a Six-Point Likert scale from 1 = *I totally disagree* to 6 = *I totally agree*. The respondents were asked to relate all questions to the digitization of the world of work.

3.2 Sample

507 working participants aged between 19 and 66 years (M = 46.18 years, SD = 11.82) took part in the survey. The participants were divided into three age groups: Young professionals with an age range from 18 to 35 years (n = 109), experienced workers with an age range from 36 to 55 years (n = 277) and silver workers with an age range from 56 to 66 years (n = 121). The sample consisted of 254 women and 253 men. All respondents live in Germany. The survey was conducted from may to august 2018 by an online questionnaire.

4 Results

Results were analyzed descriptive with mean values. Non-parametric Kruskal-Wallis-Tests were used for the analysis of group differences. Level of significance was set at $p < .05$.

4.1 Motivational Aspects

Overall, the results show medium agreement on the motivational aspects of a digital workplace (Fig. 1).

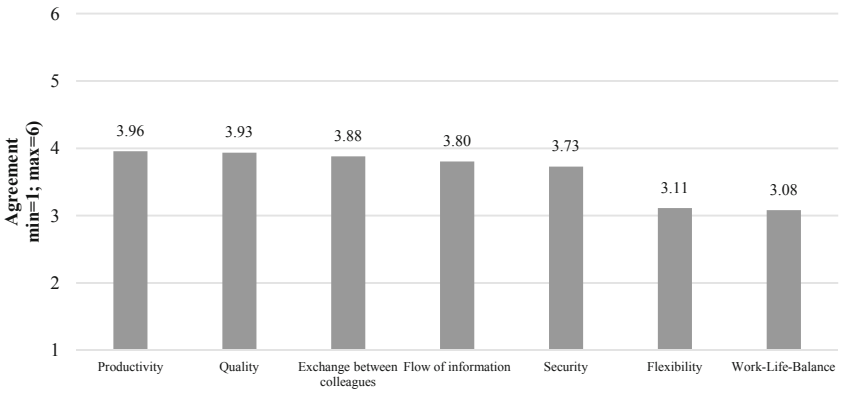

Fig. 1. Mean of overall agreement to motivational aspects

The digitization of the workplace to increase one's own work performance (M = 3.96; SD = 1.47) and its quality (M = 3.93; SD = 1.44) receives the most approval. The least agreed is that the use of digital means in the workplace increases flexibility (M = 3.11; SD = 1.47) and the work-life balance (M = 3.08; SD = 1.39). This shows that overall the advantages play less of a role in areas of private life design, such as one's work-life-balance. The advantages of an optimal work design are most clearly seen by the participants.

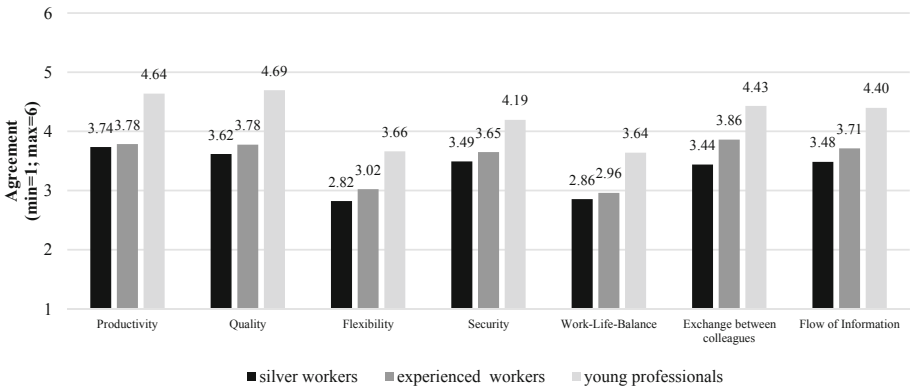

Fig. 2. Mean of agreement to motivational aspects in age-groups, based on mean values

Figure 2 shows a comparison of the assessment of the motivational aspects of digitising the workplace by age group. It can be seen that the order in which the individual aspects are assessed in each age group is the same as in the overall sample. However, it can also be seen that agreement decreases overall with increasing age.

Table 3. Results from a Kruskal-Wallis-Test for motivational aspects and age group

Motivational aspect	Age group	Mean rank	Kruskal-Wallis
Productivity	Young professionals	319.37	H(2) = 28.83; p = 0
	Experienced workers	235.3	
	Silver workers	234.15	
Quality	Young professionals	332.9	H(2) = 42.67; p = 0
	Experienced workers	235.42	
	Silver workers	221.77	
Flexibility	Young professionals	302.75	H(2) = 17.93; p = 0
	Experienced workers	245.75	
	Silver workers	225.14	
Security	Young professionals	299.96	H(2) = 15.20; p = 0
	Experienced workers	244.54	
	Silver workerss	230.38	
Work Life Balance	Young professionals	306.09	H(2) = 19.28; p = 0
	Experienced workers	242.84	
	Silver workers	228.78	
Exchange between colleagues	Young professionals	305.4	H(2) = 22.71; p = 0
	Experienced workers	249.25	
	Silver workers	214.79	
Flow of information	Young professionals	315.76	H(2) = 26.99; p = 0
	Experienced workers	241.22	
	Silver workers	223.86	

To get deeper insights about the perception of motivational aspects regarding age differences a Kruskal-Wallis-Test was performed. Results show the difference in agreement to the motives is significant for each aspect, as shown in Table 1 below.

Results show the overall ranking of motives is the same over all age groups. However, consent to the motivational aspects varies significantly depending on the age group. While young professionals see a stronger support for the motives for the digitalization of the working world, the older participants agree less with the motives.

4.2 Techno-Stress

To investigate techno-stress, techno-stress perception was first considered in the entire sample (Fig. 3).

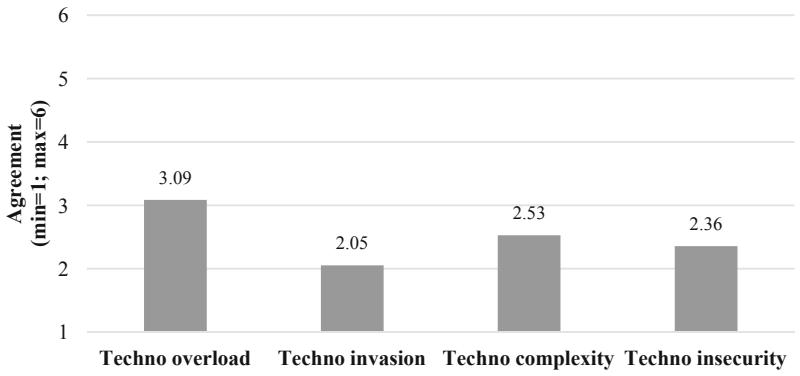

Fig. 3. Perceived techno-stress

The overall perception of techno-stress in the sample is low. The perception that by implementing technology in the work process more work has to be done in shorter time and that thus the individual workload gets too much, is most pronounced (Techno-overload: M = 3.08; SD = 1.27). The feeling that the use of technology in the workplace blurs the line between work and leisure time, e.g. through accessibility, is the least pronounced (Techno-invasion: M = 2.05 SD = 1.20).

To investigate the relationship between age and techno-stress, a Kruskal-Wallis-Test was performed (Table 4).

Table 4. Results from Kurskal-Wallis-Test for age and techno-stress

Dimensino of techno-stress	Age group	Mean rank	Kruskal-Wallis
Techno-overload	Young professionals	263.23	H(2) = 2.88; p = 0.24
	Experienced workers	258.87	
	Silver workers	234.55	
Techno-invasion	Young professionals	303.54	H(2) = 22.06; p = 0.00
	Experienced workers	251.15	
	Silver workers	215.91	

(*continued*)

Table 4. (*continued*)

Dimensino of techno-stress	Age group	Mean rank	Kruskal-Wallis
Techno-complexity	Young professionals	243.21	H(2) = 0.98; p = 0.61
	Experienced workers	254.66	
	Silver workers	262.2	
Techno-insecurity	Young professionals	280.14	H(2) = 10.92; p = 0.004
	Experienced workers	259.08	
	Silver workers	218.82	

As Table 3 shows, there is a significant difference in the perception of techno-stress between the age groups at the dimensions Techno-invasion (H(2) = 22.06; p = 0.00) with a mean rank of 303.54 for young professionals, 251.15 for experienced workers and 215.91 for silver workers. Thus, the young professionals show a higher perception of the stress triggered by the blurring of the boundaries between work and professional life through the use of modern technologies in the world of work, than the older workers. It became apparent that the age groups differ significantly in their perception of techno-insecurity (H(2) = 10.92; p = 0.004) with a mean rank of 280.14 for the young professionals, 259.08 for the experienced workers and 218.82 for the silver workers. Again, the group of young workers is more sensitive than the older groups. Younger workers who are worried about not being good enough in comparison to their competitors or worry about losing their jobs as a result rate higher than older workers.

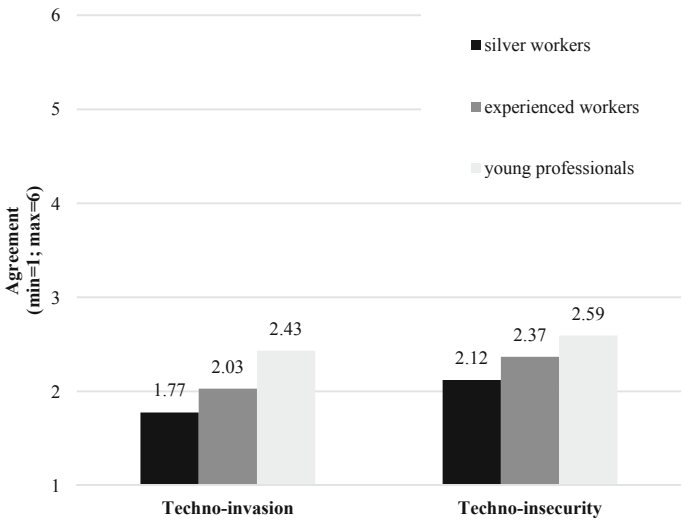

Fig. 4. Age Difference in the perception of techno-stress, based on mean values

Figure 4 shows the mean of techno-invasion and techno-insecurity for all three age groups and makes it clear that stress and strain factors induced by technology and related to work are perceived weaker with increasing age than in younger years.

Results show, that the perception of techno-stress in general is not very pronounced. Nevertheless, the examination of techno-stress in the different age groups showed a significant difference in perception between older and younger employees.

5 Discussion and Future Work

The inexorable changes in the world of work have already begun. A major challenge is demographic change and the resulting shortage of skilled workers. Experienced employees are an important and essential resource for competitive companies. Understanding this particular group of workers and investigating the needs and requirements of older workers is therefore of particular relevance. This paper focuses on the question of how differences in the perception of motivational and stressful factors in connection with the digitization of the workplace are related to age.

The results of the empirical study showed that the motives were assessed similarly, regardless of age, but that this assessment was stronger in the younger age group than among older employees. Other studies examining age differences in work-related motives found that the type of motivation changes with age. While younger workers focus on aspects such as career development, older workers are looking for a good working environment and job security [7]. The results presented here, showed that focus on growth like the increased productivity and quality of work in particular, are seen by the test persons as the strongest motivational aspects associated with digitization. However, this is the strongest aspect for all age groups – even if the younger group gives it stronger support than the silver workers and also the experienced group. So there is no difference here in the weighting of the individual motives between the age groups, but nevertheless in the intensity of the endorsement. The younger group may associate greater enthusiasm with the potential of a digital workplace because they were at the beginning of their career. However, the results indicate that there are no differentiated motivational assessment patterns between the age groups with regard to the digitization of the workplace. Companies that introduce digitization measures should therefore respond to positive aspects of the changes – such as improved work processes that enable the individual to achieve a quality increase of work – in order to raise motivation.

The results concerning the perception of techno-stress showed that the group of silver workers feel significantly less techno-stress than young professionals. This is in line with the results of Tarafdar et al. [18]. They assume that older employees are in a better position to compensate for technical innovations and the associated changes because they are equipped with more experience and knowledge [18]. With regard to techno-invasion, it is precisely this wealth of experience and formal and informal knowledge acquired, such as accessibility rules, that could mean greater serenity for silver workers than for inexperienced newcomers to the profession. In terms of techno-insecurity, too, awareness of one's own abilities and one's own standing in the work environment and in comparison with colleagues seems to lead to increased insensitivity to stress. Kooij et al.

suggest, that because of the more intrinsic motives in job performance, older workforces may like to have an enrichment of their work tasks by e.g. being a mentor [7, 8]. In line with that, the here presented results indicate a mentoring program between younger and older workers as a measure for transformation processes to a digital work environment. This could lead to a healthy and social work environment as a base for innovation, commitment and healthiness. Job enrichment by mentoring etc. might be the best solution to use potential, knowledge and experience from older workforce and at the same time may provide better job satisfaction for employees – both, younger and older.

The results imply it makes sense to design measures and strategies oriented towards the transformation of work processes and structures, taking into account the age structure of the employees and offering differentiated options of training, learning teams and mentorship programs designed to meet the complex requirements of the future of work.

Following studies showing the potential of older workers for the labor market of the future (e.g. through loyalty, expert knowledge, social competence) [4], the potential high value of older workers for sustainable enterprises could also be pointed out here. This study gives an indication that the motivational aspects of the digitization of the workplace are perceived similarly by young professionals and silver workers, even if the young people give a little more emphasis to this assessment. In principle, however, the assessment of motivational aspects does not drift apart between young and old, from which it can be concluded that the implementation of digitalization does not require a special address for older employees. On the other hand, the silver workers show themselves to be more relaxed and stress-resistant with regard to stress caused by technology, which indicates less susceptibility to the consequences of psychological stress in the work context. Against the background of a changing world of work, a lack of skilled workers and demographic change, the present study thus provides further indications that older workers are becoming a sought-after group of employees and that golden times for silver workers in the sense of sought-after skilled workers are imminent on the labor market of the future.

6 Limitations

In the present study age was measured by chronological age. Since the differences in the physical and mental aging processes are very individual, future studies must take this into account in order to obtain reliable information about the effects of aging. In addition, no relationship was established between age group and type of occupation. But especially when it comes to aspects such as experience, this plays a role. For example, the entry age of an academic into a profession is usually higher than that of a person with vocational training, which in turn can have an effect on stress management and coping strategies.

Similarly, the nature of the profession plays a role in the assessment of digitization and positive aspects and should therefore be included in future analyses. Thus, other patterns of evaluation of motivational aspects will probably emerge (e.g., comparison of physical work and knowledge work).

In this study, the subjects were introduced to a rather rough scenario of digitization on the basis of which they were to answer the questions. In a first step, this was important to capture general trends. in a next step, however, more specific scenarios should be queried in order to obtain more concrete results for individual aspects.

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