

## RESEARCH ARTICLE

# The adaptation and validation of the Techno-Work Engagement Scale (TechnoWES-9) in the case of Romanian employees

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### Abstract

The study looks into the validation and analysis of the psychometric properties of the Techno-Work Engagement Scale (TechnoWES-9) in the case of a sample of Romanian employees (N=280). The scale is based on the concept of work engagement and evaluates the well-being generated by the use of technology at the workplace. The tool includes three factors: techno-vigor, techno-dedication, and techno-absorption, each with three items. The factorial structure was verified through confirmatory factor analysis (CFA), and the reliability of the scale was examined from the perspective of its internal consistency. The concurrent validity was performed by associating scales that assess subjective well-being. The CFA supports the tri-factorial structure of the scale. The internal consistency of the total score is excellent. TechnoWES-9 is positively associated with subjective well-being, life satisfaction, and positive affect. None of the dimensions of the scale correlates with negative affect. The study suggests that the Romanian version of TechnoWES-9 is an adequate measure for the assessment of well-being of Romanian employees working in digital technology.

### Keywords

techno-work; work engagement; employability; well-being; validation.

### Introduction

Most studies that looked into the role of technology at the workplace focused on the employee's negative experiences and on work-related techno-stress (Salanova, 2003; Stich et al., 2017; Imran et al., 2017; La Torre et al., 2019; Visvizi & Daniela, 2019). However, a smaller number of studies shows the association between the use of digital technology and the user's well-being (Dienlin & Johannes, 2020; Bavaresco et al., 2021). In 2019, a first study coined the concept of techno-work engagement with the

purpose of filling the gap in the literature on the positive feeling that the employee has when s/he uses technology (digital technology, in particular) at the workplace (Mäkiniemi et al., 2019). The study was completed by the development of an instrument that measures well-being when working with technology: Techno-Work Engagement Scale-9 (TechnoWES-9) (Mäkiniemi et al., 2020).

The concept of techno-work engagement represents this positive experience in the work with technology opposed to the negative experience of techno-stress (Mäkiniemi et al.,

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2020). The concept is based on the established term “work engagement” – a positive state of mind concerning work (Schaufeli et al., 2002; Schaufeli et al., 2006) – and it is similar to the latter: techno-work engagement has three dimensions: techno-vigor (high level of energy when technology is used at the workplace), techno-dedication (enthusiasm and inspiration generated by the work with technology), and techno-absorption (full focus when technology is used at the workplace). Although both concepts mentioned above capture the meaning of well-being at the workplace, work engagement is focused on work in general, while techno-work focuses on digital technology which is used at the workplace (Mäkineniemi et al., 2019).

The scale was validated on samples of employees from various organizations (N=870) and on Finish teachers (N=216) (Mäkineniemi et al., 2020). TechnoWES-9 showed good internal consistency: McDonald  $\omega$  coefficients are over 0.82 in the case of the three factors and over 0.90 in the case of the total score. The construct validity was assessed by the correlations with the scores obtained from other relevant constructs such as techno-stress and technology-related job resources. TechnoWES-9 and its three scales correlate negatively with the techno-stress scale and the latter’s dimensions: skepticism, fatigue, anxiety and inefficacy, and it makes positive correlations with technology-related job resources (autonomy, social support, self-efficacy, value congruence) (Mäkineniemi et al., 2019).

The rationale for which we proposed to adapt and validate TechnoWES-9 for the Romanian space would be related to the fact that technology is ubiquitous in our lives, and digitalization is a megatrend of contemporary society with a major impact on the way in which people work. A balanced picture of both the negative and positive effects of the intensive digitalization of work on well-being is also needed. And TechnoWES-9 offers us the evaluation of the well-being that results from working with technology. In addition, in Romania there is a shortage of instruments that assess the individuals’ experiences with regard to the relationship with technology at the workplace.

The scale helps to understand the degree of engagement in technology-related work and the positive experiences that technology users have in the work process since technology makes their work easier and helps to increase their performance and productivity. Just like work engagement, techno-work engagement is an inspiring, fulfilling work-related state of mind. Studies have shown that work engagement is associated with happiness (Kameyama et al., 2022), life satisfaction (Mache et al., 2014), and psychological well-being (Rahi, 2022, Radic et al., 2020). Therefore, we assume that techno-work engagement is associated with the general well-being of employees. Moreover, theoretical studies have advanced the relationship between techno work engagement and subjective well-being (Cazan, 2020). On the other hand, research shows that subjective well-being conceived as individual cognitive and affective evaluations of life (Diener, 2000; Seligman, 2018) is positively and significantly influenced by workplace well-being (Horowitz, 2016). Studies on teachers show that well-being at work is correlated with happiness and optimism (Kun & Gadancz, 2019). Another empirical investigation carried out on technological employees demonstrates the impact of workplace well-being on subjective well-being via flow as the overall feeling that employees feel when they are fully engaged (Chang & Hsu, 2022). This means that a very good or less good job affects subjective well-being. Work satisfaction and work-related affect are considered essential for a successful business and increase employee psychological well-being, including hedonic and affective (DiPietro et al., 2020).

## Research hypotheses

*Hypothesis 1: Starting from the above-mentioned literature (Mäkineniemi et al., 2019; Mäkineniemi et al., 2020 ) we hypothesize that the factorial structure of TechnoWES-9 is trifactorial.*

*Hypothesis 2: Starting from the definition of techno-work and from the purpose of TechnoWES-9, we hypothesize that the scale will correlate positively with subjective well-being, positive affect and life satisfaction, and*

it will correlate negatively with negative affect.

## Method

### Linguistic adaptation of the TechnoWES-9 into Romanian

The cross-cultural adaptation of the scale was based on the recommendations proposed by Beaton et al. (2000) for self-report scales. Thus, the scale was translated into Romanian independently by two researchers. Then we made a synthesis of the translations and compared the discrepancies. The blind backward translation of the initial versions was made by other two bilingual people, an English teacher and a psychologist who is familiar with the jargon of the domain. The last stage consisted in pre-testing the version of a sample of 30 master students (all are employed in the public and/or private sector), in order to make sure items are clear and comprehensible. The latter were not included in the final sample.

### Ethical considerations

The study has been conducted in full accordance with ethical principles, including the World Medical Association Declaration of Helsinki from 1975 as revised in 2013. The study was approved by the responsible body for research ethics of the Polytechnic University of Bucharest (Reg. No. 686/22 02 2022).

### Data collection procedure

Between March and April 2022, the participants filled in an online survey with a Google Forms link. The latter was secured so that one person can fill in the questionnaire only once. The link was distributed in online groups, in e-mail campaigns, as well as inside a banking institution. In order to be eligible, one had to be over 18 and to have stable residency in Romania. The questionnaire contains a text that informs participants that all the answers are used exclusively for scientific purposes, there are no rewards for the participation in the study and data are confidential. When they joined the study, the

participants agreed to have their data processed for the research.

## Instruments

*Techno-Work Engagement Scale-9* - TechnoWES-9 (Mäkinen et al., 2020) is a 9-item instrument with normal scoring which measures a specific state of well-being related to digital technology at the workplace. The scale is made of three subscales each with 3 items assessed on a continuum from 0 – *never* to 6 – *always*: techno-vigor (e.g., *When I utilize technology in my work, I feel that I am bursting with energy*), techno-dedication (e.g., *I am enthusiastic about utilizing technology in my job*) and techno-absorption (e.g., *I feel happy when I am immersed in using technology in my work*). Eight items are adapted from the Utrecht Work Engagement Scale-9 (UWES-9) (Schaufeli et al., 2006). An item is adapted from the Utrecht Work Engagement Scale-17 (UWES-17) (subscale Vigor). The total score is calculated by adding up the scores obtained for the nine items.

*Satisfaction with Life Scale* – SWLS (Diener et al., 1985) is used in the assessment of life satisfaction and, implicitly, of subjective well-being by assessing the cognitive component of the latter. The scale included five items assessed on a scale from 1 – *strongly disagree* to 7 – *strongly agree*. SWLS demonstrated good psychometric properties in prior studies carried out on various samples of Romanian adults (Marcu, 2013; Cazan, 2014; Balgiu, 2019a; Balgiu et al., 2021). For the present study, the coefficients of internal consistency are good: Cronbach's  $\alpha=0.84$  (95%CI:0.81-0.87) and McDonald's  $\omega=0.85$  (95%CI:0.82-0.87). CFA shows good fit coefficients:  $\chi^2=9.185$ ;  $df=5$ ;  $\chi^2/df=1.83$ ; CFI=0.99; TLI=0.98; NFI=0.98; RMSEA=0.055; SRMR=0.021;  $p=0.102$ .

*Scale of positive and negative experience* – SPANE (Diener et al., 2010) is made of 12 items, out of which six are related to positive affects (the subscale Spane-Positive) and the other six are related to negative affects (the subscale Spane Negative). All the items are assessed from 1–*very rarely* or never to 5–*very frequently* or *always*. Every subscale has a

score between 6 and 30. Finally, it was calculated the effective balance (SPAN-E) by subtracting the negative score from the positive one. The scale was previously validated on samples of Romanian students (Balgiu, 2019b). In the case of the present study, Cronbach  $\alpha$  coefficients are 0.89 (95%CI: 0.86-0.90) for SPANE-P and 0.87 (95%CI: 0.85-0.89) for SPANE-N and McDonald  $\omega$ =0.89 (95%CI: 0.87-0.91) for Spane-P and 0.87 (95%CI: 0.85-0.89) for SPANE-N. CFA shows the good value of the fit coefficients:  $\chi^2=68.945$ ;  $df=51$ ;  $\chi^2/df=1.35$ ; CFI=0.99; TLI=0.98; NFI=0.96; RMSEA=0.035; SRMR=0.041;  $p=0.048$ .

Subjective well-being was measured in accordance with the model proposed by Diener (2000) and it consisted in the total of the scores obtained for the cognitive component of well-being (life satisfaction) and the scores for the affective component (the balance between positive affect and negative affect).

*The socio-demographic data.* The collected data considered: (i) self-identified gender, (ii) age, (iii) studies (primary studies, secondary studies, university studies, post-university studies), (iv) domicile (urban versus rural), (v) work sector (public, private, another), (vi) the geographical region (the main eight regions of the country were included).

## Data analysis

For a start, we analysed the descriptive statistics: averages, standard deviations, skewness and kurtosis. We used CFA for construct validity, as well as the maximum likelihood (ML) assessment method considered robust in terms of non-normal distribution (Byrne, 2010). In this sense, we used the following fit coefficients:  $\chi^2$  (chi-squared test) which needs to be insignificant from a statistical point of view (Hooper et al., 2008) and  $\chi^2/df$  (relative/standard chi-square test) which has an acceptable value if it is  $<3$  (Schermele-Engel et al., 2003). Since  $\chi^2$  is sensitive to the dimension of the sample we used a combination of indexes: CFI (comparative fit index), TLI (Tucker-Lewis index), NNFI (Bentler-Bonned Non-Normed fit index) recommendable  $\geq 0.95$  (Hooper et

al., 2008; Hu & Bentler, 1999); RMSEA value (root mean squared error of approximation) and of SRMR (standardized root mean square residual) are good, if they are  $<0.05$  (Byrne, 2010), and acceptable if they are  $<0.08$  (Hooper et al., 2008; Hu & Bentler, 1999). The AIC coefficient (Akaike information criterion) is used to compare the models; the model with the lowest values is the most desirable. Reliability was examined with Cronbach  $\alpha$  and McDonald  $\omega$  coefficients. To calculate composite reliability (CR) whose minimum cut-off level must be  $>0.70$  (Chin, 2010) the factor loading is used. The Average variance extracted (AVE) with the minimum limit level of 0,50 (Fornell & Larcker, 1981), was used to calculate the convergence validity. Concurrent validity was analysed through the TechnoWES-9 relationship with scales that evaluate subjective well-being. The discriminant validity was calculated by comparing the square root of AVE of each construct with its inter-construct correlation. Gender differences were calculated using the nonparametric Mann-Whitney U test. The measurement of gender invariance was under the recommendations of Rutkowschi and Svetina (2017), who considered that  $\Delta CFI$  should be  $< 0.010$  and  $\Delta RMSEA < 0.010$ . The use of network analysis aimed to identify the items that provide the highest information for the latent constructs. The data were analysed with the SPSS (version 22), Amos (version 22) and JASP (version 0.16.10) programs.

## Results

### Socio-demographic characteristics of the sample

The sample required to validate the scale was calculated based on the formulas developed by Soper (2022) considering all the instruments used. The parameter values for calculating the sample sizes were: an expected effect size of 0.30, a desired statistical power level of 0.95, number of latent variable was 7 and number of observed variable was 26. The recommended minimum sample size is 247. To compensate for potential losses (approximately 10%) 33 additional participants were added to this estimate, resulting in a total of 280 subjects.

Therefore, the sample was made of 280 participants in the 20 to 58 age bracket ( $\text{Mean}_{\text{age}}=30.59$ ;  $\text{S.D.}=9.80$ ), with a relatively equal proportion of males (41.43%) and females (58.57%). 97.20% of participants work and live in the city and only 2.8% work and live in the rural area. The sample is mostly made of university graduates (66.70%), followed by high school graduates (21.60%) and master and PhD graduates (11.7%). As for the work sector, 37.14% work in the public sector and 66.80% in the private sector, while 3.21% are freelance. Most participants are engineers (I.T. and telecommunications) (37.50%), teachers (32.14%), and employees working in financing and banking (14.28%). A smaller proportion of subjects work in commerce (4.28%), online journalism (3.92%), marketing (3.57 %), consultancy (2.50 %), and various other domains (1.78%).

## Descriptive statistics

The descriptive statistics were presented as an average  $\pm$  standard deviation and the normality condition of the data was verified by means of skewness and kurtosis indicators (Table 1). We calculated the Z scores for skewness and kurtosis by comparing the absolute value to the standard error. Given that the Z score is not between -3.29 and 3.29, corresponding to normal distribution for samples of 50-300 of subjects (Kim, 2013), we considered that the data have non-normal distribution. The average scores of items varied between 3.97 (*I am completely immersed in using technology in my work*) to 4.75 (*When I utilize technology in my work, I feel that I am bursting with energy*). Corrected item total-correlations are all positive and they are between 0.62 and 0.78. There are no gender differences related techno-work engagement ( $\text{Mean rank}_{\text{males}}=137.40$ ;  $\text{Mean rank}_{\text{females}}=142.70$ ;  $p=0.589$ ;  $U=9152.00$ ).

Table 1. Descriptive statistics for TechnoWES-9 items

Items	Min.	Max.	M	S.D.	Skewness	Kurtosis	Corrected item-total correlation
Techno_VI1	0.00	6.00	4.75	1.28	-1.26	1.85	0.73
Techno_VI2	0.00	6.00	4.56	1.39	-0.95	0.53	0.75
Techno_VI3	0.00	6.00	4.56	1.24	-0.75	0.27	0.62
Techno_DE1	1.00	6.00	4.67	1.26	-0.72	-0.29	0.71
Techno_DE2	0.00	6.00	4.55	1.30	-0.84	0.58	0.76
Techno_DE3	0.00	6.00	4.56	1.41	-0.86	0.28	0.77
Techno_AB1	0.00	6.00	4.24	1.47	-0.79	0.35	0.78
Techno_AB2	0.00	6.00	3.97	1.51	-0.50	-0.21	0.65
Techno_AB3	0.00	6.00	4.57	1.32	-0.74	0.05	0.63

Note: M=Mean; S.D.=Standard Deviation

## Internal consistency

As for reliability, Cronbach  $\alpha$  and McDonald  $\omega$  coefficients are over 0.80 in the case of the three subscales: techno-vigor ( $\alpha=0.81$ ;  $\omega=0.82$ ), techno-dedication ( $\alpha=0.84$ ;  $\omega=0.84$ ),

techno-absorption ( $\alpha=0.81$ ;  $\omega=0.81$ ), and TechnoWES-9 total score ( $\alpha=0.92$ ;  $\omega=0.92$ ) (Table 2). There are no significant modifications after the item deletions.

Table 2. Descriptive statistics for factors – Mean, standard deviations and reliability

Factors	M	S.D.	Min-Max	$\alpha$	$\omega$
Techno-vigor	4.62	1.12	0-6	0.81	0.82
Techno-dedication	4.60	1.16	1-6	0.84	0.84
Techno-absorption	4.26	1.22	0-6	0.81	0.82
TechnoWES-9	4.49	1.06	0-6	0.92	0.92

**Factorial structure**

We used CFA for the verification of the factorial structure. Since the assumptions of multivariate normality did not prove to be true (Mardia coefficient = 51.36; c.r = 30.54) we used bootstrapping technique (2000 resamplings). We made three models (Table 3). The first model took into consideration the unifactorial dimension:  $\chi^2=128.349$ ;  $df=27$ ;  $\chi^2/df=4.74$ ; CFI=0.93; TLI=0.91; NNFI=0.91; GFI=0.90; RMSEA=0.116 (90%CI: 0.096–0.137); SRMR=0.043; AIC=164.349. Model 2 ( $\chi^2=65.749$ ;  $df=24$ ;  $\chi^2/df=2.74$ ; CFI=0.97; TLI=0.95; NNFI=0.95; GFI=0.95; RMSEA=0.079 (90%CI: 0.056–0.102); SRMR=0.039; AIC=107.749) and 3 ( $\chi^2=53.932$ ;  $df=23$ ;  $\chi^2/df=2.34$ ; CFI=0.97; TLI=0.96; NNFI=0.96; GFI=0.95; RMSEA=0.069 (90%CI: 0.045–0.084); SRMR =0.031; AIC=97.932) are tri-factorial,

of which model 3 is with negative residual correlation between items 7 and 9. Model 3 was made in order to reduce the RMSEA value (upper limit of the confidence interval). The justification of the option for model 2 as having the highest degree of adequacy consists, on the one hand, in avoiding negative covariances between items 7 and 9. On the other hand, although there are authors who consider that the cut-off level for the upper limit of the RMSEA should be 0.080 (Hooper et al., 2008), still other authors demonstrate that this rule should not be generalized in the conditions where the factor loadings are at a high level. (McNeish & Hancock, 2018). Thus, a RMSEA value of 0.20 can be acceptable (Mc Neish & Hancock 2018). Therefore, we concluded that model 2 has the best values of the goodness-of-fit indices (Figure 1).

Table 3. Goodness-of-fit indices of the CFAs

Models	$\chi^2$	df	$\chi^2/df$	CFI	NNFI	TLI	RMSEA (90%CI)	SRMR	GFI	AIC
M1 one factor	128.349	27	4.74	0.93	0.91	0.91	0.116 [0.096- 0.137]	0.043	0.90	164.349
M2 three-factors without correlated errors	65.749	24	2.74	0.97	0.95	0.95	0.079 [0.056- 0.102]	0.039	0.95	107.749
M3 three-factors with correlated errors	53.932	23	2.34	0.97	0.96	0.96	0.067 [0.045- 0.083]	0.031	0.95	97.932

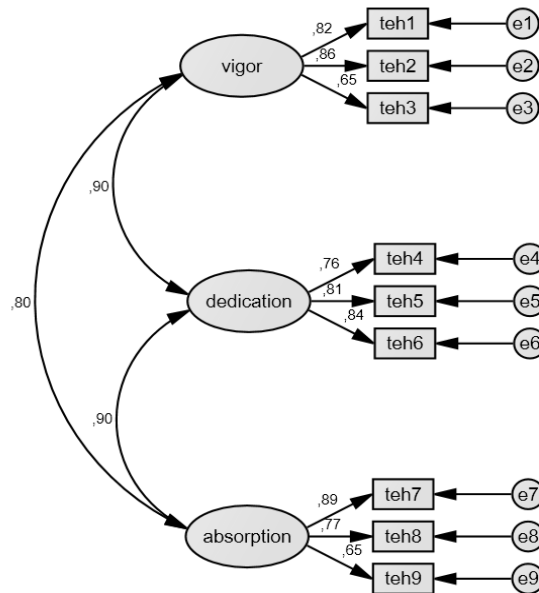


Figure 1. The confirmatory factor analysis of the scale Techno WES-9

Notes: The figure shows the standardized values of the factor loading; teh1-teh9 represent the items of the scale

**The measurement invariance across gender**

The results obtained in gender invariance demonstrated that the scale measures the same

construct in both groups of males and females (Table 4). The invariance according to gender is supported by the  $\Delta CFI$  and  $\Delta RMSEA$  values that are lower than the recommended limits of 0.010.

Table 4. The gender invariance for TechnoWes-9

Model Invariance	Overall Fit Indices					Comparative Fit Indices			
	$\chi^2$	df	$\chi^2/df$	CFI	RMSEA	$\Delta\chi^2$	$\Delta df$	$\Delta CFI$	$\Delta RMSEA$
Configural	95.383	48	1.98	0.969	0.060 [0.042-0.077]	-	-	-	-
Metric	106.090	54	1.96	0.966	0.059 [0.042-0.075]	-10.707	6	0.003	0.001
Scalar	111.877	60	1.86	0.965	0.056 [0.042-0.075]	5.787	6	0.001	0.003
Strict	125.864	69	1.82	0.964	0.054 [0.039-0.069]	13.877	9	0.002	0.002

**Concurrent validity**

Concurrent validity is certified by the fact that the TechnoWES-9 total score and its 3 subscales make weak, but significantly positive correlations with subjective well-being (r between 0.18;  $p < 0.01$  and 0.27;  $p <$

.001), life satisfaction (r between 0.21 and 0.26;  $p < 0.001$ ), positive affect (r between 0.23 and 0.32;  $p < 0.001$ ), and balance affect (r between 0.14;  $p < .01$  and 0.23;  $p < 0.001$ ) (Table 5). There were no significant correlations with negative affect.

Table 5. *Intercorrelations between TechnoWES-9 and other validated measures*

Vars.	1	2	3	4	5	6	7	8
1. Techno-VI	-							
2. Techno-DE	0.76***	-						
3. Techno-AB	0.69***	0.74***	-					
4. TechnoWES	0.75***	0.87***	0.97***	-				
5. Life satisfaction	0.26***	0.23***	0.21***	0.23***	-			
6. Positive affect	0.32***	0.23***	0.23***	0.24***	0.62***	-		
7. Negative affect	-0.10	-0.10	-0.02	-0.08	-0.40***	-0.46***	-	
8. Balance affect	0.23***	0.19**	0.14*	0.16**	0.58***	0.82***	-0.88***	-
9. Subjective well-being	0.27***	0.23***	0.18**	0.21***	0.84***	0.82***	-0.77***	0.93***

\* p < .05; \*\* p < .01; \*\*\* p < .001

**Convergent validity**

We calculated AVE (Average variance extracted) and CR (composite reliability) by considering the factor loading ( $\lambda$ ) and the standard error of measurement ( $\epsilon$ ) obtained by means of CFA. As Table 6 shows, both AVE (0.63 – Global Score TechnoWES-9) and CR (0.93 – Global Score TechnoWES-9) are over the cutoff level of 0.50 and 0.70, respectively (Chin, 2010; Hair et al., 2021).

Table 6. *Convergent validity*

Factors	CR	AVE
Techno-vigor	0.82	0.61
Techno-dedication	0.84	0.64
Techno-absorption	0.81	0.60
TechnoWES global score	0.93	0.62

**Discriminant validity**

At the same time, in order to test the discriminant validity of the scale it was used the Fornell-Larcker criterion which refers to the comparison of the square root of AVE in every construct with its inter-construct correlation. If the square root of AVE is higher, then the discriminant validity is confirmed (Fornell & Larcker, 1981). TechnoWES-9 meets the criterion of the discriminant validity: the square root of AVE value for each factor is 0.77 (techno-vigor), 0.80 (techno-dedication) and 0.80 (techno-absorption) (Table 7). The discriminant validity is also certified by the intercorrelations between the subscales of the TechnoWES-9 (between 0.69 and 0.97) higher than the correlations between the TechnoWES-9 and the other instruments (Table 5) (Hair et al., 2021).

Table 7. *Discriminant validity: Fornell-Larcker criterion*

Subscales	AVE	1	2	3
1. Techno-VI	0.61	<b>0.78*</b>		
2. Techno-DE	0.64	0.76	<b>0.80*</b>	
3. Techno-AB	0.60	0.69	0.74	<b>0.77*</b>

Note: \*square root of AVE value for each factor

## Discussion

The study aimed to validate the scale TechnoWES-9 in the case of a sample of Romanian employees from various organisations. The results of the present study demonstrate that TechnoWES-9 is a consistent instrument for the measurement of well-being in the work with technology. The level of techno-work engagement of the analysed sample is relatively high ( $M=4.49$ ;  $S.D.=1.06$ ). We have drawn this conclusion after comparing a group of Finnish teachers (with the caution with which we can compare employees coming from different cultural backgrounds) whose average value for techno-work engagement is  $M=3.93$ ;  $S.D.=1.49$  (Mäkineniemi et al., 2019). The score obtained in the present study is somehow closer to the scores of school managers ( $M=5.71$ ;  $S.D.=1.26$ ) (Mäkineniemi et al., 2019). Just like in the case of the study carried out on Finnish subjects, no gender difference was obtained in this case either.

The factorial models we assessed demonstrated that the tri-factorial 9-item structure is more appropriate for the scale Techno WES-9 than the 1-factor structure, and this aspect is in line with the study in which the concept of techno-work engagement was developed and the scale TechnoWES-9 (Mäkineniemi et al., 2020) was validated. The findings of this study supported configural, metric, scalar and strict invariance of the scale across gender.

The convergent validity was confirmed by means of AVE and CR whose values are over the minimum cut-off level recommended. In addition, the scale reliability was  $\alpha$  over 0.80 for subscales and over 0.90 for the global score and  $\omega$  over 0,85 for subscales and over 0.90 for the global score, which is very close to the original version  $\omega>0.82$  in the case of the 3 factors and  $> 0.90$  in the case of the global score (Mäkineniemi et al., 2020).

The study found that TechnoWES-9 is associated with subjective well-being, with life satisfaction – its cognitive component – with positive affect and balance affect, thus confirming the mission of the scale of the positive experiences related to work with technology. There were no negative relations

with negative affectivity, thus the hypothesis proposed with regard to the negative relation between techno-work and negative affect is not confirmed. As the number of respondents in the sample increases, the relations between techno-work and negative affect may become significant. This is an aspect which deserves to be researched in subsequent studies. The results confirm previous studies that find that the role of technology in the workplace is one of determining well-being in the conditions in which it is aided and becomes inspiring for the work performed (Hakami et al., 2021; Johnson et al., 2020). As studies show, employees can experience technical involvement in work when technology facilitates their work and allows progress that brings added value to the work carried out (Mäkineniemi, 2022), the condition being that employees possess sufficient skills in the use of new technologies (Haep, 2022).

One of the theoretical implications consists in the fact that the respective study demonstrates that the factors involved in techno-work engagement are the same as those in other European areas, such as Finland. This study also claims that the three-factor model of techno-work engagement worked better than the one-factor model and is consistent with the findings from previous studies (Mäkineniemi et al., 2020). We believe that this research provides a new measure for practitioners and researchers inside and outside organizations to assess the states that employees have when they experience a high level of involvement in working with technology. The use of the scale in self-evaluation could help the employee to be aware of the positive affective states he could have while working with technology. Although the relationship between the three factors of TechnoWES-9 with subjective well-being is moderate, they are still in the expected direction. The study depends on self-report scales of SWB, but future research should investigate different types of well-being to confirm our results. Since the 3-item version of the TechnoWES is an alternative to the 9-item version (the two versions share 92% of the variances and have good internal consistency) (Mäkineniemi et al., 2020), future research would consist in verifying the

psychometric properties of the three items version on different subject samples.

### Limitations of the study

One of the limits is due to the usage of self-report scales which can be influenced by social desirability, that is why subsequent longitudinal studies are necessary. Secondly, the use of a convenience sample reduces the possibility of generalizing the current results. Another limitation is related to the non-collection of data regarding the time of work with techno-work. One of the subsequent directions would consist precisely in correlating the level of techno-work with the number of hours in which technology is used in one's professional activity.

### Conclusions

The study is the first to analyse the cross-cultural adaptation of an instrument such as TechnoWES-9 that assesses the well-being of the employees who use technology, in the case of a group of Romanian employees. The results we obtained led us to believe that TechnoWES-9 has good psychometric properties so as to be used by researchers who deal with the impact and the functionality of new technologies on employees from various sectors.

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