

From Stress to Support: How Technostress Inhibitors Drive Task Productivity in Public Institutions

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ABSTRACT

Purpose: The purpose of this study is to examine the effects of technostress creating factors (creators) and inhibitors on the task productivity of employees.

Method: In this study, the survey method, one of the quantitative research techniques, was used. The field application was conducted on academic and administrative staff of Fırat University (Elazığ). A total of 356 surveys suitable for data analysis were obtained. The data were analyzed in the SPSS statistics program.

Findings: According to the regression analysis findings, the effect of technostress creators on task productivity is statistically non-significant, and technostress creators explain only 2% of the variance in task productivity. However, it was observed that techno-uncertainty, which is one of the factors contributing to technostress, had a significant effect. The effect of technostress inhibitors on task productivity was significant and explained 21% of the variance. It has also been found that job satisfaction had the highest effect among technostress inhibitors and continuance commitment did not have a significant effect.

Originality: Studies in the literature mainly focus on the effects of technostress creators and inhibitors on motivation, burnout, productivity and performance. Our research examines the effects of technostress creators and inhibitors on task productivity.

Keywords: Technostress, Task Productivity, Digitalization, Organizational Behavior, Technology Management.

JEL Codes: D23, M12, M15.

Stresten Desteğe: Kamu Kurumlarında Teknostres İnhibitörlerinin Görev Üretkenliğe Etkisi

ÖZET

Amaç: Bu çalışmanın amacı, teknostres yaratan faktörlerin (yaratıcılar) ve engelleyicilerinin (inhibitörler) çalışanların görev verimliliği üzerindeki etkisini incelemektir.

Yöntem: Bu çalışmada nicel araştırma tekniklerinden anket yöntemi kullanılmıştır. Saha uygulaması Fırat Üniversitesi (Elazığ) akademik ve idari personellere yönelik yapılmıştır. Toplamda veri analizine uygun 356 anket elde edilmiştir. Veriler SPSS istatistik programında analiz edilmiştir.

Bulgular: Regresyon analizi bulgularına göre, teknostres yaratıcılarının görev üretkenliği üzerindeki etkisi istatistiksel olarak anlamsızdır ve teknostres yaratıcıları görev üretkenliğindeki varyansın yalnızca %2'sini açıklamaktadır. Ancak, teknostrese katkıda bulunan faktörlerden biri olan tekno-belirsizliğin anlamlı bir etkiye sahip olduğu görülmüştür. Teknostres inhibitörlerinin görev üretkenliği üzerindeki etkisi anlamlıdır ve varyansın %21'ini açıklamıştır. Ayrıca, teknostres inhibitörleri arasında iş memnuniyetinin en yüksek etkiye sahip olduğu ve devam bağlılığının anlamlı bir etkiye sahip olmadığı bulunmuştur.

Orijinallik: Literatürde çalışmalar ağırlıklı olarak teknostres yaratıcılarının ve engelleyicilerinin motivasyon, tükenmişlik, üretkenlik ve performans üzerindeki etkilerine odaklanmaktadır. Araştırmamız, teknostres yaratıcılarının ve engelleyicilerinin görev üretkenliği üzerindeki etkilerini incelemektedir.

Anahtar Kelimeler: Teknostres, Görev Üretkenliği, Dijitalleşme, Örgütsel Davranış, Teknoloji Yönetimi.

JEL Kodları: D23, M12, M15.

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1. INTRODUCTION

Although technology and digital transformation have the potential to increase productivity and effectiveness in business processes, why is the effect of this transformation on employee productivity and task performance not realized at the expected level? King and Ehrenberg (2020) state that factors such as long learning curves and slow user adoption can delay productivity, and this is especially evident in complex innovations. Bowker (2019) argues that beliefs about IT and productivity create false impositions on employees. This contradictory situation draws attention to the phenomenon of technostress that has emerged with the proliferation of digital tools and systems. Studies by Boonjing and Chanvarasuth (2017), Tams et al. (2018), and Tarafdar et al. (2011) show that technostress has negative effects on performance. Technostress refers to the physical (Riedl, 2013), cognitive (Sagarin et al., 2003; Riedl and Leger, 2016: 35-43) and emotional loads (Brown et al., 2014) that employees encounter during the adaptation process to digital technologies, and these loads can cause decreases in task efficiency and productivity (Tarafdar et al., 2011; Karr-Wisniewski and Lu, 2010; Alam, 2016; Yang et al., 2017). Another negative effect of technology on performance can be traced to a new way of working environment and technology invasion. The transition from mainframes and desktop systems to mobile, cloud-based solutions and the rise of SMACIT technologies (Social, Mobile, Analytics, Cloud and Internet of Things), known for their adaptability and scalability (Westergen et al., 2024), are increasing the use of digital media technology in organizations and changing the traditional practices of organizations through these technologies.

The widespread use of technology, ranging from irregular phone calls and physical reminders to digital notifications such as instant messages, email notifications, meeting reminders, and task alerts sent continuously by a variety of technological devices, causes interruptions in the workflow of employees. In particular, the constant interruptions experienced by employees while using digital tools (Tams, 2017), information overload (Lee, 2016), technical problems (Tarafdar et al., 2014), role stress (Tarafdar et al., 2007) and difficulties in adapting to new skills (Thatcher and Perrewe, 2002) are among the main triggers of technostress. Since such technologies constantly interrupt employees' attention, they also cause a significant portion of the workday to be unproductive. In the literature, it is suggested that Information and Communication Technologies (ICT) make it difficult for employees to fulfill their basic job responsibilities, which can negatively affect employee well-being and productivity (Galluch et al., 2015; Tams and Dulipovici, 2019; Tams et al., 2020). In this context, the failure to realize the expected increase in productivity requires examining technostress as a factor that consumes employees' attention and resources.

This study aims to examine the effects of factors that cause technostress, such as work overload, technological invasion, technological complexity, uncertainty created by technology, and technological insecurity, on task productivity. While these factors create technostress, some factors such as technological literacy, job satisfaction, provision of technical support, organizational commitment, and ease of use of technology reduce the level of technostress. In this context, our research aims to examine the effects of these factors that create technostress on task productivity. Our research consists of the following sections: literature review, technostress, its creators, inhibitors, and task productivity conceptual framework, research methodology, results, and conclusion.

2. LITERATURE REVIEW

In the literature, stress sources related to technology and system performance have been examined in terms of security (Kwanya et al., 2012), usability (Sellberg and Susi, 2014), and system failures (Riedl et al., 2012). In addition to performance systems and non-performance factors, there are also studies examining technostress in terms of the mismatch between competences and needs (Kwanya et al., 2012; Al-Fudail and Mellar, 2008). Stress sources arising from technology use are uncertainty (Alam, 2016; Bucher et al., 2013; Zhao et al., 2020), complexity (Fuglseth and Sørebo, 2014; Liu et al., 2019); work-family conflict (Ayyagari et al., 2011), flexibility (Kim et al., 2015; Yun et al., 2012), information overload (Karr-Wisniewski and Lu, 2010; Lee, 2016), communication overload (Hung et al., 2015, Sellberg and Susi, 2014), technological overload (Bucher et al., 2013; Norulkamar et al., 2012) have been examined.

The use of computer technologies affects users' emotional health by causing emotional exhaustion (Brown et al., 2014), anger and anxiety (Lee, 2016), job burnout (Kim et al., 2015; Turel and Gaudio, 2018), job and relationship anxiety (Kummer et al., 2017), technological exhaustion and technological anxiety (Yang et al., 2017; Carlotto et al., 2017). In addition to the effects of technostress on emotional health, it also has physical effects (Riedl, 2013), such as eye strain (Kwanya et al., 2012) and high cortisol levels (Riedl et al., 2012).

Studies addressing the effects of technostress on productivity show that this stress factor can negatively affect job performance. Jena (2015), who examined the effects of techno-stress on technology-enabled performance, stated that this stress factor creates negative effects on employees' technology-based work processes. Studies by Alam (2016), Hung et al. (2015), Karr-Wisniewski and Lu (2010), Tarafdar et al.

(2011) and Yang et al. (2017) indicate that technostress experienced by employees in work processes reduces their productivity. Studies conducted by Boonjing and Chanvarasuth (2017), Kim et al. (2015), Ragu-Nathan et al. (2008), Yin et al., (2018), Tak and Park, (2016) reveal that techno-stress can have a negative effect on job satisfaction. Okolo et al. (2018) and Jena (2015) studies show that techno-stress can also negatively affect employees' commitment to the organization. In the study conducted by Yun et al. (2012), it was stated that users' tendency to resist technological changes is related to the technostress effect. The effect of technostress on the intention to use information and communication technologies (ICT) was examined by Fuglseth and Sørenbø (2014) and Kummer et al. (2017), and it was shown that this stress factor can reduce the desire to use technology.

The organizational context (Wang et al., 2008) plays a significant role in the manifestation and management of technostress. Effective interventions at both organizational and individual levels are essential to reduce the negative effects of technostress. For example, increasing digital competence among employees has been shown to reduce technostress, as individuals who feel more competent in using technology experience lower levels of stress (Golz et al., 2021). Furthermore, organizational strategies that promote a healthy work-life balance and provide training in technology use can significantly reduce technostress creators (Berger et al., 2023).

3. THEORETICAL and CONCEPTUAL BACKGROUND

Cannon defined stress as threats to homeostasis (Cannon, 1935). Stressors are factors with the potential to directly challenge homeostasis. The stress response is a compensatory process aimed at restoring homeostasis. Stress effects are the biological consequences resulting from dealing with stressors, which can include restoring homeostasis that supports health (positive effects) or harming the body or even disease (negative effects) (Lu et al., 2021). Brod (1984: 53-54) defined technostress as a modern adaptation disease resulting from the inability to cope healthily with new computer technologies.

Technostress is the stress experienced by employees regarding the use of technology (Nisafani et al., 2020; Calvo-Porrall and Pesqueira, 2022) due to reasons such as difficulty adapting to new technologies (Shu et al., 2011, Burke 2008), employees' lack of confidence in their own competence, data-based culture and performance pressure. Technostress has also been suggested to be related to reliance on technologies that fail, leading to excessive mental fatigue (Brillhart, 2004; Çoklar et al., 2016).

Factors or conditions that lead to the development of technostress in employees are excessive use of technology, constant connection to smartphones, computers and internet (Shotton, 2007; Weinstein and Lejoyeux, 2010; Cheng et al., 2015), complexity of technological tools and systems and difficulty learning these technologies, uncertainty created by the transition to new systems, constant pressure to adapt to technology, uncertainties in roles and expectations due to the use of technology and its rapid change. It encompasses a range of psychological (Sarabadani et al., 2020), behavioral, and organizational (Wang and Shu, 2008) effects that are influenced by various factors such as the type of technology (Tarafdar et al., 2011), the individual's ability to cope with it (Tuan, 2022), and the organizational environment (Wang et al., 2008). Technostress creators such as the need to constantly adapt to new technologies (Cannon, 1935; Selberg and Susi, 2014), information overload, and complex systems have been shown to reduce organizational commitment. This is especially prevalent in work environments where frequent technological changes create stress and hinder employee productivity (Tarafdar et al, 2007). The physical and psychological effects of technostress manifest as symptoms such as fatigue, headache, and increased anxiety (Arnetz and Wiholm, 1997; Small, 2009). These symptoms result from prolonged exposure to complex technologies and constant connectivity. Behavioral effects include compulsive technology use, particularly on mobile devices (Boonjing, and Chanvarasuth, 2017; Wang et al., 2023), which increases the stress experienced by individuals. The role of personality traits in compulsive technology use is also important (Hisao, 2017; Hisao et al., 2017), as certain traits may make individuals more prone to technostress (Sumiyana and Swiwidharmanely, 2020). In remote work environments, technostress is often associated with decreased job satisfaction as employees struggle to cope with the demands of remote technology use. Workplace environments lacking adequate support systems (Fuglseth and Sørenbø, 2021) tend to exacerbate the effects of technostress on employees.

Various stress factors such as techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty can lead to negative psychological outcomes in individuals such as burnout (Okolo et al. 2013), job dissatisfaction, and poor performance (Khuzaini and Zamrudi, 2021; Tarafdar et al., 2014; Sarabadani et al., 2020).

3.1. Technostress Creators

Techno-overload (TO) refer to the feeling of being overwhelmed by the amount of information and tasks that technology demands of users. This dimension is characterized by the perception that technology

requires excessive time and effort, leading to stress and burnout (Aziz and Yazid, 2021; Jena and Mahanti, 2014; Ibrahim and Othman, 2014).

Techno-invasion (TIV) describes the encroachment of technology into personal life, where individuals feel that work-life boundaries are blurred due to constant connectivity (Spira and Feintuch, 2005: 22; Estrada-Muñoz et al., 2020). This dimension highlights the stress resulting from the expectation to be available and responsive outside of traditional working hours, which can lead to family conflicts and increased anxiety (Harris et al., 2021).

Techno-complexity (TC) includes the difficulties and challenges users face when interacting with technology, including the need for advanced skills and knowledge to effectively use various digital tools (Saleem, 2023). This dimension can lead to frustration and feelings of inadequacy, especially among those who have not received adequate training or support (Kotek and Vranjes, 2022).

Techno-insecurity (TIS) reflects concerns about job security and fear of being displaced by technology. This dimension is particularly important in environments where automation and digitalization are rapidly changing job roles (Saka et al., 2020; Vallone, 2023). Employees may experience anxiety about future employment prospects, which may increase stress levels.

Techno-uncertainty (TU) relates to the unpredictability associated with technology use, including concerns about data privacy, security breaches, and the reliability of digital systems (Estrada-Muñoz et al., 2020; González-López et al., 2021). This dimension highlights the stress resulting from the lack of control over technological tools and the possible consequences of their failure.

3.2. Technostress Inhibitors

In the current literature, it is suggested that the different ways employees experience technostress can be explained by variables in certain conditions (Nisafani et al., 2020). In this context, researches reveal that individual, organizational and technological factors play a critical role in determining the impact of technostress on employees and the diversity of these effects.

Among the individual conditions, higher education level (Ragu-Nathan et al., 2008) and technology self-efficacy (Shu et al., 2011) contribute to the reduction of technostress, while low technology dependency (Liu et al., 2019) also reduces the technostress level of employees. Wang et al. (2008) suggested that high centralization of power and high innovation level at the organizational level increase the technostress level. In addition, the factors for the prevention of technostress are divided into two main categories as technology-related and non-technology-related inhibitors. Technology-related inhibitors are related to technical features such as technological literacy (Ragu-Nathan et al., 2008), provision of technical support (Kwanya et al., 2012; Norulkamar et al., 2012), participation and ease of use (Aygari et al., 2011; Hung et al., 2015). Some inhibitors arising from individual-organization interaction independent of technology in overcoming technostress are factors such as job satisfaction (Boonjing and Chanvarasuth, 2017; Kim et al., 2015), employee commitment (Okolo, et al., 2018), and culture (Yun et al., 2012).

3.3. Task Productivity

Task productivity, defined in the literature as the degree to which an application improves output per unit of time by the user (Braverman, 1974: 82-83; Danziger, 1985; Davis, 1989; Curley and Pyburn, 1982), stands out as two broad aspects of quantity of work output and quality of work produced. Braverman (1974: 146-150) emphasized the potential for automation to increase the productivity and management control of organizations. Kraut et al. (1989) reported that a customer inquiry system increased output by 50% in a large public service. Weick (1990) discussed the difficulties faced by information technology in improving productivity in post-industrial work environments. Zuboff (1988: 385) argues that information technology significantly increases productivity by changing the perception of reality, making productivity measures more abstract and difficult to define. Liff (1990) shows that office and secretarial workers believe that automation increases the interest in their jobs and the level of skill required, resulting in higher productivity. Davis (1991) argues that, in the context of information technology and white-collar productivity, an overemphasis on cost reduction and output growth may be counterproductive and therefore increasing productivity in serving internal and external customers is a more appropriate basis for evaluation. IT infrastructures are considered to be an important element of organizational success (Yates and Van Maanen, 1996) as a holistic structure encompassing hardware and software components as well as administrative roles, rules, and informal norms and behaviors that support these systems (Barley, 1990). These infrastructures provide a structure that connects different parts of the organization (Kling and Scacchi, 1982) and represents information processing capacity, increasing intra-organizational interactions and productivity (Yates, 1988: 21-22). Therefore, IT infrastructures should be evaluated not only as a technical system but also as a comprehensive whole that supports organizational processes.

4. METHODOLOGY

Technostress is the stress experienced by employees who have difficulty adapting to changing technology and digital applications. In other words, it is a concept that explains the disruption of the employee's biological and psychological balance due to technology. This study investigated whether factors such as techno-invasion, excessive workload, insecurity, complexity and uncertainty, which create technology-related stress, affect task efficiency. The assumption that these factors will negatively affect task efficiency (negative effect of technostress creators' hypothesis) was tested with regression analysis of the data in the SPSS 16 statistical program. In the literature, it has been found that some individual, organizational and work-related factors such as technology literacy, provision of technical support, job satisfaction, organizational commitment and continuance commitment reduce the resulting technostress. The assumption that task efficiency will increase if technostress decreases (positive effect of technostress inhibitors' hypothesis) was also tested with regression analysis of the collected data.

The population of this study consists of academic and administrative staff of Firat University. In the study; 1945 academic staff, 1600 administrative staff and a total of 3545 staff working at Firat University at the time the research was conducted constitute the total population size. In the case where the margin of error is 5%; the sample size is determined as 347 and above. The survey prepared in Google forms was sent via e-mail and 356 healthy surveys were evaluated.

4.1. Research Model

Assuming that technostress may vary according to demographic characteristics such as age, gender, education and income level, demographic characteristics were first included in the model. Then, the effect of technostress generators on task productivity was shown in the model. Finally, whether technostress inhibitors have a moderating effect on the effect of technostress on task productivity was added. The research model of this study is given in Figure 1.

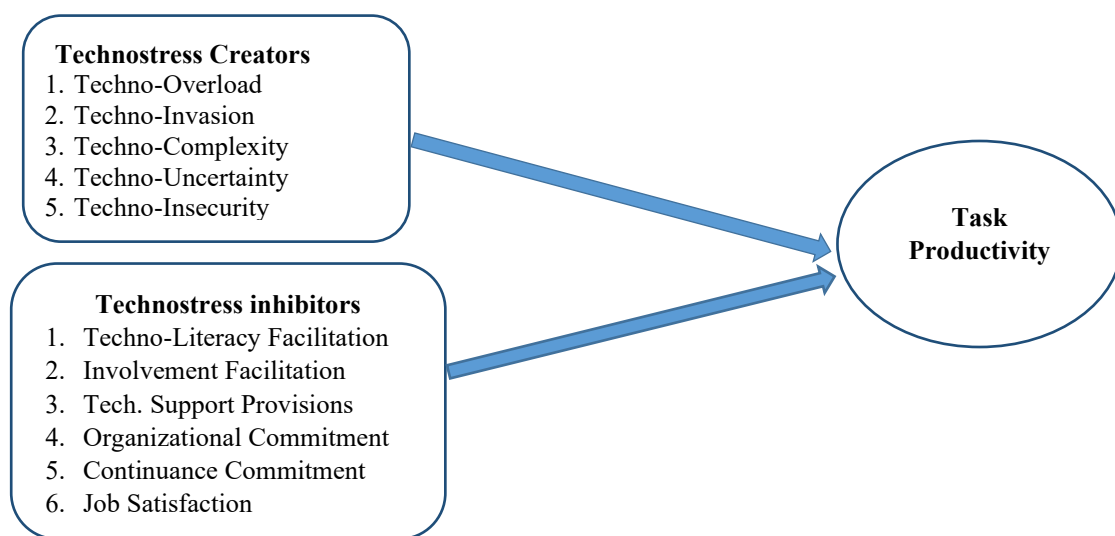


Figure 1. Theoretical model of the research

The hypotheses formulated for the research are presented below.

Hypothesis 1: Technostress creators have an effect on task productivity.

H1_a: Techno-overload has an effect on task productivity.

H1_b: Techno-invasion has an effect on task productivity.

H1_c: Techno-complexity has an effect on task productivity.

H1_d: Techno-uncertainty has an effect on task productivity.

H1_e: Techno-insecurity has an effect on task productivity.

Hypothesis 2: Technostress inhibitors have an effect on task productivity.

H.2_a: Techno-literacy facilitation has an effect on task productivity.

H. 2_b: Involvement facilitation has an effect on task productivity.

- H. 2_c: Job satisfaction has an effect on task productivity.
 H. 2_d: Organizational commitment has an effect on task productivity
 H. 2_e: Continuance commitment has an effect on task productivity.
 H. 2_f: Techno-support provisions have an effect on task productivity.

4.2. Scales

In the research, the Turkish adapted scales of Tarafdar et al. (2007) for technostress creators (reliability: 85.1), Ragu-Nathan (2008) for technostress inhibitors (reliability: 84.7) and Torkzadeh and Doll (1999) for task efficiency (reliability: 87.1) were used. Cronbach's Alpha of the scales collectively was 86.2. The research was conducted at Firat University (main mass: 3545, sample: 356). A 5-point Likert scale was used in all scales used in the study, and there was a rating from the most negative to the most positive.

Table 1. Scales and the sources

<i>Variables</i>	<i>Scale Name</i>	<i>Number of Questions</i>	<i>Source</i>
Technostress Creators	Techno-overload	5	Tarafdar et al. (2007)
	Techno-Invasion	3	
	Techno Complexity	5	
	Techno-Uncertainty	4	
	Techno Insecurity	4	
Technostress Inhibitors	Techno- Literacy Facilitation	4	Ragu-Nathan et al. (2008)
	Support Provisions	3	
	Involvement Facilitation	4	
	Job Satisfaction	3	
	Organizational Commitment	4	
Task Productivity		4	Torkzadeh and Doll (1999)

5. ANALYSIS AND EVALUATION OF DATA

5.1. Demographic Characteristics

The demographic characteristics of the academic and administrative staff who participated in the study are shown in Table 2. When the relevant tables are examined, the majority of the academic and administrative staff of Firat University who participated in the study sample and survey are male employees (% 68.5). When the marital status of the sample is examined, the majority (% 77.8) are married. The professional status of the employees who participated in the sample and survey consists of academics (82.9). When the level of education is considered, it is seen that the majority are postgraduate graduates (% 82.6).

Table 2. Demographic characteristics of the sample

<i>Demographic Characteristics</i>		<i>Count</i>	<i>%</i>
Gender	Female	112	31.5
	Male	244	68.5
Marital Status	Married	277	77.8
	Single	79	22.2
Professional Status	Academician	295	82.9
	Administrative	61	17.1
Educational Status	High School	8	2.2
	Graduate	54	15.2
	Postgraduate	294	82.6
Working Period	0-5	70	19.7
	6-10	42	11.8
	11-15	152	42.7
	16-20	92	25.8

The characteristics of the service periods of the academic and administrative staff participating in the study are shown in Table 2. When the tables are examined, it is seen that the majority of the academic and administrative staff participating in the study have a service period between 11-15 years (42.7%).

5.2. Factor Analysis

In order to determine the suitability of the scale used in the study for factor analysis, KMO (KaiserMeyer-Olkin) sample suitability test and Bartlett's sphericity test were performed. When these factors obtained as a result of the analysis were compared with the original scale, it was seen that there were some partial changes. In the comparison made; it was concluded that the factors of excessive workload, invasion, and

uncertainty were the same in both scales, and the factor loadings of the sub-variables of complexity and insecurity factors were low (complexity 4 factor loading 0.43, insecurity 1 factor loading 0.44). In summary, the 5 main and 20 sub-variables that created technostress in the original scale were reduced to 5 main and 18 sub-variables as a result of the factor analysis.

Table 3. Factor analysis of technostress creators, inhibitors and task productivity

<i>Technostress Creators</i>	<i>Factor Loadings</i>
<i>Techno-Overload</i>	
Overload 2 I am forced by this technology to do more work than I can handle.	0.87
Overload 1 I am forced by this technology to work much faster	0.86
Overload 3 I am forced to work with very tight schedules.	0.83
Overload 4 I am forced to change my workload due to increased technology complexity	0.75
Overload 5 I have a higher workload due to increased technology complexity	0.63
<i>Techno-Complexity</i>	
Complexity 1 I do not know enough about this technology for my job.	0.76
Complexity 2 I need a long time to understand and use new technologies.	0.75
Complexity 3 I do not have time to upgrade my technology skills.	0.72
Complexity 4 New recruits know more about technology than I do.	0.70
<i>Techno-Insecurity</i>	
Insecurity 4 Less knowledge sharing due to fear of replacement.	0.77
Insecurity 3 I feel threatened by coworkers with newer skills.	0.73
Insecurity 2 I must constantly update my skills to avoid being replaced.	0.69
<i>Techno Invasion</i>	
Invasion 2 I sacrifice my vacation to keep up with new technologies.	0.79
Invasion 1 I have to be in touch with my work even during vacation.	0.73
Invasion 5 My personal life is invaded by this technology.	0.69
<i>Techno -Uncertainty</i>	
Uncertainty 2 Frequent network upgrades.	0.85
Uncertainty 4 Constant changes in software.	0.81
Uncertainty 1 There are always new developments in organizational technologies.	0.56
<i>Technostress Inhibitors</i>	
<i>Technical Support Provision</i>	
Technical Support 2 Help desk responsive to requests.	0.83
Technical Support 1 Help desk staffed with knowledgeable individuals.	0.80
Technical Support 3 Help desk is accessible.	0.79
<i>Techno-Literacy Facilitation</i>	
Literacy Facilitation 3 End-user training provided.	0.79
Literacy Facilitation 4 Clear documentation provided.	0.79
Literacy Facilitation 2 End-user training provided.	0.78
Literacy Facilitation 1 Teamwork emphasized for solving technology problems.	0.52
<i>Job Satisfaction</i>	
Job Satisfaction 2 I feel pride in my job.	0.82
Job Satisfaction 3 My job is enjoyable.	0.80
Job Satisfaction 1 I like doing the things I do at work.	0.78
<i>Continuance Commitment</i>	
Continuance Commitment 3 Too few options to leave.	0.81
Continuance Commitment 2 Staying is as much necessity as desire.	0.78
Continuance Commitment 4 It is very hard to leave even if I wanted to.	0.75
<i>Organizational Commitment</i>	
Organizational Commitment 3 Organization's problems are my own.	0.80
Organizational Commitment 4 Organization has personal meaning for me.	0.77
<i>Involvement Facilitation</i>	
Involvement Facilitation 2 End users consulted before new technology introduction.	0.82
Involvement Facilitation 1 End users rewarded for using new technologies.	0.75
Involvement Facilitation 3 End users involved in technology change/implementation.	0.61
<i>Task Productivity</i>	
Task Productivity 2 This technology increases my productivity.	0.88
Task Productivity 4 This technology assists me in performing my job better.	0.86
Task Productivity 3 This technology allows me to accomplish more work than would otherwise be possible.	0.85
Task Productivity 1 This technology improves the quality of my work.	0.79

KMO: 0,86; p=0,000<0,05;

Technostress Generators

a) Techno-Overload: Factor loadings range from 0.63 to 0.87, with items such as "I'm given more work due to technology" (0.87) and "I have to work faster" (0.86) standing out with particularly high loadings. This demonstrates that employees clearly perceive the pressures of speed and the workload-increasing effects of technology. The literature (Tarafdar et al., 2007; Karr-Wisniewski and Lu, 2010) also indicates that overload is the most typical source of technostress.

b) Techno-Complexity: Factor loadings range from 0.70 to 0.76. The statements "It takes a long time to learn technology" (0.75) and "I don't have time to update my knowledge" (0.72) are particularly prominent. This is directly linked to employees' feelings of inadequacy with technology. The perception that newcomers are more knowledgeable (0.70) also reveals comparison pressure among employees.

c) Techno-Insecurity: Factor loadings 0.69–0.77. "Reducing knowledge sharing for fear of being replaced" (0.77) and "feeling threatened by colleagues with new skills" (0.73) are prominent. These findings, in line with the literature, suggest that employees are concerned about career security during automation and digitalization processes (Saka et al., 2020).

d) Techno-Invasion: Factor loadings 0.69–0.79. The items "I sacrifice my vacation" (0.79) and "I am connected to my work even on vacation" (0.73) indicate that work-life balance is disrupted by technology. This is a significant technostress dimension that triggers family-work conflict, as emphasized in the literature (Spira and Feintuch, 2005: 12-13; Estrada-Muñoz et al., 2020).

e) Techno-Uncertainty: Factor loadings range from 0.56 to 0.85, with "frequency of network updates" (0.85) and "constant software changes" (0.81) being particularly noteworthy. As emphasized in the study, this dimension is the only significant source of technostress that negatively impacts task productivity. In other words, the constant flow of technological change further stresses employees.

Technostress Inhibitors

a) Technical Support Provision: Factor loadings range from 0.79 to 0.83. "Help desk accessibility" (0.79) and "knowledgeable staff" (0.80) stand out with high loadings. This result suggests that strong technical support mechanisms facilitate employee adaptation to technology and reduce stress.

b) Techno-Literacy Facilitation: Factor loadings range from 0.52 to 0.79. Providing training and documentation yielded the highest loadings (0.79), while "solving through teamwork" yielded lower loadings (0.52). This suggests that formal training and documentation are perceived as more important by employees, while social support mechanisms have limited impact.

c) Job Satisfaction: Factor loadings are quite high at 0.78 to 0.82. Items such as "I am proud of my job" (0.82) and "I enjoy my job" (0.80) stand out. The findings support the general conclusion of the article: job satisfaction is the strongest productivity-enhancing factor among technostress inhibitors.

d) Continuance Commitment: Factor loadings range from 0.75 to 0.81. This may be due to commitment being based on obligation rather than voluntariness.

e) Organizational Commitment: Factor loadings range from 0.77 to 0.80. Strong loadings, such as "Seeing the organization's problems as my own" (0.80), reflect employees' sense of organizational belonging.

f) Involvement Facilitation: Factor loadings range from 0.61 to 0.82. "Seeking users' opinions before implementing new technology" (0.82) stands out. This suggests that participation and rewards are important in reducing technostress.

Task Productivity

Factor loadings are quite high at 0.79 to 0.88. Items such as "This technology increases my productivity" (0.88) and "It allows me to do my job better" (0.86) are particularly prominent. This finding, as emphasized in the study, suggests that employees evaluate technology positively in terms of productivity, but this productivity is shaped more by inhibitors than technostress-generating factors.

Consequently, most factor loadings are above 0.70, supporting the scale's high reliability. While technostress generators have a conceptually strong factor structure, they cannot significantly explain task productivity. In contrast, inhibitors (especially job satisfaction and technical support) are decisive in increasing productivity. Table 3, supporting the study's main finding, shows that productivity is not enhanced by negative factors, but rather by protective factors.

5.3. Reliability Analysis

The reliability levels of the scales used in the study were tested using Cronbach's alpha coefficients. The results showed that $\alpha = 0.851$ for technostress creators, $\alpha = 0.847$ for technostress inhibitors, $\alpha = 0.871$ for

task productivity, and $\alpha = 0.862$ for the overall scale. Since $\alpha \geq 0.70$ is considered acceptable, $\alpha \geq 0.80$ is considered good, and $\alpha \geq 0.90$ is considered excellent in the literature (Bryman and Cramer, 1997: 77), these values indicate that the scales are highly reliable in terms of internal consistency. In terms of validity, the KMO value, which was 0.86 and fell within the range of 0.80-0.89, was found to be at a very good level. The Bartlett test result of $p = 0.000 < 0.05$ demonstrated that the data were suitable for factor analysis. Factor analysis results show that the vast majority of factor loadings exceed 0.70, with only a few items (e.g., 0.56 for "techno-uncertainty 1" and 0.52 for "techno-literacy 1") remaining relatively low. Despite this, the overall picture demonstrates that the scale's structural validity has been established. Furthermore, the fact that the scales used have been validated in the literature supports its content validity.

5.4. Participant Perceptions of Technostress Creators, Inhibitors and Task Productivity

According to the findings in Table 4, participants' perceptions of technostress creators were at a low-to-moderate level (Mean = 2.70). The highest mean values were seen in the techno-uncertainty (Mean = 3.55) and techno-invasion (Mean = 3.46) dimensions. This suggests that employees perceive factors such as constant network updates, software changes, and the disruption of work-life boundaries as the most significant sources of technostress. In contrast, the techno-insecurity (Mean = 2.20) and techno-overload (Mean = 2.26) dimensions were the most prominent with the lowest means. This result suggests that employees perceive the fear of losing their jobs or the increased workload caused by technology as relatively less threatening, which may be related to the high job security and routinized nature of tasks in public institutions.

Table 4. Participant perceptions of technostress creators, inhibitors and task productivity

<i>Variable</i>	<i>Mean</i>	<i>Standard Deviation</i>
Techno-Overload	2.26	1.09
Techno-Complexity	2.40	1.01
Techno-Uncertainty	3.55	1.04
Techno-Invasion	3.46	1.05
Techno-Insecurity	2.20	0.92
Techno-Stress Creators	2.70	0.68
Technical Support Provision	3.38	1.18
Techno-Literacy Facilitation	3.33	1.12
Involvement Facilitation	2.77	0.95
Job Satisfaction	4.26	0.76
Organizational Commitment	3.70	1.09
Continuance Commitment	3.47	1.06
Techno-Inhibitors	3.45	0.65
Task Productivity	4.26	0.91

Regarding technostress inhibitors, participants' perceptions were at a moderate-to-good level (Mean = 3.45). In particular, the dimensions of job satisfaction (Mean = 4.26) and organizational commitment (Mean = 3.70) stand out as strong factors that reduce employees' technostress. Employees' pride in their work and their perceived value in their work can be interpreted as a significant factor mitigating the negative effects of technostress. However, participation facilitation (Mean = 2.77) had the lowest mean, reflecting the perception that employees are not sufficiently involved in the implementation of new technologies. This result points to the need to strengthen participatory practices in the technology adoption process in organizations.

The task productivity dimension was rated high (Mean = 4.26). Employees stated that technology increases their productivity and allows them to perform their jobs more effectively. Overall, the low-to-moderate perception of technostress generators, while the high impact of inhibitors, particularly through job satisfaction and organizational commitment, suggests that task productivity is positively supported. These findings confirm the main conclusion of the article and reveal that the factors that increase productivity are protective factors such as employees' job satisfaction and organizational belonging, rather than negative stress factors.

5.5. Effect of Technostress Creators Dimensions on Task Productivity

A regression analysis was conducted to determine whether the factors (creators) that cause technostress among the academic and administrative staff in the institution have an effect on task productivity. Table 5 shows the results.

Table 5. Regression results of technostress creators dimensions on task productivity^b

<i>Variables</i>	<i>Beta</i>	<i>T Value</i>	<i>Sig</i>	<i>Zero-Order</i>	<i>Partial</i>	<i>Part</i>	<i>Tolerance</i>	<i>VIF</i>
Techno-Overload	-0.07	-1.15	0.24	0.03	-0,06	-0,06	0,62	1,58
Techno-Complexity	0.10	1.71	0.08	0.10	0,09	0,09	0,69	1,43
Techno-Uncertainty	0.10	2.01	0.04	0.11	0,10	0,10	0,94	1,05
Techno-Invasion	0.03	0.54	0.58	0.07	0,02	0,02	0,85	1,17
Techno-Insecurity	0.06	1.00	0.31	0.08	0,05	0,05	0,77	1,29
<i>Model</i>	<i>R</i>		<i>R²</i>		<i>F Value</i>		<i>Significance</i>	
Technostress-Creators	0.17 ^a		0.02		2.07		0.068 ^a	

a: Predictors: (Constant), Creators, b: Dependent Variable: Productivity Means

The findings according to Table 5 indicate that the overall model fit is not statistically significant ($F=2.07$; $p=0.068$; $R^2=0.02$). This result suggests that technostress creators explain only 2% of the total task productivity. In other words, employee-perceived technostress does not have a strong or significant effect on productivity. When the sub-dimensions are examined separately, only the techno-uncertainty dimension ($\beta=0.10$; $t=2.01$; $p=0.04$) has a significant effect. This finding suggests that factors such as constant software changes and network updates can negatively impact employee task productivity. The other dimensions—techno-overload ($\beta=-0.07$; $p=0.24$), techno-complexity ($\beta=0.10$; $p=0.08$), techno-invasion ($\beta=0.03$; $p=0.58$), and techno-insecurity ($\beta=0.06$; $p=0.31$)—were not found to be statistically significant. This suggests that employees' perceptions of workload, complexity, or work-life balance do not directly affect productivity. Consequently, this analysis supports the study's general finding: while technostress creators are conceptually strong dimensions, they do not have a significant impact on productivity. Only the instability created by technological uncertainty, that is, constant change and updates, appears to be a critical risk factor for task productivity. This highlights the importance of organizational stability, predictability, and user-friendly technology management for employee productivity.

5.6. Regression Results of the Effect of Technostress Inhibitor Dimensions on Task Productivity

Regression analysis was conducted to determine whether technostress inhibitors had an effect on the task productivity of the academic and administrative staff in the institution. Table 6 shows the results.

Table 6. Regression results of the effect of technostress inhibitor dimensions on task productivity^b

<i>Variable</i>	<i>Beta</i>	<i>T Value</i>	<i>Sig</i>	<i>Zero-Order</i>	<i>Partial</i>	<i>Part</i>	<i>Tol.</i>	<i>VIF</i>
Technology Support Provision	0.32	6.45	0.00	0.32	0.32	0.32	0.92	1.08
Literacy Facilitation	0.18	3.24	0.00	0.32	0.17	0.15	0.69	1.43
Involvement Facilitation	0.12	2.23	0.01	0.29	0.11	0.10	0.69	1.44
Job Satisfaction	0.22	4.32	0.02	0.32	0.22	0.20	0.85	1.17
Org. Commitment	0.11	2.24	0.02	0.29	0.11	0.10	0.80	1.25
Continuance Commitment	0.08	1.86	0.06	0.12	0.09	0.08	0.97	1.02
<i>Model</i>	<i>R</i>		<i>R²</i>		<i>F Value</i>		<i>Significance</i>	
Technostress Inhibitors	0.46 ^a		0.21		19.07		0.000 ^a	

a: Predictors: (Constant). Creators, b: Dependent Variable: Productivity Means

According to the regression analysis results showing the effect of technostress inhibitors on task productivity, presented in Table 6, the model is statistically significant ($F=19.07$; $p=0.000$), and inhibitors explain 21% of task productivity ($R^2=0.21$). This ratio is quite high compared to the only 2% explanatory power of technostress creators and reinforces the study's main finding: employee productivity is determined by protective factors rather than technostress-inducing factors.

When sub-dimensions are examined, technical support provision has the strongest effect ($\beta=0.32$; $t=6.45$; $p<0.001$). Elements such as help desk accessibility, availability of expert staff, and rapid response times directly increase employee productivity. This is followed by job satisfaction ($\beta=0.22$; $t=4.32$; $p<0.05$). Employees' pride in their work and their enjoyment of it stand out as critical factors mitigating the negative effects of technostress. Furthermore, technological literacy ($\beta=0.18$; $t=3.24$; $p<0.01$), participation facilitation ($\beta=0.12$; $t=2.23$; $p<0.05$), and organizational commitment ($\beta=0.11$; $t=2.24$; $p<0.05$) also significantly contribute to task productivity. Training, documentation, employee participation in technology processes, and identification with the organization are other factors that support productivity. Conversely, continuance commitment ($\beta=0.08$; $t=1.86$; $p=0.06$) was not statistically significant, indicating that employees' commitment to the organization out of necessity does not contribute to increased productivity.

Overall, these results suggest that technical support, job satisfaction, and technological literacy are the primary factors that increase productivity, offsetting the negative effects of technostress. The findings suggest that strong organizational support mechanisms and employee job satisfaction are critical to capitalizing on the productivity benefits of technology.

6. FINDINGS and DISCUSSIONS

The hypothesis test results reveal a clear distinction between the impact of technostress creators and inhibitors on task productivity. Among the technostress creators (H1a–H1e), only Techno-Uncertainty (H1c) was supported ($\beta = 0.10$; $p = 0.04$), indicating that constant technological changes such as frequent updates and software modifications significantly affect task productivity. However, other creator dimensions—Techno-Overload, Techno-Complexity, Techno-Invasion, and Techno-Insecurity—were all rejected, suggesting that employees did not perceive workload pressure, complexity, work-life intrusion, or job insecurity as significant predictors of productivity in this context.

Table 7. Hypotheses testing results for the technostress and inhibitors effects on task productivity

<i>Statement</i>	<i>Result</i>	<i>Justification</i>
H1a Techno-Overload → Task Productivity	✗ Rejected	$\beta = -0.07$; $p = 0.24$ (not significant)
H1b Techno-Complexity → Task Productivity	✗ Rejected	$\beta = 0.10$; $p = 0.08$ (not significant)
H1c Techno-Uncertainty → Task Productivity	✓ Accepted	$\beta = 0.10$; $p = 0.04$ (significant. $p < 0.05$)
H1d Techno-Invasion → Task Productivity	✗ Rejected	$\beta = 0.03$; $p = 0.58$ (not significant)
H1e Techno-Insecurity → Task Productivity	✗ Rejected	$\beta = 0.06$; $p = 0.31$ (not significant)
H2a Techno-Literacy Facilitation → Task Productivity	✓ Accepted	$\beta = 0.18$; $p = 0.00$ (significant. $p < 0.01$)
H2b Involvement Facilitation → Task Productivity	✓ Accepted	$\beta = 0.12$; $p = 0.01$ (significant. $p < 0.05$)
H2c Job Satisfaction → Task Productivity	✓ Accepted	$\beta = 0.22$; $p = 0.02$ (significant. strong)
H2d Organizational Commitment → Task Productivity	✓ Accepted	$\beta = 0.11$; $p = 0.02$ (significant)
H2e Continuance Commitment → Task Productivity	✗ Rejected	$\beta = 0.08$; $p = 0.06$ (not significant)
H2f Technical Support Provision → Task Productivity	✓ Accepted	$\beta = 0.32$; $p = 0.00$ (significant. strongest)

In contrast, technostress inhibitors (H2a–H2f) demonstrated a strong and consistent positive influence on task productivity. Technical Support Provision (H2f) emerged as the most influential factor ($\beta = 0.32$; $p = 0.00$), highlighting the critical role of accessible and knowledgeable support mechanisms in enhancing employee performance. Job Satisfaction (H2c) also showed a robust positive effect ($\beta = 0.22$; $p = 0.02$), confirming that employees' pride and enjoyment in their work significantly contribute to productivity. Similarly, Techno-Literacy Facilitation (H2a) ($\beta = 0.18$; $p = 0.00$), Involvement Facilitation (H2b) ($\beta = 0.12$; $p = 0.01$), and Organizational Commitment (H2d) ($\beta = 0.11$; $p = 0.02$) were all accepted, demonstrating that training, participatory approaches, and strong organizational identification play important roles in mitigating stress and promoting productivity. Conversely, Continuance Commitment (H2e) was rejected ($\beta = 0.08$; $p = 0.06$), suggesting that staying with the organization out of necessity rather than desire does not enhance productivity.

When the research results are evaluated alongside demographic findings, the sample is largely male (68.5%), married (77.8%), academic (82.9%), with a postgraduate degree (82.6%), and with a long tenure (42.7% with 11–15 years, 25.8% with 16–20 years), which explains the direction of the hypotheses. The high level of job security in public institutions, the routinized work processes brought about by institutionalized structures, and the fact that a significant portion of the participants have been working for 10–15 years, have increased employees' capacity to adapt to technology, leading to the insignificant impact of factors such as techno-overload and techno-complexity on productivity. However, while the experience of senior employees allows them to tolerate many stressors, techno-uncertainty stemming from constant change and updates stands out as the only significant creative factor. On the other hand, the strong effect of inhibitors such as job satisfaction, technical support and organizational commitment reveals that employees who have worked in the public sector for many years attach more importance to organizational support mechanisms and the psychological safety environment provided by job security in increasing productivity.

Overall, these findings confirm the study's central argument: task productivity is less influenced by the negative pressures of technostress creators and more significantly strengthened by the presence of supportive and motivational factors. This highlights the importance of building organizational environments that emphasize technical support, training, satisfaction, and commitment, rather than focusing solely on reducing stressors.

7. CONCLUSION

This study provides insights into the effects of technostress generating and inhibiting factors on task productivity. We predicted that technostress generating factors would reduce task productivity. However,

the findings show that technostress generators do not have a statistically significant effect on task productivity ($R^2 = 0.02$, $p = 0.068$). The lack of a significant effect can be explained by the fact that the tasks are routine and standardized; and that the technological and digital systems used have been in use for a long time. The fact that the tasks are routine and standardized and that the technology and digital systems have become familiar may have eliminated techno-complexity. At the same time, the good functioning of the organization's technical support systems may have eliminated this effect. This situation may indicate that the organization is highly institutionalized and that innovation is low. However, one of the sub-dimensions of technostress creators, techno-uncertainty, was found to have a significant effect ($\beta = 0.1$, $t = 2.01$, $p = 0.04$), highlighting its potential to impair task performance.

On the other hand, our prediction that technostress inhibitors would increase task productivity was supported by the findings. The effect of technostress inhibitors on task productivity was significant and explained 21% of the variance ($R^2 = 0.21$, $p < 0.001$). Among these inhibitors, job satisfaction emerged as the most effective factor ($\beta = 0.22$, $t = 4.32$), indicating that it has a critical role in reducing the negative effects of technostress and increasing task productivity.

In this study, we developed a hypothesis that technostress is a type of stress that can prevent employees from using their cognitive and mental resources efficiently and that it will negatively affect task efficiency. According to the findings of our study, this hypothesis was rejected. Since our study was conducted in the public sector, the study can be repeated in the private sector, especially in sectors that use intensive technology and whose technology is rapidly changing. Another reason for the rejection of our hypothesis may be that the number of employees with a digital mindset in the organization is high. Therefore, the digital mindset may have a role in reducing the effect of technostress on task efficiency. Future studies may examine whether the digital mindset has a mediating or moderating role.

Future research could further investigate the mechanisms by which technostress inhibitors operate and explore strategies to strengthen these protective factors in various organizational settings. Survey method was employed as the primary quantitative research method in this study. Qualitative research methods can provide deeper insights into the operating mechanisms of technostress creators and inhibitors.

Conflict of Interest

No potential conflict of interest was declared by the authors.

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Compliance with Ethical Standards

For this study, the approval of the Ethics Committee (Ethics Committee of Social and Human Sciences Research, Rectorate of Fırat University) was obtained with the decision dated (09.01.2020) and numbered (Meeting Number: 1, Decision Number: 16).

Ethical Statement

It was declared by the author that scientific and ethical principles have been followed in this study and all the sources used have been properly cited.



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