Impact of Technostress on Productivity in Indian Public Sector Banks

Mohammed Abdul Nayeem & Sibabrata Nanda

The advancements in technology implementation in organizations like banks have contributed to the stress on the employees, relating to technology and computers. This is termed as "technostress". This study finds a relationship between the technostress and the performance of the employees of the Indian public sector banks from three Indian states numbering to a sample of 350 bank employees using a random sampling method. Findings from the study revealed that there exists a strong relationship between technostress factors and productivity, mostly negative, among the hypothesized relationships which are in line with many prior researches. Consistent with the extant literature, the study contributed to theoretical and managerial development.

Mohammed Abdul Nayeem is Associate Professor, Department of OB & HR, IBS Business School Hyderabad (Email: nayeem@ibsindia.org). ***Sibabrata Nanda*** is Manager, India Post Payments Bank, Rairangpur, Odisha. (Email: sibabratananda@gmail.com).

Introduction

Work-related stress is not a new phenomenon, the ever-increasing demands at work led to many physical, mental, emotional problems resulting in poor mental health, burnout, and sometimes depression. While the research on reduction of stress at the workplace is going on for decades, on the other hand, technology introduction at the workplace has some impact on the work and the workers. Technology has been an essential part of every organization and a part of the jobs of the employees. With the advent of technology at the workplace, technology-induced stress is commonly seen in organizations. The employees have to undergo the stress of technology at the workplace and term it as the Technostress (Dragano & Lunau, 2020).

Stress has been defined as "a person's adaptive response to a stimulus that places excessive psychological or physical demands on that person." Technostress is a word that evolved from human psychology when

Craig Brod (1984), a famous clinical psychologist defined it as "a modern disease of adaptation caused by an inability to cope with the new computer technologies healthily." With the advancement in computer technology and the implementation of many sophisticated information technology tools, technology has been changing by its definition. Technostress has been defined as any negative effect on human attitudes, thoughts, behavior, and psychology that directly or indirectly results from technology (Weinert, Maier, Laumer, & Weitzel, 2019). It has been also known as technophobia and computer anxiety. It manifests itself in two distinct, but yet related ways, viz. the struggle to accept computer technology and the more specialized form of over-identification with computer technology (Tarafdar et al, 2005).

This study explores the impact of technostress on the productivity of employees in the Indian public sector banks. The effect of technostress was previously tested in the USA context but on the tech-savvy IT and related industries. First, this study discusses extant literature on technostress and its relationship with productivity and performance-related variables. Secondly, the research attempts to build a conceptual framework and to achieve its objectives by testing the formulated hypothesis based on the data collection on the perceptions of the employees related to the technostress. Thirdly, this study is to retest the impact of technostress and to validate the scale developed by the previous researchers in the Indian context using the non-IT but highly technology-implemented sector. Fourthly, the study also focuses on the methodological issues in data collection, sampling frame, and use of the data analysis tools to get the right understanding of the phenomenon.

Research Question

What are the factors responsible to influence technostress in public banks in India? And does technostress lead to lower productivity among the employees of public sector banks in India? Based on the research questions the objectives of the study were formulated. The first one is to find out the factors responsible for technostress among the employees of public sector banks in India. Second, to study the impact of technostress on the productivity levels of the banking staff in the Indian context. The other objective is also to develop a conceptual framework for conjoining all important factors of technostress and productivity together.

Literature Review

The concept of technostress, though introduced way back in 1984, has been less studied upon by the researchers. The main focus has been on job stress excluding this vital aspect. Stress is a cognitive response that individuals experience when they anticipate their inability to respond adequately to the perceived demands of a given situation, accompanied by anticipation of substantial negative consequences due to inadequate response (Tarafdar et al, 2005).

*Effect of Technostress :*Bichteler (2018) reported that technostress im-

pacted a lot of areas at the workplace. Newer spaces created to expedite work and facilitate customers and staff members have received negative effects. What is considered to be the successful implementation of computerized projects turned out to be cascading as far as the libraries are concerned? The library staff reported having experienced technostress due to poorly designed workspaces. Staff also suffered fear and anxiety, and frustration issues due to the implementation of new technology. Managers play a vital role in bringing down these feelings of insecurity among the staff members by adopting new methods and address the concerns of the staff from time to time.

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Technostress is a construct that was most researched in the Information and Communication Technologies (ICT) after being explored in the libraries. Brillhart (2004) proposed data smog (information fatigue syndrome resulting from information overload), multitasking madness (role conflict), computer hassles (technical complexity), and burnout (emotional exhaustion and withdrawal) in the electronics perspective. More research was carried out by Tarafdar et al (2007), who came up with a scale to measure the technostress. The parameters were termed as techno-overload i.e. stress due to increased workload by the use of the technology, (Ragu-Nathan et al, 2008), techno-invasion i.e. invasion of technology on private time by increased workload, techno-complexity i.e. complexity of the technology being used, techno-insecurity i.e. job-insecurity due to the nature of technology) and techno-uncertainty i.e. technological ambiguity or information blockage (Ragu-Nathan et al, 2008). The measure of productivity was based on four items representing the construct.

Technostress is a global phenomenon where the adoption of information technology causes fears among the staff. Chen and Muthitacharoen (2016) investigated empirically the consequences of technostress in the Chinese context. The data were collected from 221 workers to test the hypotheses and it was found that there exist negative consequences of technostress beyond the confines of job-related issues that will have a greater influence on the overall job satisfaction, well being of the workers.

Progress in technology also caused in technostress. Using innovation and technostress theory and by administering questionnaires to 317 people, technostress was analyzed indirectly through innovation resistance which ultimately affected the performance of the end-users. There is strong evidence that technostress can impact the productivity and performance of workers (Kim & Lee, 2017). Ragu-Nathan, Tarafdar, Ragu-Nathan and Tu (2008) reported the phenomenon of technostress experienced by the end-user in the context of Informational Communication Technology and examined its relationship with three important variables, job satisfaction, organizational commitment, and intention to stay. Data collected from 608 end users revealed that technostress contributes to

the reduction in job satisfaction, leading to less organizational commitment and hence intention to quit the organization. On the other hand, adopting technostress inhibitors increased job satisfaction, strong organizational commitment, and less intention to quit. Gender, age, computer literacy also played an important role in determining the relationship between technostress and these three job-related variables.

There exists a curvilinear relationship between organizational tenure and job performance.

Relationship between technostress and other job-related variables: There are mixed results when it comes to technostress and other job-related variables. One such study by Wihler, Meurs, Kramer and Blickle (2015) also provided mixed results regarding job tenure and job performance in terms of general mental ability. The study hypothesized that job tenure is positively related when general mental ability is high and job stress is low. The results from the study indicate that general mental ability and job stress affect job tenure on work performance. Uppal (2016; 2017) studied job design, job stage using conversation resource theory models to probe the moderating effects of motivational job characteristics on organizational tenure and job performance. This longitudinal study with a sample of 679 people covering 19 different profiles and 13 public sector organizations, found that there exists a curvilinear relationship between organizational tenure and job performance.

De Sivatte, Gordon, Olmos and Simon (2018) investigated job experience, site experience, and job performance among Spanish bank employees on a large data pool for a longitudinal study. Job experience showed a positive relationship with job performance whereas site experience showed a negative. Role of gender also played an important role in moderating the relationship between these variables. Sunanda (2018) on the other hand, looked at organizational commitment and its relationship with job satisfaction among public and private university teachers in Nigeria. Park and Noh (2018) studied Korean women managers and the influence of job stress and managerial efficacy on job satisfaction. They considered job satisfaction closely related to job performance and findings from the study revealed that enhancing job satisfaction of women managers leads to better productivity and performance.

Relationship between technostress and public sector organizations: Much of the early works on technostress started in private organizations as the penetration of technology is high in the private sector. Emulating the private sector and with the growing demand to cater to the needs of the public at large, many public organizations have also started to implement technology in their firms. This new addition of technological base in public organizations led to technostress among the employees as these members of the organizations were slow in adapting to the technological change.

Mathews and Shulman (2005) extended Kay's (1995) model of sustain-

able competitive advantage of private sector organizations to the public sector organizations. Using a case study method approach the authors analyzed how a public sector organization engaged in public good through the creation of a knowledge base and services. According to the authors, public sector organizations face a paradox, on one hand, they need to deliver goods and services to the public good and on the other hand, they have to also maintain sustainable competitive advantage.

Among several studies conducted in the public and private sector banks to know the influence of work-related stress on employees' well-being, Mundia (2019) investigated stress in a work environment of public and private sector bank employees in Brunei. Using a quantitative questionnaire survey the author gathered the data from 860 randomly selected employees of public and private sectors to conclude that work-related stress was found to be prevalent among the public and private sector employees. Education and family support play an important role in managing stress levels. Unaddressed stress leads to low productivity levels.

Research Gap

The previous and extant literature highlighted the need for coping behavior from both organizations and employees to overcome the technostress-related issues at the workplace. Although studies have focused on the private sector organizations to a large extent in India public sector particularly banks have undergone a sea change in terms of adapting to technology and there is a wide gap that exists to ascertain what factors lead to technostress among the public sector banks in India.

Most of the studies in the past have concentrated on the job-related or work-related variables and their impact on the performance of the employees. No study brought a conceptual framework to know the antecedents of technostress and its impact on the productivity of the employees in public sector banks in India. Therefore, there's a need to study the impact of technostress among the employees of Indian public sector banks and to know what adverse effects on the physical and mental well-being of the employees due to technostress.

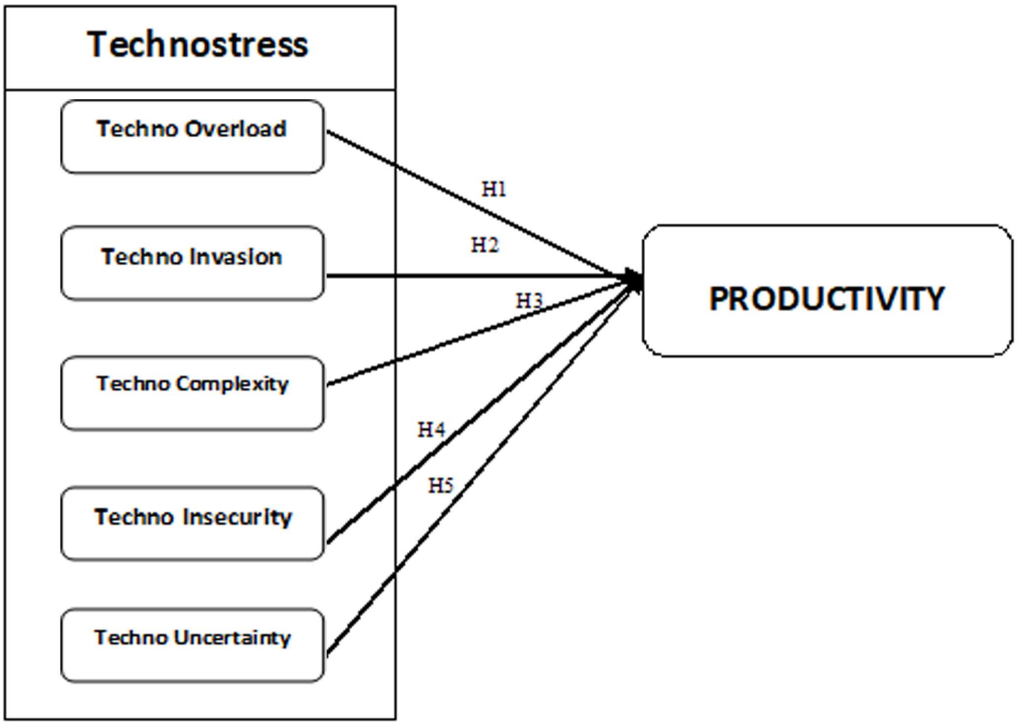
Theoretical Framework & Hypotheses Formulation

The technostress creators viz. techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty will form the construct technostress. As we discussed earlier, there may exist an impact of technostress on productivity. The model below depicts the same thing. (Fig. 1)

Relationship between Techno Overload & Productivity

In line with the literature review, techno-overload is nothing but forcing employees working in the ICT environment to work more than the required number of hours and the work needs to be completed in a quick session. So both quantity and time increased to meet the demands of the work (Jena, 2015). It is

Fig. 1. Theoretical Model of Factors Affecting the Technostress & Productivity



argued that due to this forced techno - overload the productivity of the employees gets affected (Lee, Lee & Suh, 2016). Therefore, employees who are overloaded with the technical work will be associated with the productivity levels of the employees negatively. Hence the following hypothesis.

H1: Techno Overload is related to productivity

Relationship between Techno - Invasion & Productivity

It is evident from the literature review that with the advent of technology at the workplace there is no distinction between work and personal life. According to Jena (2015), the work demands employees to be available 24x7 to the demands of the work. Employees feel the organization reaches out to them anytime through connected or they are expected to be available and connected with the technology to meet the demands of the work. This overall demand arising out of techno -invasion between professional and personal life will tell upon the productivity of the employees (Khan & Mahapatra, 2017). Employees feel

With the advent of technology at the workplace there is no distinction between work and personal life.

stressed due to the invasion of technology in their personal life and that will affect the productivity at the workplace. Therefore, the next hypothesis:

H2: Techno Invasion is related to labor productivity

Relationship between Complexity & Productivity

Jena (2015) pointed out that techno- complexity is a situation where the employees in the context of ICT feel that their skills, knowledge, and abilities are inadequate due to the complexity attached with the technology usage. As a result, the employees are constantly trying to keep themselves update to learn newer technologies from time to time. There's a respite to their learning new technological aspects. On the other hand, productivity will take a beating due to the complexity of the technology. The constant adjustment to new systemic changes in the technology will force the employees to look for new up-gradation of their skills and match with the existing technologies. Therefore there exists a strong relationship between the techno-complexity of the employees with their productivity levels and hence we hypothesized:

H3: Techno-complexity is related to productivity

Relationship between Techno-Insecurity & Productivity

Employees feeling insecure due to changes in technology and their inability to cope with the fast-changing nature and structure of technology cause a lot of stress and feeling of insecurity among the employees (Jena, 2015). This sense of insecurity among the employees will impact productivity at the workplace (Lee, Lee & Suh, 2016). They are constantly looking for upgrading or matching with the pace of the technology and would not give enough support in taking care of the productivity. Thus the following hypothesis:

H4: Techno -Insecurity is related to productivity

Relationship between Techno - Uncertainty & Productivity

The nature of modern technology is to constantly evolve but the ability of the employees to cope with these fast changes can be seen as uncertain and unsettled. There's always some gap that exists between technological changes constantly happenings and employees filling of the gap through their enhancing of skills to match with the pace of the technology (Jena, 2015). This unsettling and uncertain aspect of technology can hamper the productivity of the employees at the workplace (Khan & Mahapatra, 2017). They feel unsure of the movement of technological pace and to match with it leads to an uncertain situation. Hence we argue that there is a strong relationship between techno uncertainty and productivity. Therefore, our hypothesis is:

H5: Techno Uncertainty is related to productivity

Methodology

The items and factors used in the research were borrowed from the original scale development study by Tarafdar et al. (2007) and further improvised by Tarafdar, Tu, & Ragu-Nathan (2010a & 2010b). A factor analysis was done to verify whether the same factors loaded successfully in the Indian context. The factor scores were calculated by following the average factor score method for all the technostress creators and productivity. As technostress is formed with the above-mentioned five factors or the five technostress creators (independent variables), a regression was run to verify the relationship with the productivity (dependent variable).

Sample & Data Collection

Data were collected from different public sector bank employees in three states, Chhattisgarh, Odisha, and Andhra Pradesh. The public sector banks have generally similar set up of infrastructure and similar work habits. The survey was conducted for the data collection. Questionnaires having 27 items from the previous scale were administered in which 23 measured the five technostress creators and the last four items measured productivity. Participation in the survey was entirely optional and the filled-in questionnaires were mailed back to the researcher. The data was collected by the researcher in the state of Andhra Pradesh. A few oral translations were required in some places in Odisha and Chhattisgarh. The responses were appropriately represented in the questionnaire form by the respondents after clearly understanding the questions. Total 350 questionnaires were administered out of which 142 usable questionnaires were received. The demographics for the respondents such as age, gender, and educational qualifications, etc were sought off for use in further extension of the study.

Measures

The scale developed by Tarafdar et al. (2007) has been in use for measuring technostress and its impact on productivity. The scale was developed in the USA context. Tu et al. (2005) have tried to revalidate it in the Chinese context. The five dimensions (total 23 items) of technostress and productivity (total 4 items) were used for this study. Responses on all items were gathered through a 5-point Likert scale fixed as 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree.

Results

After the responses were received, factor analysis was conducted to check any difference in loading of the items as in the original study. According to Tarafdar et al (2007), factor analysis identifies the underlying factor structure and thus provides initial unidimensionality (convergent validity) among the items in a factor. In this study, principal component analysis was used as the method in the factor analysis with the varimax rotation. The items loaded in the same factors they were intended to load. The reliability for each factor was tested with

Cronbach's alpha. The alpha values for techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty were found to be 0.935, 0.914, 0.895, 0.860, and 0.918 respectively. For the factor productivity, Cronbach's alpha was calculated to be 0.859. That indicates the internal reliability of the measure. The loading plot of the factors is as shown in the figure.

Table 1. KMO & Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.790
Bartlett's Test of Sphericity	Approx. Chi-Square	3.467E3
	Df	351
	Sig.	.000

Table 2 Factor Analysis - Rotated Component Matrix

	Component					
	1	2	3	4	5	6
Q1	.953					
Q4	.919					
Q3	.883					
Q2	.856					
Q5	.799					
Q11		.896				
Q12		.879				
Q10		.810				
Q13		.802				
Q14		.752				
Q16			.953			
Q17			.931			
Q18			.920			
Q19			.799			
Q26				.818		
Q24				.778		
Q27				.773		
Q25				.722		
Q15						
Q6					.910	
Q7					.906	
Q9					.891	
Q8					.822	
Q23						.910
Q20						.845
Q21						.788
Q22						.750

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

As the factors loaded comfortably, the factors were measured using the average score method of the items. The factor scores thus calculated were put into the regression equation to find out the relationship between productivity and the technostress creators. The results of the regression are as shown in Table 3.

Table 3 Regression Analysis - Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.605[a]	.366	.342	.32811

a. Predictors: (Constant), TCHNOUNCER, TCNHNOVRLD, TCHNOINSEC, TCHNOCOMPLX, TCHNOINV

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.439	5	1.688	15.678	.000[a]
	Residual	14.641	136	.108		
	Total	23.080	141			

a. Predictors: (Constant), TCHNOUNCER, TCNHNOVRLD, TCHNOINSEC, TCHNOCOMPLX, TCHNOINV
b. Dependent Variable: PRODUCTIVITY

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.780	.377		2.069	.040
	TCNHNOVRLD	-.093	.064	-.102	-1.460	.100
	TCHNOINV	-.209	.074	-.201	-2.838	.005
	TCHNOCOMPLX	-.126	.051	-.173	2.461	.015
	TCHNOINSEC	-.004	.039	-.008	.113	.100
	TCHNOUNCER	-.538	.073	-.541	7.381	.000

a. Dependent Variable: PRODUCTIVITY

The regression results show that the model has a relatively low R^2 value, but the F value is significant (p<0.00). This implies the overall model fits but explains only a low or weak relationship. Comparing the beta coefficients, it is clear that techno-overload and techno-insecurity are negatively significant (p=0.1). Techno-invasion has a negative beta coefficient and hence is inversely related to productivity. So also techno-complexity and techno-uncertainty are negatively related to the productivity.

For a new or complex technology, the time taken to understand it and make use of it will be more compared to the less complex or old technology. In the former case, it may invade private life, whereas the complexity factor will also be high. In this case, we can see that as per the equation above, the resultant is a positive relationship between productivity and technostress. So, for the public banks of India, techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty are the creator fac-

tors for technostress and technostress in whole has a good relationship with productivity.

Hypothesis Testing

For testing of the hypothesized relationship, in this study, we have regression analysis to check the relationship of variables with SPSS 21.0 version as a tool. Factor analysis is used for the extraction of organic and composing factors and we have also composed factor scores and the same factor scores were used for further analysis of the data. These factor scores represent each one of the factors namely –Techno-overload. Techno-invasion, Techno-complexity, Techno-insecurity, Techno-uncertainty, and Productivity. The independent variable has five factor scores and the dependent variable has a one-factor score. Therefore, the dependent variable factor is regressed with the independent factors, and the summated factors of all the independent variables were also functionalized. The result of the regression equation is given in Table 3. The regression model has got a relatively good R^2 value (0.36). This implies the overall model fit and explains a good relationship among the variables. Comparing the beta coefficients, it is clear that all independent variables are significant ($p<0.10$). Therefore, we found support for hypotheses H1- H5.

The earlier studies have also found support for the dimensions of the technostress (Jena, 2015). The study did not hypothesize the directionality of the independent and dependent relationship.

Technostress is entrenched in the work systems of the public sector banks in India.

We found that all the five dimensions of technostress are negatively related to productivity. The results are not surprising as technostress is entrenched in the work systems of the public sector banks in India.

Discussion

This study contributed to the theory and practice of technostress and productivity, using the theoretical framework drawn from the literature review. This study conceptualized and provided theoretical and empirical validation for the concept of technostress and its impact on productivity. Earlier studies have focused on technostress and its relationship with job satisfaction (Jena, 2015), technostress and job performance (Marwat & Khan, 2010), technostress and innovation (Chandra & Srivastava, 2019). Apart from technostress with many other dependent variables, studies in the past have also explored different contexts like the private sector, public sector (Mathew & Shulman, 2005), libraries (Gorman, 2001), academic institutions (Jena, 2015), banking (Sunanda, 2018; Khan & Khan, 2018), Pharmaceuticals industry (Marwat & Khan, 2010), Physical education (Rahimi, 2008).

The research reveals a moderate but significant relationship between technostress and productivity in the Indian public sector banks context that

comes in support of the findings by Hunter and Thatcher (2007). The previous researches have landed upon the conclusions of a negative relationship (Brillhart, 2004; Tarafdar et al., 2007; Ragu-Nathan et al., 2008) and a non-significant relationship (Tu et al., 2005 ; Ahmed et al., 2011). Hence it calls for more research to validate these different findings.

Limitations & Future Research

Firstly, the sample size is restricted to three states of India and hence there cannot be a generalization about the study. Secondly, productivity was measured from the items the respondents reported themselves. Therefore, there might have been a chance of bias. Further studies can be carried out taking a direct measure of productivity to validate the findings. Future research can take up productivity measures from secondary data sources.

This paper opened many ways for the extension of the study. Firstly, the impact of technostress and the creators of technostress can be measured in the other public sector organizations in different contexts too. Secondly, the impact can be measured in the private banks in India and other countries with other private or public sector organizations. A comparative analysis can be made to understand the extent to which both private and public sector banks differ in terms of technostress and its impact on productivity. Thirdly, the study analyzed the relationship between the technostress creators and productivity. So much more can be explored by carrying out new researches especially during the COVID 19 times where the world was shut down and most of the activities were happening using ICT tools and Work From Home (WFH) or Work From Anywhere (WFA) had become the norm. Many employees were facing technostress more than ever before. If the situation continues under lockdowns then there would be severe repercussions on the employees' well-being in the organizations. COVID 19 induced restrictions on physical movements and work from anywhere using the technology and internet tools is altogether a big area to explore. It will also be interesting to check the technostress relationship with other important job-related variables like job satisfaction, organizational commitment, turnover, absenteeism, managerial support, etc. Education and experience variables can also be studied along with these to explore its impact on the overall technostress on the employees.

Conclusion & Recommendations

Technology is an inseparable part of any organization and is going to stay in the majority of jobs. In most cases, it makes our life easier and our work more productive (Tarafdar et al, 2005). But many a time modern technologies exert negative psychological and social impacts that should not be neglected. Technostress, being stress in nature, may lead to physical illness, fatigue, and mental disorders that eventually lead to excessive absenteeism (Brillhart, 2004; Tarafdar et al, 2007). The cost involved in all these is huge to the organization and

the country as a whole (Brillhart, 2004;Tarafdar et al, 2007). The studies in the west confirmed these propositions.

However, our study found no negative relation between technostress and productivity as the case in the west. That may indicate that the stress caused due to technology in the public sector banks in India is not so severe or is just to make use as a trigger to enhance productivity (Hunter & Thatcher, 2007). The Indian government might take this as an indication and a precautionary measure, not to meet the same fate as their western counterparts. A clear HR and organizational policy might help employees in coping up with the pressures of technostress.

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