The relationship between workplace digitalization and older worker's productivity

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Abstract: Many studies have confirmed the positive impact of workplace digitalization on productivity, especially in terms of efficiency, innovation and cost reduction. On the other side, some studies reported disconnections between these two variables. Therefore, this paper is trying to resolve the inconsistent findings regarding the impact of workplace digitalization on productivity in a transitional context. The sample size used for the analysis consists of 103 respondents. Structural Equation Modeling (SEM) technique is adopted to explore complex relationships among variables. In addition, the mediation analysis was performed to investigate the mediating role of employee job satisfaction in the relationship between workplace digitalization and older employees' productivity. The results suggest that the total effect of workplace digitalization on employee productivity is significant (β = 0.578, p = 0.000), indicating a positive relationship between these variables without considering the mediator. When mediator job satisfaction was included, the direct effect of workplace digitalization on employee productivity became very low and statistically insignificant (β = 0.003, p = 0.966), suggesting that the relationship between them is fully mediated by variable job satisfaction.

Keywords: workplace digitalization, productivity, older employees, SEM, mediation analysis

1 Introduction

Over time, technology has become an integral part of our lives, revolutionizing various aspects of society, including the economy. Companies in various sectors embrace digital technologies to streamline operations, reach wider markets and deliver products and services more efficiently. The emergence of the covid-19 pandemic only further accelerated the digitization process. Technological advances

have undoubtedly led to job changes in certain sectors, especially those that rely heavily on routine tasks. However, in addition to the great benefits that the digitization process has brought, it is still a challenge to establish a balance between technological progress and the well-being of employees.

Many studies were conducted to analyze whether and how workplace digitalization influences employees' productivity [1,2,3]. Most of them have confirmed the positive impact of digitalization on productivity, in terms of efficiency, innovation and cost reduction. On the other hand, some studies reported disconnections between these two variables, due to lower socialization, and lack of skills [4].

A very low number of studies particularly examined the impact of digitalization on productivity among older employees [5,6,7] and even lower number were conducted in developing countries [8], especially Balkan countries.

In that sense, this study contributes to a very limited literature by trying to resolve the inconsistent findings on the relationship between workplace digitalization and employees' productivity in a transitional context. Four hypothesis were proposed and tested for that purpose.

Hypothesis 1 (H_1): Workplace digitalization positively and significantly impacts employees' productivity.

Hypothesis 2 (H_2): Workplace digitalization positively and significantly impacts employees' job satisfaction.

Hypothesis 3 (H_3): Employees' job satisfaction positively and significantly impacts employees' productivity.

Hypothesis 4 (H_4): Employees' job satisfaction as a mediating variable increases the effect of workplace digitalization on employees' productivity.

2 Methodology

The main objective of this paper was to study the impact of technology on older people's productivity, with mediating effect of variable job satisfaction. Sample consists of workers older than 55, employed in Serbian organizations. Study was conducted between December 2022 and February 2023. Data were collected personally. The survey covered a total of 103 workers. The demographic characteristics of the sample are shown in Table 1

		Number	%
Gender	Male	46	44.67
	Female	57	55.33
Sector	Manufacturing	21	20,6
	Service	18	17,7
	Education	4	2,9
	Administration	24	23,5
	Other	36	35,3

Table 1.
Socio-demographic characteristics of the sample

Demographic characteristics (Table 1) showed that the statistical population included mostly female employees, working in different sectors with more than 30 years of working experience.

The questionnaire is made up of two parts. The first part consists of 3 questions which lead to the socio-demographic data (gender. working experience in years and sector of employment), and the other part consists of 40 questions divided into 3 groups. Digitalization, Employee productivity and Job satisfaction [9]. Five-point Likert scale was used to assess the answers, where 1 means „I completely disagree“ and 5 means „I completely agree“.

The Partial Least Square (PLS) approach to Structural Equation Modelling (SEM) was used to analyze the relationship between the observed variables. One of the main reason why PLS-SEM was chosen in this study is that PLS-SEM is very suitable for small sample analysis [10]. The modelling process is divided into two main stages: Stage 1 - Measurement Model Assessment and Stage 2 - Structural Model Assessment. The measurement model reflects the interactions between the observed data and the latent variable, whereas the structural model represents the relationships between latent variables. In addition, we have also analyzed the mediating role of job satisfaction in the relationship between workplace digitalization and older employees' productivity.

3 Results and discussion

3.1. Measurement model assessment

Measurement model assessment included establishing construct reliability and validity of scale tools [11]. The construct reliability and convergent validity of the measurement model are assessed using Cronbach's alpha (CA), rho A, Composite Reliability (CR), and Average Variance Extracted (AVE), which are presented in Table 2.

Construct	Cronbach's alpha	rho_A	CR	AVE
Employee Productivity (EP)	0.856	0.866	0.855	0.540
Job Satisfaction (JS)	0.925	0.927	0.925	0.509
Workplace Digitalization (WD)	0.856	0.866	0.855	0.505

Table 2.
Construct reliability and validity

According to Table 2, the Cronbach's Alpha and CR values exceed the recommended threshold of 0.70, as suggested by Hair et al. [12]. The Cronbach's Alpha values ranged from 0.856 to 0.925, indicating satisfactory internal consistency for all the constructs. Furthermore, the CR ranged from 0.855 to 0.925, providing additional support for the reliability of the constructs. Convergent validity is assessed using the Average Variance Extracted (AVE) statistic. As recommended by Fornell and Larcker [13], an AVE value equal to or greater than 0.50 indicates that the items converge to measure the underlying construct, thus establishing convergent validity. In this study, the AVE value for the constructs was higher than 0.5, so convergent validity is also confirmed.

Besides convergent validity, the discriminant validity should also be checked before assessing the structural model. Henseler et al. [10] suggested the usage of Heterotrait-Monotrait ratio of correlations (HTMT) criterion for that purpose. Ideally, according to Kline [14] a threshold value needs to be 0.85 or less, while other authors [15] proposed a threshold of 0.90 or less.

Construct	Job Satisfaction (JS)	Employee Productivity (EP)
Employee Productivity (EP)		
Job Satisfaction (JS)		0.801
Workplace Digitalization (WD)	0.716	0.581

Table 3.
Discriminant validity—HTMT ratio

Table 3 indicates that all HTMT ratios are lower than the suggested threshold of 0.9, confirming the good discriminant validity of the model.

3.2 Structural Model Assessment

Since the reliability and validity of the measurement models are established, hypothesized causal relationships within the inner model can be evaluated using PLS-SEM. The hypotheses were tested in a two-tailed manner, specifically emphasizing the positive direction of the relationships. To assess the statistical significance of these relationships, the bootstrapping procedure in SmartPLS4 software (5000 bootstrap samples were generated) was employed [16].

Hypothesis	β	SD	t	p	Results
H1: WD > EP	0.003	0.078	0.043	0.966	Nor confirmed
H2: WD> JS	0.715	0.044	16.309	0.000*	Confirmed
H2: JS> EP	0.804	0.064	12.582	0.000*	Confirmed

Table 4.
Results of the structural model assessment – direct effect

The obtained results (Table 4) show that the path coefficient indicating the relationship between workplace digitalization and productivity is very low (β=0.003) and statistically insignificant (p=0.964), suggesting that hypothesis H_1 should be rejected. However, positive and statistically significant path coefficients between variables workplace digitalization and job satisfaction (β=0.715, p=0.000), as well as between job satisfaction and productivity (β= 0.804, p=0.000), support hypotheses H_2 and H_3.

The mediation analysis aimed to investigate the mediating role of job satisfaction in the relationship between workplace digitalization and productivity of older workers in observed organizations. The results shown in Table 5 reveal that the total

effect of WD on EP is significant (β = 0.578, p = 0.000), indicating a positive relationship between these variables without considering the mediator. When mediator JS was included, the direct effect of WD on EP became very low and statistically insignificant (β = 0.003, p = 0.966), suggesting that the relationship between them is fully mediated by the variable job satisfaction, which confirms hypothesis H_4.

	Total effects			Direct effects			Indirect effects		
	β	t	p	β	t	p	β	t	p
Workplace Digitalization on Employee Productivity	0.578	9.854	0.000*	0.003	0.043	0.966	0.575	9.415	0.000*

β = Path Coefficient, t = t-Statistics, p = level of significance *p < 0.05.

Table 5.

Total effect, direct effect, and indirect effect for the model mediation

Finally, the evaluation of obtained R^2 (the coefficient of determination) and f^2 (the effect sizes of the paths) supplement the previous analysis (Table 6).

Predictor	Outcome	R^2	f^2
Workplace Digitalization	Job Satisfaction	0.511	1.043
Workplace Digitalization	Employee Productivity	0.650	0.000
Job Satisfaction			0.905

Table 6.

R^2 and f^2 values

R^2 has been used to determine the explained variance of the latent dependent variables about the overall variance. The cutoff R^2 values suggested by Chin [17] are as follows: 0.190 weak, 0.333 moderate, and 0.670 substantial. According to the results in Table 6, the overall model explained 65% of the variance in EP. The model also explained 51.1% of the variance in variable job satisfaction, so it can be said

that some other factors influence this variable. Still, the model has a good predictive value.

According to Cohen [18], an f^2 value measures the strength of each predictor variable in explaining endogenous variables. An f^2 value from 0.02 to 0.149 is considered small, from 0.15 to 0.35 is considered medium, and higher than 0.35 is considered large, Considering these thresholds a large effect was found in the relationship between WD and JS, as well as JS and EP, 1.043 and 0,905, respectively. On the other hand, no effect was recorded in the relationship between WD and EP.

Conclusions

One of the main implications of this study is comprehension of the true value of older employees, which could serve employers to overcome the negative stereotypes about older workers and to see them as important resources. This research has limitations. Sample only included older employees from one country, hence partially restraining a generalization of the results. The questionnaire didn't include the level of education of the employees, which could, as moderator variable to some extent, change the obtained results. Future research aims to expand the sample to other countries and consider other variables, such as level of education.

Acknowledgement

The authors wish to acknowledge the support by COST (European Cooperation in Science and Technology; www.cost.eu), in the framework of COST Action CA21107 'Work inequalities in later life redefined by digitalization' (DIGI-net: www.digineteu.eu).

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