

Role of Technostress in Job Satisfaction and Work Engagement in People Working with Information and Communication Technologies

Pawel Kot

University of Lublin, Poland

Today's working environment becomes very stressful due to the rapidly changing information and communication technologies (ICT) used in the work process. As part of this survey, measures were taken to verify the relationship between technostress creators and technostress inhibitors, and job satisfaction and work engagement of employees. To this end, 354 employees using ICT at work were surveyed. Polish versions of the following scales were used in the survey namely Technostress Creators and Technostress Inhibitors Scale (Kot, 2022), Job Satisfaction Scale (Zalewska, 2003) and Utrecht Work Engagement Scale (Schaufeli et al., 2006). The survey used the method of Structural Equation Modelling to find the relation between the analyzed variables: Technostress creators, Technostress inhibitors and job satisfaction and work engagement. The results have revealed a relation between technostress creators and technostress inhibitors. Additionally, these variables turned out to be important for shaping job satisfaction, and ultimately also for explaining employee work engagement. Technostress may have a negative effect on employee satisfaction and work engagement, so action should be taken to reduce technostress creators in the workplace and to support technostress inhibitors.

Keywords. Technostress, job satisfaction, work engagement

Along with the popularization of the transistor, calculating machines for business use were started to be introduced. Initially, large mainframes were operated only by specialized technical teams. With the introduction of personal computers, their use was becoming more and more common, both among employees holding various positions in organizations as well as individuals (Nimon, Shuck, &

Pawel Kot, The John Paul II Catholic University of Lublin, Lublin, Poland.

Correspondence concerning this article should be addressed to Pawel Kot, The John Paul II Catholic University of Lublin, Al Raclawickie 14, 20-950 Lublin, Poland. Email: kotpawel@o2.pl

Zigarmi, 2015). Popularization of the internet and wireless connections resulted in a rapid development of mobile devices for both individual and business use (Bondanini et al., 2020). Technological progress led to the introduction of ICT in various areas of our lives, for example, social relationships, health, science, work (Bondanini et al., 2020; Maier et al., 2022; Ragu-Nathan et al., 2008; Sharma & Gupta, 2022). The ongoing digital revolution has introduced new technical and economic paradigms to the functioning of organizations and individuals (Hoehe & Thibaut, 2020). ICT facilitate dissemination of information and knowledge regardless of geographic borders, cultural, and linguistic barriers (Maier et al., 2022). In the business sector, ICT led to the production of new goods and services, enable the emergence of new distribution channels within traditional economic sectors as well as innovative business models, and creation of completely new industries (Bondanini et al., 2020).

Despite its unquestionable advantages, common access to relatively cheap communication and technological solutions also caused some difficulties (Tarafdar et al., 2011). For an increasing number of people dealing with modern technologies on a daily basis, dealing with the chaotic inflow of enormous amounts of data of various nature, simultaneous processing and effective use has become a problem. The IT solutions used for this purpose face both the technological limitations and the cognitive abilities of users (Bondanini et al., 2020; Jena 2015). The burden resulting from the use of the latest technologies in everyday and professional life has coined the term technostress (Sharma & Gupta, 2022). This type of occupational stress is a problem for both employees and organizations because stressful working conditions are related to employee well-being, physical health, and work performance, as well as the level of satisfaction or engagement (Aktan & Toraman, 2022).

The term technostress refers to the psychological stress connected with the use of technologies (Bondanini et al., 2020). Brod (1984) defines technostress as a modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner. Ragu-Nathan et al. (2008) analyses technostress in the context of the working environment. According to them, technostress describes the stress that employees feel because of multitasking, constant contact, information overload, frequent system updates and the resulting uncertainty, the need for continuous learning and the resulting job-related uncertainty and technical problems related to the organizational use of ICT (Tarafdar et al., 2011). Therefore, it is a state of agitation observed in some employees whose work is to a

large degree related to the operation of new technologies. On the one hand, it may be caused by the fear of the necessity to use technologies, but on the other hand it may result from unexpected restriction of access to it such as failure, finishing work (Bondanini et al., 2020). Nowadays some researchers connect technostress with the phenomenon of addiction to new technologies, which can affect not only employees but also ordinary users of new technologies (Maier et al., 2022).

A stimulus, event or situation that induces stress is a stressor (Lazarus & Folkman, 1984). In the case of technostress, the stressor is a mismatch between organizational requirements and individual capabilities of using ICT (Ragu-Nathan et al., 2008; Stana & Nicolajsen, 2021; Tarafdar et al., 2017). Additionally, Tarafdar et al. (2007) have identified five groups of technostress creators in an organization. These include: (a) techno-overload refers to a situation where introduction of ICT requires longer, faster and more intensive work than before its introduction; (b) techno-invasion refers to a situation where thanks to technology (laptops, smartphones, high-speed data transmission) employees can be available to the employer at any time, even outside of working hours and place of work; (c) techno-complexity is a situation where the technology used in an organization becomes more and more complicated year by year, and its users feel that their skills are insufficient due to the progressive complexity of the implemented technological solutions; (d) techno-insecurity is a situation where employees, due to the progressive ICT development in the organization, are afraid of losing their jobs to the advantage of other employees who have more knowledge, skills and competence to use modern technologies effectively; (e) techno-uncertainty refers to short life cycles of ICT solutions. This is a situation where ICT users feel insecure because constant changes and improvements in information and communication technologies make their knowledge and skills obsolete. This makes them constantly learn and update their knowledge to keep up with the technological innovations used in the organization.

Apart from technostress creators, Ragu-Nathan et al. (2008) also identified technostress inhibitors that protect employees from experiencing technological stress. These include (a) literacy facilitation, which includes equipping employees with the necessary knowledge, skills and competence necessary to deal effectively with ICT in the position occupied; (b) technical support provision refers to the situation where the organization provides fast and effective assistance of the technical support department in case of ICT-related problems; (c) involvement facilitation takes place by building

employee engagement by encouraging and engaging them at various stages of the implementation of a new ICT. This is done by informing employees about planned changes, their scope and how these changes will affect both the effectiveness of the entire organization and their work.

Job Satisfaction

Job satisfaction is defined as a pleasurable, positive emotional state resulting from the appraisal of one's job or job experiences (Md-Abdullah, Tamanna, & Jahan, 2019). It can be defined as positive if a working person is satisfied with the assigned tasks and working conditions, or negative if it does not meet their expectations (Nuzulia & Saputra, 2022). Evaluation of the job as satisfactory or not is subjective, as the same circumstances may contribute to a feeling of satisfaction in one employee, but to a lesser or no extent in another (Md-Abdullah et al., 2019). The elements that make up job satisfaction may be primarily: Job requirements, degree of physical load, individual job attractiveness, rewarding structure, purpose of work, co-workers, management style, remuneration or organizational climate (Aktan & Toraman, 2022). Working conditions are also significantly related to job satisfaction (Nuzulia & Saputra, 2022). Functioning in the conditions of permanent presence of ICT devices and technologies at the workplace may cause their users to feel overloaded and stressed (Ayyagari, Grover, & Purvis, 2011; Hwang & Cha, 2018; Jena, 2015; Tarafdar et al., 2017). In numerous studies, job satisfaction is a variable analyzed in the context of relations between working conditions and stress (Aktan & Toraman, 2022; Biela, 2018). As among employees in other industries (Md-Abdullah et al., 2019; Nuzulia & Saputra, 2022), also among ICT users job satisfaction (including working conditions) has a positive impact on the effective functioning of employees and the resulting benefits for the organisation (Aktan & Toraman, 2022; Hwang, & Cha, 2018; Ragu-Nathan et al., 2008).

Another variable related to the functioning of employees in the organization is work engagement. Schaufeli et al. (2002) define engagement as a work-related, relatively constant, a positive mental state that is characterized by dedication, vigor and absorption. Vigor is defined by a high level of energy and psychological resilience while working, a willingness to put effort into one's job, and perseverance even in the face of difficulty. Dedication is defined as a sense of meaning and significance of work, and experiencing enthusiasm, inspiration, pride, and challenge. In turn, absorption is defined as having full focus and commitment to the job, with time passing fast

and a person having difficulty to take a break from work (Schaufeli et al., 2006; Schaufeli & Bakker, 2010). Work engagement tends to be perceived as the state of optimal functioning of an employee (Hallberg & Schaufeli, 2006). Engaged employees are more likely to exhibit socially desirable behaviors, such as group work and helping others, which leads to an increase in organizational effectiveness (Garg, Dar, & Mishra, 2017).

There is no consensus among researchers as to the relationship between job satisfaction and work engagement. Some researchers do not differentiate between work satisfaction and engagement, believing that they are in fact the same construct (Garg et al., 2017; Seppälä et al., 2009). The similarity of both constructs may be indicated by usually high correlations obtained when measuring engagement and satisfaction (Nimon et al., 2015). Nevertheless, most researchers differentiate between these constructs. Schaufeli and Bakker (2010) differentiate between satisfaction and engagement indicating that work engagement is a pleasurable and positive state related to the process of performing work, characterized by a high level of energy and persistence, absorption in work and difficulty detaching from it. On the other hand, job satisfaction is a positive assessment of work resulting more from an employee's general opinion and beliefs about the work and its conditions than from the specific feeling while doing it (Shuck & Reio, 2013). Most studies have obtained moderate correlations between the analysed constructs (Nuzulia & Saputra, 2022; Seppälä et al., 2009; Schaufeli & Bakker, 2010), and even results suggesting no significant relations between these constructs (Rakowska & Maćik, 2016). There are also studies in the literature showing causal links between the dimensions of engagement and satisfaction. The literature includes both studies confirming the influence of satisfaction on engagement (Pastuszak et al., 2011; Rakowska & Maćik, 2016) and vice versa assuming the impact of engagement on developing job satisfaction (Rai & Maheshwari, 2021). Because a dominant view in the literature is that it is yet job satisfaction that is the starting point for developing work engagement, this study will analyze the model if satisfaction leads to work engagement. Due to the relations between technostress and job satisfaction and organizational engagement confirmed in other studies (Ayyagari et al. 2011; Jena, 2015; Ragu-Nathan et al., 2008; Tarafdar et al., 2007), this model will also include technostress inhibitors and technostress creators.

Literature Review

Today's world is becoming a very stressful environment due to the rapidly changing information and communication technologies (ICT). This problem particularly affects working environments where the use of ICT is one of the basic tasks at work. In a meta-analysis of research on technostress, Bondanini et al. (2020) indicate a significant increase in interest in this issue among the international scientific community. At the same time, this topic was not of interest to researchers in Poland, which is to change, among others, in this publication and the related series of research on technostress.

Functioning in the conditions of permanent presence of ICT devices and technologies may result in the users' experiencing of technostress (Ayyagari et al., 2011; Bondanini et al., 2020; Hwang, & Cha, 2018; Stana & Nicolajsen, 2021; Tarafdar et al., 2017). The presence of stress at work may reduce employee satisfaction and work engagement (Biela, 2018; Jena, 2015; Nuzulia & Saputra, 2022; Ragu-Nathan et al., 2008). The aim of this survey was to verify the influence of technostress inhibitors and technostress creators (and their mutual relationship) on job satisfaction among employees using ICT. Secondly, the relationship between technostress and job satisfaction and organizational engagement was studied. Many studies have found a negative relationship between stress and job satisfaction (Biela, 2018; Nuzulia & Saputra, 2022; Ragu-Nathan et al. 2008).

On the other hand, technostress inhibitors consider such organizational mechanisms as training, technical support, and involvement facilitation, which are important in the context of the non-threatening implementation of ICT and their effective use (Tarafdar et al., 2007). Therefore, working in a position that requires the use of ICT may seem more pleasant and lead to positive job evaluations.

Technostress inhibitors are activities adopted in the organisation to help ICT users, i.e., they are a certain contrast to technostress creators that hinder effective and efficient work performance (Hwang, & Cha, 2018; Jena, 2015; Tarafdar et al., 2017).

Since technostress inhibitors facilitate the use of ICT (Hwang, & Cha, 2018; Ragu-Nathan et al. 2008) and may eliminate the negative impact of the existence of technostress creators on job satisfaction. Due to the doubts presented in the theoretical introduction as to the nature of the relationship between job satisfaction and work engagement in this study according to the approach of (Nuzulia & Saputra, 2022; Pastuszak et al., 2011; Rai & Maheshwari, 2021;

Rakowska & Maćik, 2016; Schaufeli & Bakker, 2010; Seppälä et al., 2009; Shuck & Reio, 2013). Keeping in view the literature following hypotheses are formulated.

Hypotheses

1. Technostress creators have a negative impact on job satisfaction.
2. Technostress inhibitors have a positive impact on job satisfaction.
3. Technostress inhibitors are negatively related to technostress creators.
4. Technostress inhibitors are a mediator that eliminates the negative effects of technostress creators on job satisfaction.
5. Job satisfaction positive relationship with on the level of work engagement in employees using ICT.

Method

Participants

In the survey 369 respondents participated, but for formal reasons responses from 354 people were included in the analyses. The analysis was performed on $N = 354$ cases, with uniform [$\chi^2 (1, N = 354) = 1.63; p = .20$] gender distribution (women: $n = 189; 53.4\%$). Every third respondent declared the age between 20-30 years ($n = 99; 28.0\%$), about a quarter of the respondents 31-40 years ($n = 93; 26.3\%$) or 41-50 years ($n = 89; 25.1\%$), and approximately every fifth respondent was aged 51+ years ($n = 73; 20.6\%$). It can be concluded that the distribution of subjects in age groups is statistically proportional [$\chi^2 (3, N = 354) = 4.19; p = 0.241$]. The age of the subjects ranged between 18 and 65 years, and the average age of respondents was $M = 38.54$ years ($SD = 16.32$). The respondents were professionally active people who use ICT in their everyday work (computers, the Internet, mobile phones). The average length of work experience with ICT in the study group is 15.64 years ($SD = 11.67$). The age range of 18-65 years is the legislative range of labor force participation in Poland. Previous analyses did not reveal statistically significant differences in the severity of technostress by age and work experience in the study group (Kot, 2022). Therefore, analyses were

performed on the entire study sample without distinguishing subgroups.

Measures

The following measures were used to assess the study variables.

Technostress Creators and Technostress Inhibitors Scale

The study used the Polish version of Technostress Creators and Technostress Inhibitors Scale (Kot, 2022) consisting of 36 statements. The statements are grouped into two components with 8 scales namely Technostress Creators (Techno-overload, Techno-invasion, Techno-complexity, Techno-insecurity, Techno-uncertainty) and Technostress Inhibitors (Literacy Facilitation, Technical Support Provision, Involvement Facilitation). The participants were asked to indicate to what extent they agree with each of the statements. The answers were provided on a 5-point rating scale ranging from 0 = *not applicable* through 1 = *strongly disagree* to 5 = *strongly agree*. The result in each of the scales was the quotient of the sum of points obtained from the answers to the questions on that scale, divided by the number of questions included in the scale. Owing to this method of calculating the results regardless of the number of statements in the scale, it is possible to easily compare the intensity of technostress creators and technostress inhibitors. The range of possible scores is from 1 to 5 and higher the score, the higher the level of technostress creators and technostress inhibitors. The Polish adaptation is characterized by good psychometric properties with the reliability coefficients of individual subscales ranges from .86 to .93 (Kot, 2022).

Zalewska's Work Satisfaction Scale

To measure job satisfaction, Zalewska's Work Satisfaction Scale (Zalewska, 2003) was used, which measures overall job satisfaction. The questionnaire was inspired by the Satisfaction with Life Scale (Deiner et al., 1985). The questionnaire contains five statements and respondents provide their answers on a 7-point scale ranging from 1 to 7, where 1 = *strongly disagree* and 7 = *strongly agree*. Cronbach's alpha for the surveyed group is .81.

Utrecht Work Engagement Scale

Utrecht Work Engagement Scale (Schaufeli et al., 2006), available in Polish on the author's website, was used to measure

engagement and motivation to work. The questionnaire consists of 9 statements relating to the work of the respondents, rated on a 6-point scale from 0 = *never* to 6 = *always* grouped in three subscales that is, vigor, absorption and dedication. The higher the score, the greater the intensity of a given dimension of engagement. The accuracy and reliability of the tool have been confirmed in numerous studies. The reliability of the Polish version in this study was .84 for vigor subscale, .84 for absorption subscale, and .87 for dedication subscale.

Procedure

Data was collected via the internet and organizations where work requires the use of ICT were asked to provide employees with a request to participate in the study. Employees interested in participating in the study filled in the online version of the measures.

Ethical Considerations

The conducted research served scientific purposes. It was approved by a relevant bioethical committee. The research was carried out considering ethical principles comprising voluntary, informed and confidential participation of the respondents. In the course of research performance in accordance with the Declaration of Helsinki, care was taken to maintain the highest standards in terms of designing, collecting, analyzing and interpreting the collected data.

Results

To estimate the influence matrix between the factors of technostress including technostress creators (overload, invasion, complexity, insecurity, uncertainty) and technostress inhibitors (literacy facilitation, provision, involvement facilitation), and their impact on job satisfaction and work engagement (vigor, absorption, dedication), and in order to find indirect influences in the model and to potentially explore it, the structural equation modelling technique is used. This technique allows for the correct analysis of complex cause-effect relationships, considering mediating effects including multi-dimensional analysis.

The obtained values of the Kolmogorov-Smirnov tests demonstrated that all variables showed significant discrepancies from the normal distribution, and the technostress creators' dimension was

clearly concentrated around the mean (leptokurticity of distributions). The variables are assigned short codes allowing for easier graphic presentation of the model (Table 1).

Table 1

Descriptive Statistics and Normality Tests (N = 354)

Scale	<i>R</i>	<i>M</i>	<i>SD</i>	<i>Skew.</i>	<i>Kurt.</i>	<i>D</i>
Techno-overload	1.00-5.00	2.91	.86	.08	.06	.08**
Techno-invasion	1.00-5.00	2.53	.96	.33	-.45	.10**
Techno-complexity	1.00-5.00	2.49	.86	.44	.13	.08**
Techno-insecurity	1.00-5.00	2.48	.86	.42	.31	.08**
Techno-uncertainty	1.00-5.00	2.94	.85	.16	-.06	.09**
Literacy Facilitation	1.00-5.00	3.24	.89	-.01	-.31	.09**
Technical Support Provision	1.00-5.00	3.29	.93	.10	-.59	.13**
Involvement Facilitation	1.00-5.00	3.23	.84	.17	-.39	.10**
Job Satisfaction	2.20-5.60	4.05	.92	.16	-.84	.12**
Technostress Creators	0.96-4.78	2.54	.65	.61	1.18	.05*
Technostress Inhibitors	1.00-5.00	3.25	.81	.08	-.40	.06**
Vigor	1.33-6.00	3.62	1.05	.44	-.16	.10**
Absorption	1.33-6.00	3.52	.97	.38	.15	.09**
Dedication	1.67-6.00	3.57	.97	.48	.15	.10**

* $p < .05$. ** $p < .01$.

In order to determine the relationship between the dimensions, a correlation analysis is performed. The non-parametric Spearman's *rho* correlation test based on rank is used, the properties of which allow for a good estimation of the correlation coefficients in the case of distributions significantly deviating from the normal distribution. The results are presented in Table 2. The obtained correlation coefficients indicate that within a given construct all factors correlate with each other statistically significantly. This information is considered in further modelling.

Firstly, a model is developed (hereinafter also called Model A), where technostress creators and technostress inhibitors are presented as latent variables, that is constructs (shaping from the sub-dimensions of the technostress level), which in turn were to influence job satisfaction, which was supposed to be a predictor of three dimensions of work engagement (Figure 1).

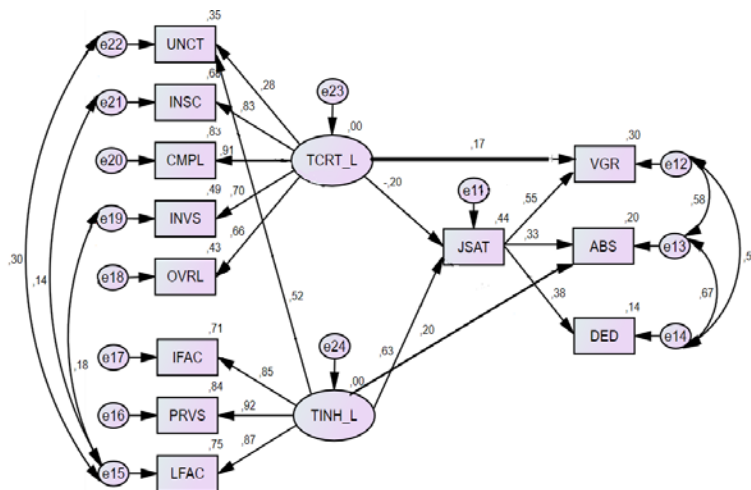
Table 2
Correlations Matrix for all Study Variables (N = 354)

	Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Overload	-													
2	Invasion	.60**	-												
3	Complexity	.55**	.65**	-											
4	Insecurity	.53**	.55**	.73**	-										
5	Uncertainty	.25**	.25**	.22**	.35**	-									
6	Literacy Facilitation	.10	.08	-.03	.03	.58**	-								
7	Provision	.08	.01	-.05	-.02	.48**	.81**	-							
8	Involvement Facilitation	.07	-.03	-.04	.01	.45**	.71**	.74**	-						
9	Job Satisfaction	-.05	-.18**	-.23**	-.18**	.26**	.52**	.56**	.58**	-					
10	Technostress Creators	.79**	.80**	.83**	.82**	.49**	.16**	.01	.01	-.12*	-				
11	Technostress Inhibitors	.10	.03	-.04	.01	.55**	.93**	.93**	.86**	.59**	.13*	-			
12	Vigor	.02	-.03	-.04	-.09	.16**	.29**	.30**	.30**	.41**	.01	.32**	-		
13	Absorption	.02	.11*	.11*	.05	.11*	.24**	.26**	.30**	.30**	.01	.29**	.61**	-	
14	Dedication	-.01	.09	.06	.03	.06	.15**	.16**	.09	.22**	.06	.15**	.56**	.67**	-

* $p < .05$. ** $p < .01$.

Initially, model A did not fit the data [$\chi^2/df = 6.47$; RMSEA = 0.124 (0.112-0.137); GFI = 0.841; AGFI = 0.762; TLI = 0.259; CFI = 0.416]. Although some of the paths are statistically significant, the assessment of the quality of the model indicates that it cannot be interpreted correctly. Therefore, the model was modified. The modification of the model consisted in calculating the model indexes, changing its shape, and recalculating the results to compare the changes between the models. Firstly, the irrelevant paths are removed (criterion: the highest statistical significance result in the model), when there are no paths proposed for removal and single paths are added using modification indexes. Alternatively, at some stages many different options were considered, choosing paths in line with the expected impacts. Ultimately, the best possible solution resulting from these trials is presented (Figure 1).

Figure 1. Model Specifying Predictive Role Technostress and Job Satisfaction in Work Engagement.



Note. OVRL = Techno-overload; INVS = Techno-invasion; CMPL = Techno-complexity; INSC = Techno-insecurity; UNCT = Techno-uncertainty; LFAC = Literacy Facilitation; PRVS = Technical Support Provision; IFAC = Involvement Facilitation; JSAT = Job Satisfaction; TCRTL = Technostress Creators; TINH_L = Technostress Inhibitors; VGR = Vigor; ABS = Absorption; DED = Dedication.

Following many various modifications, a data fit model was developed [$\chi^2/df = 1.82$; RMSEA = 0.048 (0.030-0.065); GFI = 0.965; AGFI = 0.933; TLI = 0.889; CFI = 0.931].

Discussion

The final shape of the model obtained is like the theoretical assumptions. The final shape of the model obtained is like the theoretical assumptions. Findings revealed that Technostress inhibitors have a positive effect on job satisfaction, technostress creators have a negative effect. In an increasing number of professions and in an increasing number of positions, work requires functioning in the conditions of the permanent presence of ICT devices and technologies (Biela, 2018). This became even more intense in the period of increased remote work intensity caused by the pandemic (Wang et al., 2020). The presence of technostress creators (techno-overload, techno-invasion, techno-complexity, techno-insecurity, techno-uncertainty) is associated with lower job satisfaction. Functioning in technostress conditions may therefore lead to a decrease in job satisfaction, and thus many negative consequences both for the employees themselves (dissatisfaction, decreased engagement, professional burnout) and the organization for which they work for example, fluctuation, counterproductive behavior, low work productivity (Aktan & Toraman, 2022). Therefore, actions reducing perceiving the presence of ICT as stressors should be taken (Maier et al., 2022; Tarafdar et al., 2017). As expected, the presence of technostress inhibitors (literacy facilitation, technical support, involvement facilitation) at work is associated with a higher level of employee satisfaction (Hwang & Cha, 2018; Tarafdar et al., 2017). Proper working conditions translate into greater satisfaction among the surveyed employees (Biela, 2018). Providing appropriate support to employees in contact with ICT translates into a higher level of job satisfaction. This is confirmed by the results of the research by Stana and Nicolajsen (2021) indicating the importance of social support in better coping with technostress.

What is interesting, the relationship between technostress inhibitors and technostress creators is the opposite of the assumptions of research. A weak but positive correlation was obtained between the variables, which makes it necessary to reject the third research hypothesis. The existence of a positive relationship between technostress inhibitors and technostress creators may indicate that organizations, aware of the burden that functioning in technostress conditions may be for employees, activate various protection strategies (Ayyagari et al., 2011; Sharma, & Gupta, 2022). Therefore, technostress inhibitors and technostress creators coexist. Technostress inhibitors such as literacy facilitation, technical support and involvement facilitation proposed in the model by Tarafdar et al.

(2007) also require some effort on the part of employees to be able to start to have impact in a work situation. Further education, training, involving employees at various stages of ICT implementation or, finally, the support of the technical department do not eliminate the source of stress itself, but require acquisition of new competences to cope with work situations that are difficult for a person working with ICT. Some studies (Maier et al., 2022; Sharma, & Gupta, 2022) show that a more adequate form of reducing negative influences could be developing certain personality traits of employees as resources for coping well with technostress, for example, conscientiousness, low neuroticism. Perhaps, in order to reduce technostress creators, other forms of support and resources would be necessary going beyond improving the competence of handling new technologies at work, e.g. the ability to work under time pressure, dealing with stress in general, greater openness to experience, or broadly defined social support (Lazarus & Folkman, 1984; Stana & Nicolajsen, 2021; Sharma, & Gupta, 2022).

Findings did not support the assumption that technostress inhibitors will be a mediator eliminating the negative impact of technostress creators on job satisfaction. As already mentioned, the relationship between technostress inhibitors and technostress creators is not so obvious, and therefore it did not affect the nature of the relationship between technostress creators and job satisfaction. It seems therefore that the technostress creators and job satisfaction relationship may be modified rather by personality or environmental factors (Jena, 2015; Maier et al., 2022).

Results shows that job satisfaction has impact on the level of work engagement (vigor, absorption, dedication) in employees using ICT. It should be stressed that in this relationship both dimensions of technostress (technostress inhibitors and technostress creators) are important, that affect the levels of work engagement, both directly and indirectly through job satisfaction. Work engagement is sometimes perceived here as the state of optimal functioning of an employee (Hallberg & Schaufeli, 2006), therefore organizations should strive to provide them with factors such as high job satisfaction and presence of technostress inhibitors with a low level of technostress creators. The obtained results confirm the stability of the impact of job satisfaction on all dimensions of employee engagement including vigor, absorption, dedication obtained by other researchers (Pastuszak et al. 2011; Rakowska & Mącik, 2016; Rai & Maheshwari, 2021). Sources of engagement in employees using ICT, as in representatives of other industries, should be seen in job satisfaction, which in this case is conditioned by the presence of technostress inhibitors with

minimized presence of technostress creators (Jena, 2015). Additionally, the direct influence of technostress inhibitors on Absorption was revealed. The presence of factors protecting against technostress favors concentration on and engrossing in one's work (Garg et al., 2017; Schaufeli et al., 2006). What is also interesting, technostress creators directly impact one of the dimensions of engagement, that is vigor which is characterized by high levels of energy and mental resilience while working, the willingness to invest effort in one's work and persistence even in the face of difficulties (Hallberg & Schaufeli, 2006).

Limitations and Suggestions

Owing to the undertaken measures, it was possible to achieve satisfactory data fit indexes. Nevertheless, this model is not an ideal one. Undoubtedly, its limitations include combining measurement errors for the variables of technostress inhibitors and creators. Additionally, the issue of the common variance of both technostress indexes is revealed-their collinearity is thus demonstrated not only within the individual dimensions of technostress but also between them. The uncertainty variable should constitute a component of both dimensions of technostress, which casts some doubt on the accuracy of the division of variables into creators and inhibitors. A protective procedure could be the removal of these items, but in this study it was decided to map the structure of the technostress measurement tool. The second weakness of the model is the strong correlation between the components of engagement. This may speak in favor of recognizing engagement measured according to Schaufeli's methodology (Schaufeli & Bakker, 2010), promoted by some researchers, but as a univariate construct (Nimon et al., 2015; Seppälä et al., 2009). It is worth considering these modifications in future research. Additionally, due to the lack of confirmation of some research hypotheses, further research should include additional personality (Maier et al., 2022) and environmental (Biela, 2018) variables as determinants of experienced technostress, satisfaction and engagement.

Implications

The use of information and communication technologies is very important for achieving significant professional and economic growth in the modern information society. Especially recently, when due to the pandemic many people have been forced to work remotely from

their homes, the importance of ICT for the performance of professional duties has increased even more in industries originally poorly related to technology. Owing to the latest ICT technologies, it is possible to increase the efficiency and effectiveness of the work process, but some factors involved in this situation have been identified as technostress creators. To care for the appropriate level of employee engagement, so important for each organization, actions should be taken to maintain high job satisfaction despite working in the conditions of existence of technostress creators, and this can be done by appropriate supporting of technostress inhibitors.

Conclusion

The results have revealed a relation between technostress creators and technostress inhibitors. Additionally, these variables turned out to be important for shaping job satisfaction, and ultimately also for explaining employee work engagement. Technostress may have a negative effect on employee satisfaction and work engagement, so action should be taken to reduce technostress creators in the workplace and to support technostress inhibitors. Technostress inhibitors are protective factors for the mental health of employees, their job satisfaction and work engagement. Looking at the past dynamics of development of new technologies, it should be assumed that technological solutions will be even more burdensome not only at work but also into everyday life or entertainment. This process will intensify even more, and thus negative feelings of technostress will become more and more common among new technologies users.

References

- Aktan, O., & Toraman, C. (2022). The relationship between technostress levels and job satisfaction of teachers within the COVID-19 period. *Education and Information Technologies, 18*(1), 1-25. doi.org/10.1007/s10639-022-11027-2
- Ayyagari, R., Grover, V., & Purvis, R. (2011) Technostress: Technological antecedents and implications. *MIS Quarterly 35*(4), 831-858. doi.org/10.2307/41409963
- Biela, A. (2018). *European Questionnaire for Job Analysis: Theoretical and Methodological Bases*. Amsterdam: Peter Lang AG.
- Bondanini, G., Giorgi, G., Ariza-Montes, A., Vega-Muñoz, A., & Andreucci-Annunziata, P. (2020). Technostress dark side of technology in the workplace: A sociometric analysis. *International Journal of*

- Environmental Research and Public Health*, 17(21), 8013. doi.org/10.3390/ijerph17218013
- Brod, C. (1984). *Technostress: The human cost of the computer revolution*. New York: Addison-Wesley.
- Deiner, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, 49(1), 71-75.
- Garg, K., Dar, I. A., & Mishra, M. (2017). Job satisfaction and work engagement: A study using private sector bank managers. *Advances in Developing Human Resources*, 20(1), 58-71.
- Hallberg, U. E., & Schaufeli, W. B. (2006). Same but different: Can work engagement be discriminated from job involvement and organizational commitment? *European Psychologist*, 11(2), 19-127. doi.org/10.1027/1016-9040.11.2.119.
- Hoehle, M. R., & Thibaut, F. (2020). Going digital: How technology use may influence human brains and behavior. *Dialogues in Clinical Neuroscience*, 22(2), 93-97. doi.org/10.31887/DCNS.2020.22.2/mhoehe
- Hwang, I., & Cha, O. (2018). Examining technostress creators and role stress as potential threats to employees' information security compliance. *Computers in Human Behavior*, 81(2), 282-293. doi.org/10.1016/j.chb.2017.12.022
- Jena, R. K. (2015). Impact of technostress on job satisfaction: An empirical study among Indian academician. *The International Technology Management Review*, 5(3), 117-124. doi.org/10.2991/itmr.2015.5.3.1
- Kot, P. (2022). Psychometric properties of the Polish version of Technostress Creators and Technostress Inhibitors Scale. *Medycyna Pracy*, 73(4), 1-17. doi.org/10.13075/mp.5893.01236
- Lazarus, R., & Folkman, S. (1984). *Stress, appraisal, and coping*. Boston: Springer-Verlag.
- Maier, C., Laumer, S., Thatcher, J. B., Wirth, J., & Weitzel, T. (2022). Trial-period Technostress: A conceptual definition and mixed-methods investigation. *Information Systems Research*, 1(1), 1-10. doi.org/10.1287/isre.2021.1047
- Md-Abdullah, S. A. H., Tamanna, N., & Jahan, I. (2019). Employees' job satisfaction in tertiary level hospitals. *Journal of Armed Forces Medical College, Bangladesh*, 11(2), 14-19. doi.org/10.3329/jafmc.v11i2.39816
- Newman, D. A., & Harrison, D. (2008). Been there, bottled that: Are state and behavioral work engagement new and useful construct "wines"? *Industrial and Organizational Psychology*, 1(1), 31-35. doi.org/10.1111/j.1754-9434.2007.00003.x
- Nimon, K., Shuck, B., & Zigarmi, D. (2015). Construct overlap between employee engagement and job satisfaction: A function of semantic equivalence? *Journal of Happiness Studies*, 17(3), 1149-1171. doi.org/10.1007/s10902-015-9636-6

- Nuzulia, S., & Saputra, H. (2022). Do high salaries ensure job satisfaction? An investigation on the factors affecting job satisfaction of educators in Indonesia. *Journal of Nonformal Education*, 8(1), 66-72. doi.org/10.15294/jne.v8i1.34534
- Pastuszak, Z., Turkyilmaz, A., Akman G., & Ozkan, C. (2011). Empirical study of public sector employee loyalty and satisfaction. *Industrial Management & Data Systems*, 111(5), 675-696. doi.org/10.1108/0263571111137250
- Ragu-Nathan, T. S., Tu, Q. Tarafdar, M., & Ragu-Nathan, B. S. (2008). The consequences of technostress for end users in organizations: Conceptual development and empirical validation. *Information Systems Research*, 19(4), 417-433. doi.org/10.1287/isre.1070.0165
- Rai, A., & Maheshwari, S. (2021). Exploring the mediating role of work engagement between the linkages of job characteristics with organizational engagement and job satisfaction. *Management Research Review*, 44(1), 133-157.
- Rakowska, A., & Mącik, R. (2016). Employee involvement and job satisfaction-dependency modelling with the use of PLS-SEM. *Organization Review*, 5, 48-58. doi.org/10.33141/po.2016.05.07
- Schaufeli, W. B., & Bakker, A. B. (2010). Defining and measuring work engagement: Bringing clarity to the concept. In: A. B. Bakker & M. P. Leiter (Eds.), *Work engagement: A handbook of essential theory and research* (pp. 10-24). New York: Psychology Press.
- Schaufeli, W. B., Salanova, M., Gonzalez-Roma, V., Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach, *Journal of Happiness Studies*, 3(1), 71-92. doi.org/10.1023/a:1015630930326
- Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire. *Educational and Psychological Measurement*, 66(4), 701-716. doi.org/10.1177/0013164405282471
- Seppälä, P., Mauno, S., Feldt, T., Hakanen, J., Kinnunen, U., Tolvanen, A. & Schaufeli, W. (2009). The construct validity of the Utrecht Work Engagement Scale: Multi-sample and longitudinal evidence. *Journal of Happiness Studies*, 10(4), 459-481.
- Sharma, S., & Gupta, B. (2022). Investigating the role of technostress, cognitive appraisal, and coping strategies on students' learning performance in higher education: A multidimensional transactional theory of stress approach. *Information Technology & People*, 1(1), e5352. doi.org/10.1108/ITP-06-2021-0505
- Shuck, B., & Reio, T. (2013). Employee engagement and wellbeing: A moderation model and implications for practice. *Journal of Leadership and Organizational Studies*, 21(1), 43-58. doi.org/10.1177/1548051813494240

- Stana, R., & Nicolajsen, H. W. (2021). Sociological mechanisms behind ICT-related technostress in the workplace. In: Z. W. Y. Lee, T. K. H. Chan, & C. M. K. Cheung, (Eds.), *Information technology in organizations and societies: Multidisciplinary perspectives from AI to technostress*, (pp. 85-110). Emerald Publishing Limited.
- Tarafdar, M., Cooper, C. L., & Stich, J. F. (2017). The technostress trifecta - techno eustress, techno-distress and design: Theoretical directions and an agenda for research. *Information Systems Journal*, 29(1), 1-37. doi.org/10.1111/isj.12169
- Tarafdar, M., Tu, Q., Ragu-Nathan, T. S., & Ragu-Nathan, B. (2007). The impact of technostress on role stress and productivity. *Journal of Management Information Systems*, 24(1), 307-334. doi.org/10.2753/MIS0742-1222240109
- Wang, B., Liu, Y., Qian, J., & Parker, S. K. (2020). Achieving effective remote working during the COVID-19 pandemic: A work design perspective. *Applied Psychology*, 70(1), 16-59. doi.org/10.1111/apps.12290
- Zalewska, A. (2003). The Satisfaction with Job Scale: A measure of cognitive aspect of overall job satisfaction. *Acta Universitatis Lodzianis, Folia Psychologica*, 7(1), 49-61.

Received 31 December 2021

Revision received 19 April 2022