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REMOTE WORK AND TECHNOLOGICAL STRESS IN MEDIUM AND LARGE ENTERPRISES IN POLAND

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Purpose: The aim is to investigate the relations between technological stress, digital competence and some organizational variables like type of work, development of the whole organization, software and hardware development, changes in organization and hiding knowledge.
Design/methodology/approach: The aims were reached through verification of hypothesis based on the statistical analysis of data. The data of researched issues were obtained by surveying the employees from medium and large companies in Poland. The topic falls within the scope of theory and research on human-computer interactions and the influence of technology on human well-being.
Findings: The majority of employees experience various aspects of technostress at work. Techno-stress partly correlates with introduction of changes in a company, development of organization or hiding knowledge by employees. Digital competence correlates partly with software and hardware development and hiding knowledge.
Research limitations/implications: Correlations observed were weak or medium in strength. More of organizational conditions and variables could be included in the future analysis (e.g. type of leadership, organizational culture), because present ones were limited due to restricted size of the questionnaire. Further extended research on a larger sample may be suggested.
Practical implications: The results may be useful for managers of Polish companies managing teams of remote employees and facing challenges with their increased level of stress. Increased responsibility of companies in terms of employees' well-being is a prerequisite for effective operating in fast changing environment of modern market.
Social implications: The conditioning of techno-stress for Polish remote or hybrid employees is a significant subject related to lowering well-being of modern employees in Poland. It may start further research and implementing policies aiming at improvement of working conditions to increase level of well-being and interpersonal relations (e.g. cooperation) for remote employees.
Originality/value: The paper presents the study of up-to-date problem of techno-stress and its conditioning in remote and hybrid type of work in medium and large companies in Poland. It may be of use to the managers leading virtual teams and facing the problems stemming from the disturbed well-being of employees.
Keywords: remote work, technological stress, medium enterprises, large enterprises
Category of the paper: research paper.

1. Introduction

Digital transformation and the development of the information society broadly affect the way employees perform their professional tasks. This in turn influences learning necessary skills and work approaches of modern employees. New multimedia technologies and software that enhance collaboration are increasingly accessible to employees. More and more employees can utilize different tools and communication methods, including videoconferencing, online training, and software that supports remote work, such as document management and database access, which can improve organization's efficiency and competitiveness on the market. (Karczewska, 2019). This has enabled increased occurrence of remote working in the last few years.

The key aspects in defining remote work are: preforming work outside the work headquarters and usage of tools and techniques of new ICT (Sobczyk, 2009, pp. 20-21). Employees working remotely are oftentimes a part of virtual teams. Lipnack and Stamps (2000, p.5) define virtual teams as: „a group of people who work interdependently with a common purpose, using technology to communicate and collaborate across space, time, and organizational boundaries. They interact through interdependent tasks guided by a common purpose, and they rely on technology to coordinate their efforts and achieve their goals". Virtual teams can bring a lot of benefits, such as effective allocation of human resources, reduction of commuting time, while also transcending limitations of time and space (Lipnack, Stamps, 2000). However, they also encounter difficulties regarding employee well-being, establishing and maintaining trust between coworkers, as well as effective and satisfactory interpersonal communication in organization.

A study by Wang et al. (2021) highlighted the difficulties that virtual employees encounter in remote work, such as difficulties in maintaining work-life balance, poor communication with coworkers or supervisors, procrastination in executing work tasks. The authors of the study emphasized the importance of social support of the supervisors and on the other side the self-discipline of the employees. This form of collaboration entails some possible negative consequences. In the times of the Covid-19 pandemic, a lot of employees began working online without adequate preparation and training, hence noted various challenges (Albrychiewicz-Slocinska, 2021, p. 44) such as the necessity for interaction and connection with other employees; sustaining a work-life balance; difficulty in addressing urgent issues without delay; the requirement for self-discipline, as well as effective organization of work time and motivation; not all employees have personal competencies to work remotely in an effective way. We can define a type kind of work-related stress present in remote work and caused by the use of new technologies. The term: technostress or technological stress has been coined in the 1980s. It has been described as "a modern disease of adaptation caused by an inability to cope with new computer technologies in a healthy manner" (Brod, 1984) and as a "state of arousal observed in certain

employees who are heavily dependent on computers in their work" (Arnetz, Wiholm, 1997). According to Trafargar et al. (2019) techno-distress is "how individuals perceive information systems as a threat, leading to the experience of subsequent 'negative' stress and primarily resulting in detrimental outcomes".

This article undertakes the subject of techno-stress and a part of its organizational conditioning in medium and large companies in Poland. The aim of the research was to investigate the relations between technological stress and digital competence as well as some organizational variables like type of work (stationary/remote/hybrid), development of the whole organization, software and hardware development in organization, introduction of changes in organization and hiding knowledge as a form of lack of cooperation in teams. Following the introduction, this article is organized as follows: section 2 addresses the literature review and the development of research questions, section 3 presents the methodology; section 4 presents and discusses the results, and section 5 delves into the conclusions and implications of the research.

2. Literature Review

Scientific researchers have shown a growing interest in remote work in the years after Covid-19 pandemics, highlighting flexibility of this kind of work and significance of Information and Communication Technologies allowing people to work all around the globe and at any time (e.g. Atoko, 2021, Singh et al., 2022, Orlandi et al., 2024).

Working remotely is frequently associated in research with a greater sense of autonomy, flexibility or job satisfaction. More flexible schedule of duties and time with family were among benefits most often indicated by the remote employees. (Barbuto et al., 2020) In research of Golden (2006) a curvilinear relationship between telecommuting and job satisfaction was proven, depending on the extent of telecommuting. Bigger amount of remote work may lower the satisfaction e.g. due to the sense of isolation (Golden, 2006).

During the Covid-19 period (2020–2021) a range of various stressors were related to aspects of remote working like inflexibility in this form of working, absence of training and self-efficacy, privacy issues, lack of self-confidence, insufficient organizational communication or technological knowledge, mental-health disorders, including workaholism, absence of intrinsic and extrinsic motivation for work, job-related stress, work-life balance, insufficient organizational support for employees, while also authoritative style of leadership (Bahamondes-Rosado, 2023,

Another significant stressor indicated in the literature is: an endless requirement and expectation of updating one's digital competencies, along with managing work–life balance, while technology distorts the boundaries between them. This increases people's vulnerability to detrimental psychological and health consequences. (Mahapatra and Pati, 2018) At the same time, research shows that developed digital competence tends to mitigate the decrease in performance

due to techno-stress. (Tarafdar et al., 2014) Also self-confidence in own abilities in a specific domain among remote workers may play a protective role against stress (Condiglio et al, 2023) The confidence in individual's abilities may make the increasing requirements more bearable for an employee.

The lack of time for preparation may increase level of techno-stress. Employees who had to adapt suddenly to remote work experienced techno-overload and techno-fatigue in the times of Covid-19 pandemics (Bahamondes-Rosado et al., 2023, p. 10).

Shen and Kuang (2022) highlighted the correlation between technostress, work exhaustion, knowledge hiding, positively moderated by job autonomy among Chinese employees in some professions. The study was limited in terms of occupations and industries studied. Also, recent studies of e.g. Molino et al. (2020) have indicated that technostress may contribute to various issues, including mental fatigue, insomnia, reduced concentration, irritability, memory disturbances, sensations of exhaustion, decreased productivity or level of job satisfaction, as well as lack of work-family life balance. The study analyzed mentioned issues in the Italian context.

Literature of the subject indicates that some organizational characteristics can be connected to technostress like type of culture, leadership style, design of work, and principles and procedures for the use of technology. The research conducted among Chinese employees showed that the lowest level of technostress could be observed in the organizations with low level of centralization and with low level of innovation. (Wang et al., 2008).

Some scientific research indicates that remote work offers employees greater independence and opportunities to handle responsibilities or decrease job-related stress (Delanoeije and Verbruggen, 2020). However, other studies have pointed out that remote workers may face increased stress due to home environments or the heightened use of ICTs (Gualano et al., 2023). When such various outcomes appear, it is worth to continue examining the matter. Also, the conditioning of technostress is oftentimes investigated in one type of national culture (eg. collectivistic like China). It is significant to investigate them in Polish, more individualistic culture. Recognizing this type of stress conditioning is vital for implementing suitable preventive strategies, to alleviate negative results of techno-stress and to facilitate the execution of specific methods for handling techno-stress.

This study aims to fill this gap by analyzing in Polish context the role of some organizational variables like type of work (stationary/remote/hybrid), development of the whole organization, software and hardware development in organization, changes occurring in organization and hiding knowledge as a form of lack of cooperation in teams in medium and large companies in Poland and the level of employees' stress connected to the use of new technologies like ICT or Internet (techno-stress). The conditioning of this phenomena for remote and hybrid employees in Poland is a significant subject in the situation of lowering well-being of modern employees.

Concepts mentioned above were used to ask a few research questions. The following questions have been asked: Are there any differences in level of techno-stress or digital competence of the stationary, hybrid and remote employees? Is the level of technostress affected by the level

of new technologies development in a company, introduction of changes in the company and the development of the company? Is there a relationship between level of technostress or digital competence and knowledge hiding? Is digital competence affected by the level of new technologies development in a company, introduction of changes in the company and the development of a company?

3. Methodology

The presented research was part of a broader study conducted in December 2022 on medium and large companies (employing more than 50 individuals) in Poland. It addressed the topics of social relationships, human capital, and knowledge sharing within organizations during the post-pandemic period. The research employed a survey method utilizing a questionnaire tool. The study was executed using the CATI technique, which stands for computer-assisted telephone interviewing. Random sampling was employed. The sampling frame consisted of REGON database of Polish enterprises. A total of 575 respondents completed the questionnaires (out of 1532 attempts). The respondents were white-collar workers from various sectors, including: higher education, pharmaceuticals, energy, and the automotive industry. The assumed confidence interval was 95%. For the statistical analysis of the acquired data, the Statistica software was utilized. Statistical measures such as the Mann-Whitney U test and Spearman's rho were applied. The following research hypotheses have been set up:

1a There is a positive relationship between the new technologies (software/ hardware) development level in the company and technostress.
1b There is a positive relationship between the new technologies (software/hardware) development level in the company and the level of digital competence of employees.
2a There is a positive relationship between the form of work and technostress.
2b There is a positive relationship between the form of work and the level of digital competence of employees.
3a There is a positive relationship between knowledge hiding and technostress.
3b There is a positive relationship between knowledge hiding and the level of digital competence of employees.
4a There is a positive relationship between introducing changes in the company and technostress.
4b There is a positive relationship between introducing changes in the company and the level of digital competence of employees.
5a There is a positive relationship between the development of the company and technostress.
5b There is a positive relationship between the development of the company and the level of digital competence of employees.

The indicators of technostress were inspired by the wider tools of technostress created by Smith J.M. (1999) and Ragu-Nathan (2008). The adopted indicators of variable technostress included mental as well as physical fatigue. More details are presented in Figure 1 in section of Results and Discussion.

Knowledge hiding indicators took into consideration three facets of knowledge hiding; evasive hiding, "playing dumb" involving deception, and rationalized hiding. Hence 12-item knowledge hiding scale was adopted (Connelly, 2019). The following types of work were identified for selection by the respondents: stationary work, hybrid work, and remote work.

4. Research results and discussion

The surveyed employees assessed the extent to which they agreed with the indicators of researched variables.

The aspects of technostress which the respondents assessed (Figure 1) were as following:

V1 Feeling body pain (e.g. back, head, eyes, wrists) when working with computer equipment.

V2 Feeling more physically tired than when working without a computer due to the use of new technologies.

V3 Feeling mentally tired when working with a computer.

V4 Feeling more mentally tired than when working without a computer due to the use of new technologies.

V5 Feeling unwillingness to cooperate with people when working with a computer.

V6 Being forced to work faster than before due to the use of new technologies (new computers, programs, applications).

The majority of employees acknowledged experiencing nearly all of the researched aspects of technostress (Figure 1). Two aspects were distinctively experienced by fewer employees and these were: feeling unwillingness to cooperate with people and being forced to work faster.

Another researched aspect was the relationship between technostress and digital competence and the form of work. U Mann-Whitney did not show statistically significant differences in techno-stress or digital competence and the form of work which the surveyed performed.

Level of software and hardware development in a company correlated with digital competence (0.13) but not with different aspects of technological stress (Table 1). There were no statistically significant correlations between researched variables.

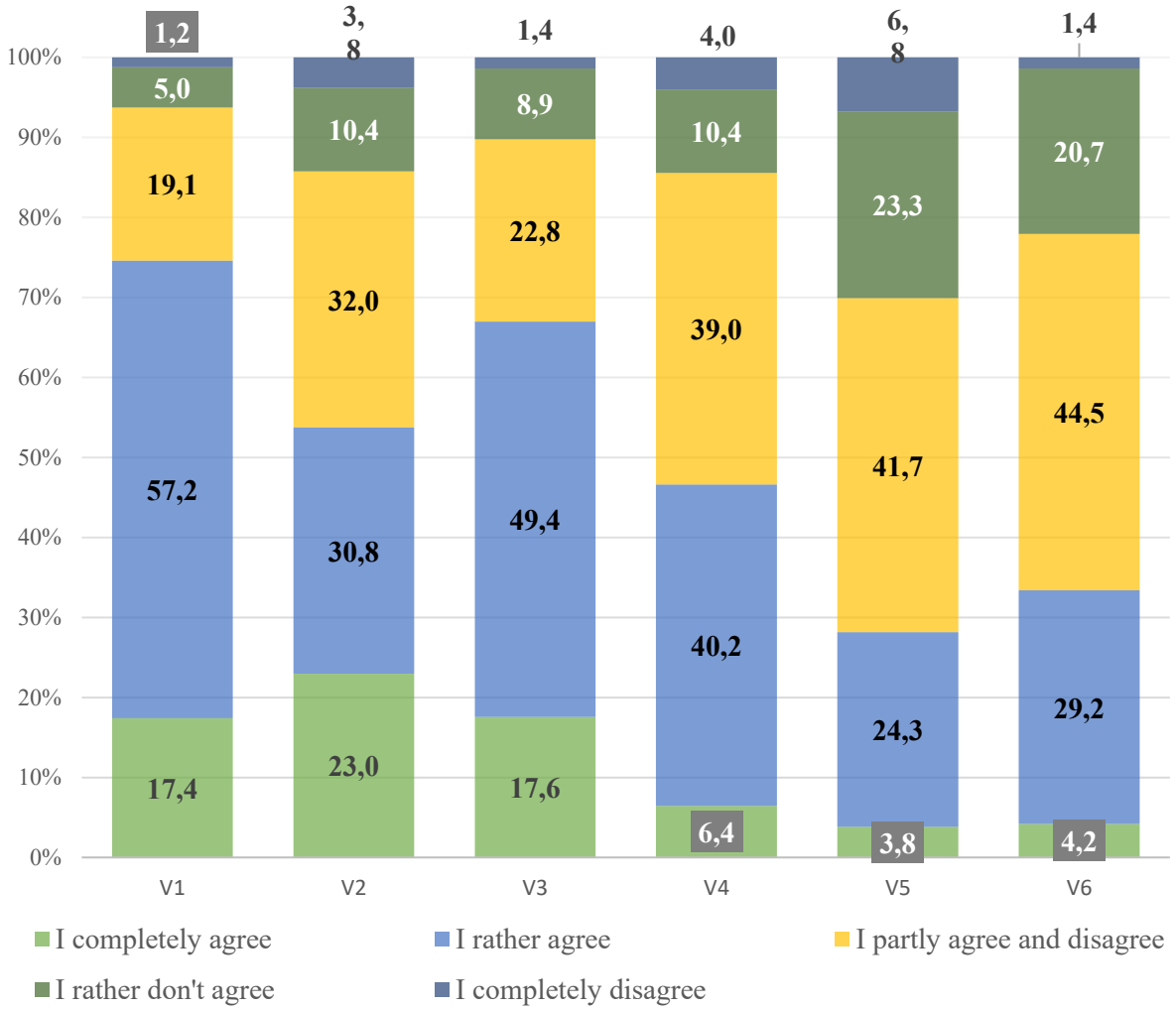

Figure 1. Techno-stress in Polish medium and large companies. In percentage.

Source: Own study.

Table 1.

The development of software and hardware in a company and technological stress and digital competence (p<0,05); Spearman's rho correlation

	Own level of skills in using computer hardware and software	Feeling more mentally tired due to the use of new technologies	Feeling more mentally tired than when working without a computer due to the use of new technologies	Feeling reluctant to cooperate with people when working at the computer	Being forced to work faster than before due to the use of new technologies (e.g. programs, applications)
The level of development of computer hardware and software in own organization over the last two years	**0.13**	0.05	-0.01	0.03	-0.01

Source: Own study.

Level of company's development (like increase in revenue, equity capital) and productivity correlated with some different techno-stress aspects, but not with digital competence. More detailed information is presented in Table 2.

Table 2.
The development of a company and technological stress and digital competence (p<0,05). Spearman's rho correlation

	Own level of skills in using computer hardware and software	Feeling more mentally tired due to the use of new technologies	Feeling more mentally tired than when working without a computer due to the use of new technologies	Feeling reluctant to cooperate with people when working at the computer	Being forced to work faster than before due to the use of new technologies (e.g. programs, applications)
In the last year, the company's revenues increased compared to the previous year	-0.03	0.04	**0.09**	0.06	**0.10**
In the last year, the company recorded an increase in the value of equity capital compared to the previous year	0.01	**0.09**	0.06	0.04	-0.01
In recent years, productivity in the company has been increasing	-0.01	0.04	-0.02	**0.09**	**0.10**

Source: Own study.

Introducing changes in a company by managers correlated weakly with digital competence (0.10) and mental fatigue (0.10) as well as with reluctance to cooperation with people (0.09). The rest of the aspects didn't show any correlation with the introduction of changes (Table 3).

Table 3.
Introducing changes in company and technological stress and digital competence (p<0,05). Spearman's rho correlation

	Own level of skills in using computer hardware and software	Experiencing body pain (e.g. back, head, eyes, wrists) when working with computer equipment	Feeling more physically tired than when working without a computer due to the use of new technologies	Feeling more mentally tired due to the use of new technologies	Feeling more mentally tired than when working without a computer due to the use of new technologies	Feeling reluctant to cooperate with people when working at the computer	Being forced to work faster than before due to the use of new technologies (e.g. programs, applications)
Managers introduce changes in the company	**0.10**	0.07	0.05	**0.10**	0.07	**0.09**	0.06

Source: Own study.

Some of the aspects of techno-stress correlated with various behaviours representing withholding from sharing knowledge. All or almost all of the researched behaviours correlated with mental fatigue and experiencing body pain due to use of new technologies (Table 4).

Table 4.
Technological stress and withholding from sharing knowledge (p<0,05). Spearman's rho correlation

	I offered the person different information than what he or she really wanted	I pretended that I didn't have current information	I said I didn't know, even though I knew	I pretended I didn't know what he was asking	I explained that I would like to tell him/her but I can't
Experiencing body pain (e.g. back, head, eyes, wrists) when working with computer equipment	0.16	**0.21**	**0.23**	**0.22**	**0.24**
Feeling more physically tired than when working without a computer due to the use of new technologies	**0.19**	0.15	0.15	0.17	**0.24**
Feeling more mentally tired due to the use of new technologies	**0.24**	**0.33**	**0.22**	**0.27**	**0.24**
Feeling more mentally tired than when working without a computer due to the use of new technologies	0.10	**0.20**	0.16	**0.20**	0.15

Source: Own study.

As results from the collected data, high digital competence correlated weakly with sharing experience with the employees from own team (0.09) and helping new employees joining own team (0.09). The rest of the indicators did not correlate with level of competence (Table 5).

Table 5.
Digital competence and sharing knowledge (p<0,05). Spearman's rho correlation

	Sharing knowledge with the employees from own team	Sharing experience with the employees from own team	Helping new employees who joined own team	Sharing knowledge with the employees from outside own team	Sharing experience with the employees from outside own team
Own level of skills in using computer hardware and software	0.02	**0.09**	**0.09**	-0.02	-0.02

Source: Own study.

Hypotheses 1b, 3a, 3b, 4a, 5a have been partly confirmed, but the hypothesis 2 (a and b) concerning form of work has been rejected, as well as hypotheses 4b and 5b concerning relationship between digital competence and changes in organization, and development of organization were also rejected (Table 6).

According to the results of this paper's study fast pace of companies' development and introducing changes may become stressors increasing level of techno-stress of employees. The more stressed and fatigued the employees are the less eager they may be to share knowledge and more prone to hide it or not help coworkers (Table 6). Also study by Ayyagari, Grover, and Purvis (2011) shows that the rapid technological advancement in organizations may increase employees' stress levels, especially when employees feel that their abilities or knowledge is insufficient to use new technologies as required. The authors' study revealed that the implementation of complicated digital systems without adequate training may lead to the feelings of inadequacy, anxiety, and frustration, which subsequently elevates employees' stress levels. What is distinctive in this paper's study is the fact that the development of software or hardware in organization contributes to the heightening the level of digital competence and not so much to the techno-stress of employees. Yet, there should be mentioned that, according to the literature of the subject older employees may experience more stress or digital apprehension than the younger ones when facing new software (Seifert et al., 2020; Pang et al., 2021).

Table 6.
Correlations between techno-stress and digital competence and chosen organizational variables. Verification of the hypotheses

		a. Techno-stress	b. Digital competence
1.	Software and hardware development in org.	didn't correlate	**partly correlated**
2.	Form of work	didn't correlate	didn't correlate
3.	Hiding knowledge	**partly correlated**	**partly correlate**
4.	Changes in organization	**partly correlated**	didn't correlate
5.	Organization development	**partly correlated**	didn't correlate

Source: Own study.

People have the ability to adapt to their surroundings, but this process sometimes come with high costs. As a result, in situation of high requirements, they must direct their resources and effort towards personal tasks and individual requirements of the environment, prioritizing their own needs over the group or other's needs. Among others, employees can hide knowledge from coworkers when they are facing too overwhelming techno-complexity. (Shen, Kuang, 2022, p. 2). In this paper's study it was also indicated that the more stressed and fatigued the employees are, the less eager they may be to share knowledge and more prone to hide it and refuse to help coworkers. Therefore, knowledge hiding and other interpersonal problems may occur.

Technostress needs to be properly identified and addressed, because it can have a detrimental influence on employee's health, leading to unfavorable outcomes. It may cause various pathologies, including lower performance resulting from lack of knowledge sharing or other

cooperation between employees. Managers should improve work organization to minimize techno-overload, because work-life conflict is closely linked to work fatigue or even burnout. According to the literature, improving employee's digital literacy can lower level of techno-stress of employees (Torkzadeh, Van Dyke, 2002; Bakker, Demerouti, 2014) Additionally, allowing employees the chance to restore their resources, introducing policies balancing work and private life would be a recommended management practice.

5. Conclusion

New information and communication technologies became an indispensable element of an everyday work landscape. Especially since Covid-19 a lot of the employees experienced remote working, which changed many aspects of their working experience. One of the consequences is techno-stress associated with remote or hybrid work.

As results from the research on medium and large companies in Poland, the majority of employees experience different aspects of technostress at work. Techno-stress partly correlates with the introduction of changes in a company and development of a company. It is also related with hiding knowledge by employees. In turn digital competence correlates partly with software and hardware development and hiding knowledge. However, it should be taken into consideration while interpreting the results that the correlations were of weak and medium strength and occurred in case of some of the researched aspects, not all of them. Hence, it is recommended to investigate these problems in a further, more extended study.

Employees' well-being becomes a significant responsibility of companies and becomes a prerequisite for effective operating in fast changing and demanding environment of modern market. Human resources strategy including the problematics of techno-stress should be a part of CSR of companies. Acknowledging various organizational conditioning of techno-stress of employees is crucial for implementing proper preventive strategies and policies to alleviate the adverse effects of techno-stress and to facilitate the introduction of specific methods for handling the employees' stress.

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