

TECHNOSTRESS ASSESSMENT IN THE IT WORKFORCE IN ROMANIA: THE NEED FOR MANAGEMENT ADAPTATION

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Abstract:

Technostress highlights the challenges individuals face in adapting to new technologies, especially in the absence of effective coping mechanisms and preventive strategies. This phenomenon has far-reaching implications, affecting both organizational and personal environments. This study explores the impact of technostress on the IT workforce in Romania, shedding light on its implications for job stress, organizational stress, and employee morale within the context of the country's evolving IT industry. The investigation, based on 2141 valid responses, utilizes Ordinary Least Squares Regression (OLS) and Pearson Correlation Coefficients to analyse the relationships between stress, morale, and job satisfaction. The inclusion of COVID-19 effects adds a contemporary dimension to the study, recognizing the changing landscape of work and its potential impact on IT workers' well-being. Management in the IT sector in Romania needs to be adaptable and responsive to the needs and challenges posed by technostress. This includes providing support to employees in managing workloads, promoting healthy technology use practices, and creating a balanced work environment.

Key words: management, technostress, technology, work stress, assessment

JEL classification: O32, O33, I31.

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1. INTRODUCTION

The term "technostress" was introduced in 1984 by American psychiatrist Craig Brod in his book "Technostress: The Human Cost of the Computer Revolution" (Craig, 2009), and it is defined as a form of adaptive stress caused by excessive use or pressure associated with information technologies. Digital transformation is a change in a company's business model through the application of new digital technologies, requiring appropriate organizational strategy (Milosevic, Ilic et al, 2022). It is caused by a lack of preventive strategies (Rohwer, Flöther et al, 2022) and affects both organizational and personal environments (Salo, Pirkkalainen et al, 2022). Despite affecting practically every individual directly or indirectly, the business world and corporate culture emphasize technostress as a significant issue due to its effects on human interaction and behavior, necessitating adaptation of organizational management to workforce needs.

Therefore, the purpose of this paper is to investigate the phenomenon of technostress, specifically its impact on the IT workforce in Romania. The study examines the challenges posed by technology, specifically focusing on job stress, organizational stress, and employee morale within the context of Romania's IT industry. The findings, presented in the results section, highlight

mean statistics for employment stress, employee morale, and employment satisfaction based on a sample of 2141 valid responses.

The research uses Ordinary Least Squares Regression (OLS) (XLSTAT, 2023) as the main statistical modelling approach, ensuring the basic assumptions are met. Skewness and kurtosis values are analysed to validate further analyses, supporting the use of OLS for assessing job stress and organizational stress. Furthermore, the paper explores the relationship between stress, morale, and job satisfaction through Pearson Correlation Coefficients. The study unveils significant negative correlations between satisfaction dimensions and stress levels, emphasizing the importance of satisfaction in mitigating stress. The inclusion of COVID-19 effects adds a contemporary dimension, acknowledging the evolving landscape of work and its potential impact on IT workers' well-being.

2. LITERATURE REVIEW

Technostress is a significant issue, often exacerbated by technological malfunctions and devices that fail to meet user needs. Technologies, especially those in the communications field, can initially appear beneficial but become problematic after widespread adoption; therefore, studying the multifaceted aspects of employee performance management in digital and virtual enterprises becomes a necessity (Itza and George, 2023).

Events like the COVID-19 pandemic have intensified technostress through abrupt shifts to online teaching and work. Additional causes of technostress include privacy invasions, malware, cyberbullying, social media addiction, job displacement by technology, and information overload (Mohammed, 2022). Solutions usually involve technological education, but a practical approach could be creating technology that limits other technologies' overreach, such as applications that prevent work communications outside of office hours (Rohwer, 2022; Pfaffinger, Reif et al, 2022).

Romania's software development industry is flourishing, with experienced tech experts and numerous international IT giants establishing R&D centers in cities like Bucharest, Cluj-Napoca, and Iasi. The sector grows annually by 14.3%, contributing significantly to the GDP, with software development comprising about 6.2% of GDP. Romania leads Europe in the number of certified IT specialists (Khrystyna, 2023; Sergey, 2023; International Trade Administration, 2023; Progressio, 2019). The pandemic has both lowered moderate stress levels and increased overall stress among Romanian IT employees, leading to challenges like sleep disorders and burnout (Berea, 2022; Dumitrache and Popescu, 2021; Săvescu, Kifor et al, 2022; Cristian, 2020).

Occupational stress significantly impacts productivity in Romanian companies, causing absenteeism, low job satisfaction, and quality decline. Surveys indicate high stress levels among employees, with many experiencing insomnia and severe health problems due to stress. More than half of the employees attribute stress to disorganized work environments and task overloads, with many believing their stress levels have doubled in recent years (Petreanu, Iordache et al, 2013; Romania Insider, 2019).

3. METODOLOGY

In order to identify ways to adapt management to the needs of IT workers in Romania, we conducted an assessment of occupational stress among them, based on three hypotheses:

H1. Correlation between Job and Organizational Stress: We anticipated a positive connection between stress experienced at work and stress related to the overall organization.

H2. Employee Morale and Stress: We predicted that higher employee morale would be linked to lower levels of both job and organizational stress.

H3. Job Satisfaction and Stress: We hypothesized that job satisfaction would be negatively associated with both job and organizational stress.

To test these hypotheses, we used statistical models with a large number of respondents (2141 valid responses) in the IT industry in Romania. The study is not only relevant to this specific

industry but also provides insights for broader research. We measured job and organizational stress using a 10-point scale in a survey, with 1 indicating "Not stressful at all" and 10 indicating "Extremely stressful. As for independent variables: Employee Morale: We gauged this using a single survey item on a 10-point scale; Job Satisfaction: We considered three survey items, each coded on a five-point scale.

The survey data utilized in this study is entitled the ComputerWorld "iTalent Survey", which was a collaboration with ComputerWorld's series entitled "100 Best Places to Work in IT", the Griffiths School of Management within Emanuel University of Oradea and Advanced Solutions, a research and consulting firm located in Oradea, Romania.

During Phase 1, Computerworld readers, PR professionals and other interested parties were invited to nominate organizations they consider great employers for IT workers. Phase 2 included a review of the basic criteria utilized to include firms for further survey participation. IT employees are considered to be those IT workers who provide technology support and services to their own company -- or to multiple companies through their work at an IT service provider. Workers who would not be included are administrative support staff for the IT department, staff who work in communications or PR for the technology department, IT contractors, or those staff whose primary role is in product development for outside sales.

The survey content of Phase 2 included: organizations' benefits, training and development, average salary increases, percent of staff promoted, turnover rates, and the percentage of women and minority staff in management in IT departments. Participating organizations distributed an employee survey to a randomly selected sample of their IT staff, as part of the survey process. The employee survey collected data on employee satisfaction within the following domains of research: management, benefits, workplace culture, compensation and job duties. Organizations were asked to randomly select IT staff to complete an employee survey. The employee iTalent survey was conducted in Romania using a combination of email communication, phone follow-up and mail notices. Respondents completed the online survey that was programmed utilizing the Qualtrix software and survey response program.

4. FINDINGS

Mean Statistics for Employment Stress, Employee Morale and Employment Satisfaction. A total of 2141 valid responses were found for the three numeric variables in Table no.1, which shows the mean values for job stress, organization stress, and employee morale. A mean of 5.9 and a standard deviation of 2.3 for Job Stress and 5.3 for Organizational Stress. A mean of 6.9 with a smaller standard deviation of 1.8 for Employee Morale.

Table no. 1. Descriptive Statistics of Employee Stress and Morale

	Mean	s	Skew	Kurt
• Job Stress ¹	5.9	2.3	-0.32	0.92
• Organization Stress ¹	5.3	2.5	0.00	-0.77
• Employee Morale Perception ²	6.9	1.8	-0.90	0.92
N	2141			

¹[1 – Not Stressful/10 – Extremely Stressful]

²[1 – Extremely Low/10 – Extremely High]

Source: own projection, using SPSS

In order to validate further analyses of both job and organizational stress, skewness and kurtosis values are included in order to ensure basic assumptions of Ordinary Least Squares Regression (OLS), which will serve as the main statistical modelling approach for this paper (Cohen et al., 1983; Hair et al., 2010). The statistical analysis supports the use of Ordinary Least Squares Regression (OLS) for the initial assessment of job stress and organizational stress. Skewness, which gauges normality by measuring asymmetry, shows virtually normal distribution

for job stress (skewness value of -0.32) and no measured skewness for organizational stress (value of 0.00). Kurtosis values, indicating outliers, are below three for both job and organizational stress, suggesting flatter and thinner data distributions compared to normal distributions. Line graphs in Figures no. 1, 2, and 3 visually depict stress variables and employee morale for inspection.

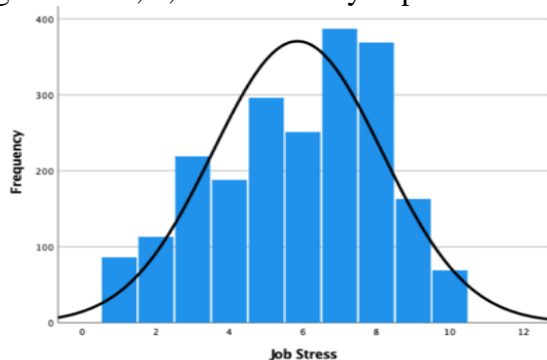


Figure no. 1. Job Stress Variable

Variable

Source: Own elaboration using data from SPSS analysis

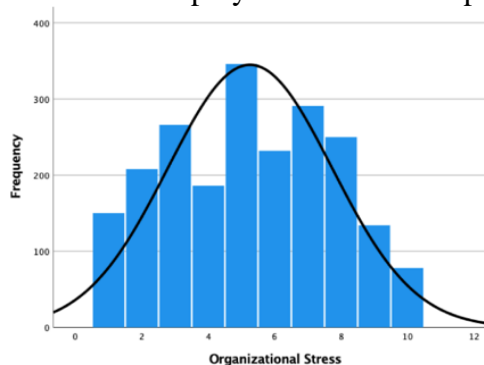


Figure no. 2. Organizational Stress

Source: Own elaboration using data from SPSS analysis

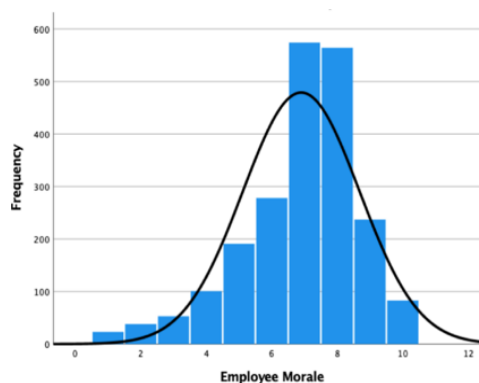


Figure no. 3. Employee Morale Variable

Source: Own elaboration using data from SPSS analysis

However, comparing these stress measures to other research is challenging due to differences in measurement methods, such as the use of multi-item instruments or more traditional 5-point Likert-type response values by other researchers. (Bright, 2021; Dima, Meseșan Schmitz et al, 2021). Dima et al. asked 83 Romanian Social Workers to rate their perceived job stress level on a scale of 1 to 10 using an online survey in the field from July 2020 through December 2020. Given the authors' intentions to study the effects of the COVID-19 pandemic on job stress, it is not surprising that the mean job stress level for this sample was 8.61, a 47% higher mean value than the current study's mean value of 5.9.

Table no. 2. Percent Distribution and Mean of Job Satisfaction

Satisfaction	% Very Dissatisfied	% Dissatisfied	% Neutral	% Satisfied	% Very Satisfied	Mean
• Salary/remuneration	4.7	14.6	23.0	47.6	10.2	3.4
• Work/life balance	3.7	14.4	25.1	44.8	12.1	3.5
• Career/training	12.8	23.6	30.4	26.0	7.2	2.9

[1 – Very Dissatisfied / 5 – Very Satisfied] N= 1930

Source: own projection, using SPSS

Table no. 2 shows the percentage distribution of three global satisfaction variables along with the mean score. The surveyed IT workers are generally satisfied with all three areas of their

professional experience. The majority of respondents (57.8% and 56.9%) are very satisfied or satisfied with their current salary and work/life balance, respectively. However, 30.4% of respondents select "Neutral" for career development and/or training programs. Unlike salary and work/life balance, more respondents are overall dissatisfied with existing career development and/or training programs (36.4% vs 33.2%).

Pearson Correlation Coefficients of Stress, Morale and Satisfaction: moving to Table no. 3, a bivariate Pearson correlational analysis, similar results follow from those of above statistical relationships. All Pearson correlation coefficients are significant at the $p < 0.01$ level. What is of special importance is the relationship between the two stress categories, job and organizational, which heretofore have not been displayed. As is expected and hypothesized, job and organizational stress are highly correlated with a Pearson correlation coefficient of 0.58. On the other hand, they do not represent identical concepts as there is still much variation left to explain ($R^2 = 33.8\%$). Employee morale is slightly more correlated to organizational stress as compared to job stress (r equals -0.32 and -0.11 respectively).

Table no.3. Correlation (r) of Stress and Satisfaction

	Job Stress(r)	Org Stress(r)
<u>Organizational Climate</u>		
Organizational Stress	0.58**	
Job Stress		
Employee Morale	-0.11**	-0.32**
<u>Satisfaction</u>		
Salary/remuneration	-0.10**	-0.19**
Work/life balance	-0.30**	-0.30**
Training/career dev prog.	-0.13**	-0.28**
† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$		
Source: own projection, using SPSS		

As was indicated in the previous analysis of stress and satisfaction, all satisfaction dimensions are negatively correlated to stress. As satisfaction increases, stress decreases. And again, the strongest stress correlations are for work/life balance. The lowest correlation value is for salary and job stress, maybe a realization of the relatively lower level of power over this job factor and increasing salary desires. On the other hand, overall correlation values are higher for organizational stress. For all three domains of satisfaction, there is ample evidence that employees do perceive a connection to their employer in a general way, as responsible for policies and benefits that can increase or decrease satisfaction.

Multivariate Regression Parameter Estimates of Stress: table no. 4 and 5 present multivariate regression models (OLS) with job stress and organizational stress as dependent variables. Some initial comments are necessary. The two models presented represent the most parsimonious models estimated utilizing the adjusted R^2 model fit statistic. All previously presented variables were included in the subsequent model construction work (not shown). Brackets indicate the reference category for variables included in their categorical forms.

Moving to Table no. 4, an analysis of regression estimates for job stress, there are again strong evidence of the relationship and appropriate inclusion of both organizational stress and employee morale, both significant at the $p < 0.01$ level. In Model 1, for every one-point increase in the mean for organizational stress, mean job stress increases by 0.52 points, net of other variables. The first interesting result that lies in contrast to earlier bivariate statistics is the relationship between job stress and employee morale. Even as Table 4 indicated a small but statistically significant negative correlation between job stress and employee morale, the OLS parameter estimate for the multivariate model shows a positive (and statistically significant at the $p < 0.01$ level) effect for employee morale on job stress. Within this model and for this data, as morale increases, job stress increases (to be sure by a small value). Further analyses were undertaken to discover the variable or variables responsible for the change in sign (not shown). In brief, the

additional of organizational stress inverts the sign of the estimate employee morale. As is hinted at in the Table 4, the correlation between employee morale and organizational stress is much stronger than for job stress. This indicates that organizational stress either (1) suppresses the true relationship between job stress and employee morale, (2) there is a non-linear relationship between these three variables or (3) autocorrelation is a possible challenge. To test (3), Variance Inflation Factors were calculated for Model 1 resulting in low values (1.11 for both organizational stress and employee morale). This points to the possibility of a suppressor and/or a non-linear effect. To ascertain, a squared interaction term was calculated between organizational stress and employee morale. Inclusion of this variable in Model 2 resulted in a positive estimate between both stress variables (0.17), a negative estimate (-0.14) between employee morale and job stress and a small positive squared term is positive with all estimates being statistically significant at the $p < 0.01$ level.

Table no. 4. OLS Regression of Job Stress

	Model 1	Model 2
Intercept	1.18**	3.49**
Organizational Stress	0.52**	0.17**
Employee Morale	0.14**	-0.14**
Employee Morale*Org Stress	---	0.05**
Management Position		
[Upper management]	---	---
Middle management	0.60*	0.60*
First level management	0.24	0.24
Non-management position	0.20	0.20
Tenure		
[< 1 year]	---	---
1 – 2 years	0.26†	0.23†
3 – 5 years	0.37**	0.36**
> 5 years	0.10	0.10
Employment Status		
[Full-time]	---	---
Part-time	-0.53*	-0.61**
Sub-contractor/Freelance	-0.16	-0.14
Other	-1.04**	-1.12**
Work/Life Balance Satisfaction		
[Very Satisfied]	---	---
Satisfied	0.45**	0.41**
Neutral	0.82**	0.77**
Dissatisfied	1.14**	1.15**
Very Dissatisfied	1.32**	1.44**
Adjusted R²	37.4%	37.1%
N	1552	1552

[Reference group]

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$

Source: own projection, using SPSS

The interpretation of this model parameterization indicates a weak non-linear relationship exists between these two variables. Looking at mean job stress values by employee morale levels, there is evidence of a slight “hump” in the data for job stress.

The study finds that the correlation between job stress and employee morale is influenced by a steeper relationship at higher morale values. When employee morale is low and increasing, it has little impact on job stress until a morale value of "7," after which there are significantly steeper

drops in job stress. Although two models have similar R² values (37.4% vs. 37.1%), the author considers Model 2 as the better empirical model for further reference. Middle managers, compared to upper management, show a statistically significant relationship with job stress. Tenure has a weakly significant relationship with increasing job stress, and non-full-time employees, especially those with an "other" employment status, experience lower job stress levels.

The analysis also highlights that work/life balance is a statistically significant satisfaction domain for job stress. As satisfaction decreases, job stress increases, with the "Very Dissatisfied" group showing the largest increase in mean job stress. The overall model explains 37.1% of the variance in job stress. In Table 5, the study replaces job stress with organizational stress. Both types of stress are significantly related, showing a robust relationship in the dataset. Employee morale has a negative and statistically significant parameter estimate predicting organizational stress. Age is positively associated with organizational stress, while tenure is weakly negatively associated. Increasing tenure leads to slight decreases in organizational stress, indicating that age, more than tenure, drives experienced increases in organizational stress.

Table no. 5. OLS Regression of Organizational

	β
Intercept	2.73**
Job Stress	0.55**
Employee Morale	-0.27**
Age	
[18–24]	---
25–30	0.27†
31–35	0.47**
36+	0.60**
Tenure	
[< 1 year]	---
1 – 2 years	-0.13
3 – 5 years	-0.23†
> 5 years	0.21
Work/Life Balance Satisfaction	
[Very Satisfied]	---
Satisfied	0.31*
Neutral	0.56**
Dissatisfied	0.43*
Very Dissatisfied	0.13
Training/Career Dev. Programs	
[Very Satisfied]	---
Satisfied	0.48*
Neutral	0.40*
Dissatisfied	0.68**
Very Dissatisfied	1.12**
Adjusted R²	41.7%
N	1544
[Reference group]	
†p<0.10; *p<0.05; **p<0.01	

Source: own projection, using SPSS

In similar fashion to the relationship with job stress, work/life balance satisfaction is negatively associated with organizational stress. The main difference between these relationships is

both the magnitude of the estimate effects (the largest estimate being 0.56 for the “Neutral” category in this model as compared to 1.44 for the “Very Dissatisfied” in the job stress model) and the level of statistical significance (“Very Dissatisfied” does not reach statistical significance at the selected test levels in this model). The more impactful satisfaction domain relates to training and career development. Here there are stronger parameter estimate effects, resulting in a monotonic increase in organizational stress with decreasing satisfaction with extant training and career development ecosystem among respondents’ employers. As is expected, those who indicate they are “Very Dissatisfied” with this professional benefit, expectation or experience are the most stressed about their current organization.

It is unfortunate that any research on and discussion of the workplace environment before March of 2021 must now be concluded with, in the least, a cursory review of the multiple and wide-ranging effects COVID-19 has undoubtedly had on the global work environment (for a review, see Rastogi and Dhingra, 2020). Levels of stress of all types greatly increased during the initial stages of the pandemic and have not abated, leading to new studies on the prevalence of post-traumatic stress disorders (PTSD) on health care worker populations (Yili, Xin et al, 2021). Much other research has been published focused on a wide array of professions and COVID-19 related phenomena, such as increases in working from home (Țălnar-Naghi, 2021).

5. DISCUSSION: BEST PRACTICES ON HOW TO MINIMIZE THE STRESS

Initial individual-level results continue to support the JD-R model by showing that demographic and job characteristics, rough approximations for job demands, were strongly correlated and in expected directions. For example, one of the clearest and strongest relationships involved middle management, the highest mean job and organizational stress levels within bivariate analysis and a significant estimate to job stress within multivariate models. This is consistent with findings in the literature that highlight the stressful role middle managers hold in most organizations, caught between responsibilities for subordinates below and accountability to those above (Buick and Thomas, 2001). One might conjecture that increasing job demands for middle managers outstrip increasing job resources leading to higher job stress. This lies in contrast to a recognition of higher levels of access to workplace resources that apply to all employees but become more visible to managers, and maybe more appreciated, leading to lower levels of organizational stress.

In summary, there is ample evidence to support the first hypotheses presented: (H1) Job and organizational stress will be positively correlated to each other.

Of much research interest is the strong, statistically significant finding of employee morale’s indirect relationship with both job and organizational stress (Increasing morale, all things being equal, should lead to decreasing stress and increased satisfaction (Hoff, Song et al, 2020). In summary, there is ample evidence to support the first hypothesis presented: Demographic variables will be significantly associated with job stress. In summary, there is strong evidence to support the second hypothesis (H2) presented that employee morale will be negatively correlated to both job and organizational stress.

The strong and statistically significant finding of the negative relationship between increasing work-life satisfaction and decreasing job and organizational stress deserves special focus (Table no. 5 and Table no. 6). This dataset confirms the extant literature that is replete with studies focused on the critical importance of employee work-life balance for reducing stress and turnover. These results match well with current survey data on Romanian IT professionals. Brainspotting’s most recent survey of almost 6,000 Romanian IT professionals asks questions on salaries, satisfaction and other perceptions. On the question on how IT workers evaluate their current and prospective employer, the top four responses were “The company pays well” (74%), “The company develops complex projects and works with new technologies” (70%), “Company invests in the well-being of the employees” (69%) and “Company invests in the training and development of its employees” (68%)

Finally, increasing satisfaction with training and/or career development programs was significantly associated with decreasing organizational stress, net of all other controls. The ground breaking study conducted by Andreassi, Lawter et al, (2014) develops a sophisticated framework for testing the effectiveness of professional training programs on job satisfaction by incorporating uncertainty avoidance as a moderator of this relationship. Given that Romania's uncertainty avoidance score is 90 (out of 100), it is interesting then that as satisfaction with training increases, there is not a multivariate relationship with job stress, indicating that, to some degree, there is support for this hypothesis. On the other hand, there is a strong, negative relationship between training satisfaction and organizational stress. This portends positive possibilities if, even with high uncertainty avoidance, Romanian IT workers do value training and career development, inexorably as the fastest path to career advancement and salary increases. As a reminder, 68% of surveyed IT professionals by Brainspotting (2021) listed "Company invests in the training and development of its employees" as one of their top four criteria for evaluating their employer. The third hypothesis presented (H3), namely that job satisfaction will be negatively associated with job and organizational stress, finds initial strong evidence for work-life balance satisfaction only.

6. CONCLUSION

Organizations need to implement management policies and practices that support employees in managing technostress because the challenges and opportunities for Romanian IT employees and the firms that employ them are multifaceted. While financial remuneration remains a primary motivator for emigration, there are other impactful tools within the employee engagement toolkit that can decrease stress, boost satisfaction, and ultimately reduce attrition.

Beyond salary increases, benefits such as flexible hours, remote work (particularly relevant post-COVID-19), and diverse child-care arrangements rank high among IT professionals. To capitalize on these opportunities, IT firms should conduct comprehensive surveys addressing organizational climate, workplace culture, stress, employee morale, and benefit satisfaction. Ensuring employee involvement in data review and the implementation of policies arising from these surveys is crucial for fostering confidence and trust in the organization. Distinguishing between job stress and organizational stress is vital, as they require separate measures, analyses, and interventions. Management should create instruments during evaluation cycles that allow for the collection of stress-related data, incorporating both downward and upward evaluation strategies for comprehensive insights. Special attention should be paid to the stress and satisfaction experiences of middle managers, with targeted professional development programs and support systems to address their unique challenges.

Building and maintaining positive organizational climates and workplace cultures are key strategies. Mitigating the negative relationship between decreasing work-life balance satisfaction and increasing job and organizational stress is crucial. With the rise of telework, addressing communication needs, rethinking work-life balance in the post-COVID-19 era, and innovating in company-supported childcare are essential considerations. The global shift to remote work has also highlighted the importance of social relationships in the workplace. Companies must find ways to foster both digital and physical connections among workers to enhance social support, decrease stress, and boost satisfaction and productivity. The transformation of company culture will be influenced by how organizations adapt to new modes of interpersonal contact within the context of policies and procedures. Additionally, supporting the physical environments of IT workers who work from home is crucial. Balancing the integration of home and work environments is necessary to ensure a healthy work-life balance. The challenges faced by IT workers, both traditional and emerging, underscore the interconnectedness of stress, satisfaction, and productivity.

In conclusion, understanding the specific preferences and needs of Romanian IT workers enables the design of more efficient and supportive working environments. Recognizing the dynamic nature of the IT sector and considering the impact of both longstanding and emerging factors will contribute to the creation of a resilient and adaptive workforce in Romania.

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