Relationship Model of Technostress and Ergonomics Risk Factors in Call Center Industry

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Abstract: The advancement of information and communication technology brings an innovative way of doing business and due to the rapid introduction of technology in the workplace may cause the organization to suffer technology stress. This study aimed to develop an interplay model of technostress and ergonomics risk factors in business process outsourcing industries. To achieve the objective of this study, a sample was conducted to 572 call center agents. After the data filtering process which involves the amputation of insincere responses, 383 research participants from different business process outsourcing industries. This study employed a quantitative descriptive survey method. The questionnaire underwent factor loading and reliability analysis. Structural equation modeling technique was used to test the relationship and predictive capabilities of the variables. Findings showed that ICT users experienced technostress due to information overload and technological advancement in the workplace. Moreover, the effect of technostress in workplace manifest in the emotional and physical aspect of the user. This study found out a significant predictor of technostress in work body posture and workplace design. Overall, the findings provide some insights for the managers of business process outsourcing industries on technostress and ergonomics risk factors in ensuring a healthy work environment through ergonomics intervention strategies.

Keywords – Technology management, technostress, workplace, ergonomics risk factor

I. INTRODUCTION

Information and communication technology (ICTs) in the workplace has grown appreciably in recent years. The development of ICTs become beneficial to the world, but on the other hand, constant changes in ICTs become a leading source of pressure for most individual, especially those employees independently working in the workplace. The development information and communication technology creates an innovative way of doing business and possibly enhance the productivity of people and modify new work practices. However, the progress of ICT in the organization generates negative consequences in the individuals' life. As businesses need to satisfy and provide customers' requirements efficiently and the need for market share to increase and stay connected with their customers 24/7 become the most stressful and high-risk work in corporations nowadays.

The call center industry is available 24 hours, seven days a week to serve the customer by accepting a massive amount of requests via telephone and email, penetrating record and information of the customer through a computer. Call center industries are the primary adopter of technologies, becoming a fast-changing and renewing technology in the business sector. The use of these fast-changing and renewing technologies generate a source of pressure among call center

agents. The need for advanced computer and ICT facilities in the workplace are inseparable primarily to keep the operation running efficiently. Therefore, it is imperative from the management viewpoint to address the ergonomics issues in the workplace and related technostress among ICT users.

Consequently, the study aimed to generate a relationship model of technostress and ergonomics risk factors in call center industry. The result of the analysis will provide an output of ergonomics based intervention strategy.

A. Objectives of the Study

The primary purpose of this research was to generate a model for the interplay of technostress and ergonomics risk factors in business process outsourcing industries at CALABARZON area as a basis for ergonomics based intervention strategy. Specifically, this research aimed to answer the following questions (1) to present the demographic profile of the respondents in terms of age, gender, highest educational attainment, length of experience, type of work schedule and types of call services (2) to determine the level of technostress caused by information and communication technology in terms of technology overload, technology invasion, technology complexity, technology insecurity and technology uncertainty (3) to identify the effects of technostress in the workplace in terms of behavioral, emotional, physical and psychological (4) to assess the level of ergonomics risk factor in the workplace along with work body posture, mental workload and workplace design (5) to develop model that interplay technostress and ergonomics risk factors.

II. METHODOLOGY

This research utilized a quantitative approach and descriptive method to determine the outcomes of the study. The descriptive research design is a scientific method which involves perceptive and describing the behavior of a subject matter while not influencing it in any process. The survey questionnaire was used to gather data. In this research, the researcher used purposive random sampling. A purposive sample defined as a non-probability sample that is selected based on the characteristics of a population. The total surveyed was 572, and 383 respondents only who were sincerely answered the questionnaires included in the study. The minimum number of respondents for structural equation modeling was 200 respondents [1].

The analysis of modeling the interplay of technostress and ergonomics risk factor utilized the structural equation modeling as the statistical treatment of the study.

The assumption of the data was checked using multivariate normality and multicollinearity test. The exploratory factor analysis (EFA) and Kaiser –Meyers-Olkin (KMO) and Bartlett's test of sphericity were performed to verify the sampling adequacy. The confirmatory factor analysis (CFA) was done to analyze the convergent and discriminant validity of the items. Composite reliability (CR) and average variance extracted (AVE) was calculated to check the reliability of the items. Then, the Chi-square/degrees of freedom, Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Normal Fit Index (NFI), Tuker- Lewis Index (TLI), Comparative Fit Index (CFI), Root mean square error of approximation (RMSEA) were used to examine the model fit of the hypothesis.

III. RESULTS AND DISCUSSION

A. Demographic Profile of the Respondents

Table 1. Distribution of Respondents

N = 383

Demographic Variables	Options	Frequency	Percentage
Age	20-25 years old	134	35.0
	26-30 years old	115	30.0
	31-35 years old	59	15.4
	36-40 years old	58	15.1
	> 40 years old	17	4.4
Gender	Male	159	41.5
	Female	224	58.5
Highest Educational Attainment	High school graduate	106	27.7
	College graduate	236	61.6
	Postgraduate	41	10.7
Length of Experienced	1-5 years	224	58.5
	6-10 years	123	32.1
	11-15 years	31	8.1
	> 15 years	5	1.3
Type of Work Schedule	Morning Shift	163	42.6
	Night Shift	220	57.4
Type of Call Services	Inbound Services	317	82.8
	Outbound Services	66	17.2

Based on the gathered data, the following are the results of the study. There was 134 out of 383 or 35 percent of the respondents were age 20-25 years old. This implied that BPO industries were looking for a young individual who can learn and adapt technology easily. In terms of gender 224 out of 383 or 58.5 percent were female. This showed that female was preferred mostly by BPO industries mainly because of their excellent interpersonal skills in terms of handling complaints. In educational attainment 236 out of 383 or 61.6 percent were a college graduate. The findings revealed most companies were looking a college graduate mainly because their decision making is more matured also can quickly train and less supervision in work.

In terms of length of experienced, a total of 224 out of 383 or 58.5 percent working in the call center for 1-5 years. The results discovered that call center agents stayed in the company for a short period mainly due to work stress and lack career growth. In terms of work schedule, 220 out of 383 or 57.4 percent of the respondents were working during the night shift. Results showed that majority call centers working in Philippine BPO industries were serving European or American countries. In terms of call services,

317 out of 383 or 82.8 percent of the respondents were engaged in inbound calls mainly because in the business perspective inbound calls offer a wide variety of business services which includes the inquiries, technical help, transcription, complaints, customer service, support sales, marketing, and billing.

B. Level of Agreement in Technostress Caused By Information and Communication Technologies

Table 2. Level of Agreement in Technostress Caused By Information and Communication Technologies

Technostress Indicators	Composite Mean	Interpretation
Techno-overload	3.47	Agree
Techno-invasion	3.28	Moderately Agree
Techno-complexity	3.21	Moderately Agree
Techno-insecurity	2.85	Moderately Agree
Techno-uncertainty	3.29	Moderately Agree

The assessment of the respondents in the technostress created by information and communication technologies concerning techno-overload was agreed, and the findings revealed that users are required to work much faster because of the introduction of new technologies in the workplace. This implied that users working in a technologically driven workplace were expected to be more productive and efficient, thereby reducing manual task. Techno-invasion was assessed moderately agree and found out that users of ICT were spending less time with their family mainly because of the modern communication tools and technologies, employees can reach anytime and anywhere. Techno –complexity was assessed moderately agree, and it has shown in the result that users were required to upgrade their technical skills. Mainly because BPO industries consistently improve their information and communication infrastructure which resulted in the upgrading of technical skills.

The techno-insecurity was assessed moderately agree, and it revealed that users need to continually update their skills to avoid being replaced in their position. Because of competitiveness, employers were keener to hire employees with more updated and highly developed skills as required by the job position. Lastly, techno-uncertainty was assessed moderately agree, and according to ICT users, their organization always had developmental changes in the technology they were using which was a clear indication that companies were pressured to re-engineer their processes and continuously improved their technologies to become more competitive.

C. Effects of Technostress in the Workplace

Table 3. Effects of Technostress in the Workplace

	Composite Mean	Interpretation
Behavioral	3.19	Sometimes
Emotional	3.32	Sometimes
Physical	3.66	Often
Psychological	3.19	Sometimes

The respondents have assessed the adverse effects of technostress in the workplace. The respondents have sometimes experienced insomnia in the behavioral aspect of technostress. This implied that the majority of respondents were working at night which resulted in disturbance of the body's natural biological clock through circadian rhythms. Sometimes respondents experienced irritability in the emotional aspect mainly to the complexity of technological feature in the information and communication technology tools and devices. In terms of physical aspect, they were often experienced back pain due to prolonged sitting, and poor posture in the workplace. The findings showed that respondents did not observe correct posture while doing their work in the computer and lastly, the psychological aspect of technostress sometimes experienced information overload due. It may seem to indicate that users might be unsure as work activities need more attention which creates a mental overload.

D. Level of Ergonomics Risk Factor in the Workplace

Table 4. Human Risk Factor in the Workplace

	Composite Mean	Interpretation
Work body posture	3.63	Agree
Mental Workload	3.54	Agree
Workplace Design	3.59	Agree

The respondents have assessed the level of a ergonomics risk factor in the workplace. Findings showed that in terms of work body posture, respondents agreed in the risk factor and it revealed in the study that working on the same physical position was a dominant risk because of the nature work in the computer and engagement in telephone calls. The presence of uncertainty in mental workload has shown that having a lot of technical knowledge and information process was considered prevalent. Since the majority of respondents were engaged in inbound calls, it was expected more inquiries were coming in which requires technical expertise and resulting in mental fatigue. Lastly, the workplace design assessed agreed by the respondents and identified that adjustability of the chair had contributed risk factor among users. The vital aspect of workplace design is the adjustability of the chair because it allows the users to move freely from a stationary position which prevents them from having back pain.

E. Interplay Model of Technostress and Ergonomics Risk Factor

The research developed a model that interplay technostress and ergonomics risk factors using exploratory factor analysis, confirmatory factor analysis, and structural equation model.

Table 5. Test of Sampling Adequacy

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.928
Bartlett's Test of Sphericity	Approx. Chi-Square	12002
	df	1128
	Sig.	.0000

Table 5 presents the test of sampling adequacy, and the result of KMO is 0.928 and Bartlett's test of sphericity resulted in a significance value of .000 and approximate chi-square value of 12002. The result shows the acceptance of factor analysis was satisfied. A statistically significant Bartlett's test of sphericity (sig. < .05) indicates that sufficient correlations exist among the variables to continue [2]
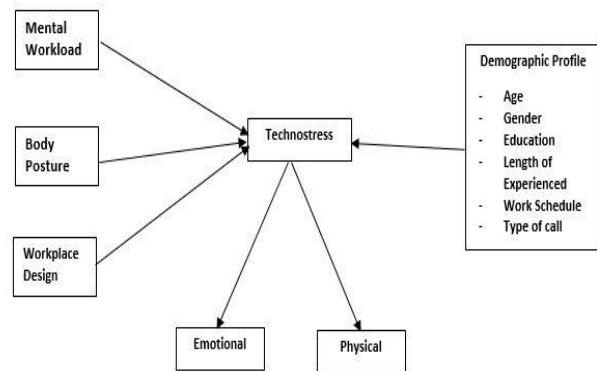

Figure 1. Relationship Model of Technostress and Ergonomics Risk Factors

Figure 1 illustrates the structural equation model for the interplay of technostress and ergonomics risk factors. In the proposed model, all measures variables shown in the box with labels that correspond in the questionnaire. The researcher evaluated the model fit on the basis of multiple indices – chi-square, chi-square/df, Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Normal Fit Index (NFI), Comparative Fit Index, Tuker-Lewis Index (TLI) and Root mean squared error of approximation (RMSEA).

Table 6. Summary of Model Fit Indices

Model Indices	Values	Standard values
Chi-square/degrees of freedom	1.728	< 5
Goodness of Fit Index (GFI)	0.825	>0.80
Adjusted Goodness of Fit Index (AGFI)	0.806	>0.80
Normal Fit Index (NFI)	0.836	>0.80
Tuker-Lewis Index (TLI)	0.918	>0.90
Comparative Fit Index (CFI)	0.923	>0.90
Root mean square error of approximation (RMSEA)	0.044	<0.05

The table 6 shows the summary of the model fit indices of the standardized regression weights for the technostress and workplace human risk factors. The result showed of chi-square/degrees of freedom value of 1.728. A goodness of fit index value is 0.825, adjusted goodness of fit index is 0.806, NFI value is 0.836; TLI value is 0.918, and the CFI value is 0.923, and RMSEA value is 0.044. The values identified in this research for different model indices satisfy the acceptable levels.

Hypothesis: Technostress influence by demographic profile.

This hypothesis aimed to test the influenced of technostress in demographic profile such as age, gender, education, length of experience, work schedule and type of call.

Table 7. Relationship of Demographic profile and Technostress

	Variables		Unstandardized				Standardized
	Exogenous	Endogenous	Estimate	S.E	C.R	P	Estimate
H1	Age		-0.007	0.039	-0.097	0.923	-0.010
H2	Gender		-0.170	0.081	-1.436	0.151	-0.098
H3	Education		-0.255	0.069	-3.532	***	-0.179
H4	Length of Experienced	Technostress	0.099	0.065	1.631	0.103	0.082
H5	Work Schedule		0.316	0.081	4.438	***	0.184
H6	Type of Call		0.180	0.051	3.529	***	0.040

***P- value <.001;

Table 7 presents the relationship between the demographic profiles in the development of technostress among individuals. As result, age is negatively influenced by technostress and not statistically significant (b = -0.010, p > .05). The result validates the findings that there is no direct relationship between age and technostress [5]. On the other hand, younger workers experienced technostress [6] while other literature stated that more technostress experienced among older workers [7]. The acceptance information technology indicates the user's age is negatively associated with the perception of the ease of technology [8].

In the other result, gender is influenced negatively by technostress and not statistically significant, (b = -0.098, p > .05). The result supports the findings that gender variable doesn't have strongly influenced technostress [9]. The gender variable did not have any explanatory power over the general level of technostress. However, it found out that technostress is evident among men [6] in contrary to the study that more technostress experienced among women [7].

Education is negatively influenced and statistically significant to technostress (b = -0.179, p < .001). The result validates the findings that users with a higher level of education report less technostress [9]. Similarly, it found out that anxiety regarding the use of a computer is negatively related to education [8]. Furthermore, it suggested that workers, in the course of academic life should acquire skills in the use of the computer, becoming comfortable with its use [10].

With regards to the effect of length of experience to technostress, the result shows that the length of experienced is positively influenced and not statistically significant to technostress (b = 0.082, p > .05). The result corroborates the findings that length of experienced is not significant to technostress [8].

Work schedule is positively related and statistically significant to technostress (b = 0.184, p < .001). The result verifies the findings that employees working at night shift exhibit a higher level of stress as compared with the morning shift. Since working at night disturbs the body's natural biological clock through disruption of circadian rhythms [11].

Call services is positively related and statistically significant to technostress (b = 0.040, p < .001). The result validates the findings that employees of inbound call center experienced a higher level of technostress as compared to employees outbound call center due to the reason that inbound call center employees are more on customer interaction and receiving customer complaints most of the time [11]. The outbound call is less stressful as compared with inbound call [12].

The observed contradictory result on the relationship between demographic and technostress supports the comprehensive review on the degree of distribution of differences within the organization can affect the outcome of the variable interest [13]. Similarly, the role of contextual factors in the research diversity of the workforce and variation in research context can lead to significant changes in the result of the studies at organizational and individual levels [8].

Hypothesis: Ergonomics risk factors positively influence technostress

This hypothesis aimed to test the influenced of ergonomics risk factors such as mental workload, work body posture and workplace design in the development of technostress.

Table 8. Relationship of Ergonomics Risk Factor and Technostress

	Variables		Unstandardized				Standardized
	Exogenous	Endogenous	Estimate	S.E	C.R	P	Estimate
H7	Mental Workload		0.121	0.072	1.694	0.090	0.104
H8	Work Body Posture	Technostress	0.338	0.060	5.680	***	0.324
H9	Workplace Design		0.283	0.056	5.046	***	0.314

***P- value <.001;

Table 8 shows the relationship of technostress and ergonomics risk factors. The result indicates that mental workload is positively related but statistically insignificant predictor of technostress (b = 0.104, p > .001, R2 = 0.40). The result supports the findings that mental health has a positive and negative association between Internet use and stress [14]. Mental workload has a positive association between ICT use and technostress. The inconclusive result might be the potential effect of between ICT use and stress differ between occupational and private settings. [15].

On the other hand, Work Body posture is positively and statistically significant to technostress (b = 0.324, p < .001). The result supports the findings that there is a positive relationship between ergonomic hazard and technostress. It revealed that ergonomics hazards include repetitive and

forceful movements, awkward postures that arise from improper work methods and improperly designed work stations [16].

Hypothesis: Physical and Emotional aspect positively influenced by Technostress

This hypothesis aimed to test the influenced of technostress in the aspect of physical and emotional.

Table 9. Relationship of Technostress and Its Effects in the Workplace

Variables		Unstandardized				Standardized
Exogenous	Endogenous	Estimate	S.E	C.R	P	Estimate
H10 Technostress	Physical aspect	0.835	0.063	13.253	***	0.769
H11	Emotional aspect	0.979	0.078	12.551	***	0.796

***P-value < .001*

Table 9 shows the relationship of technostress and its effects in the workplace. The results show the positive and significant effect of technostress in physical aspect (b = 0.769, p < .001 and R^2 = 59.1%) and emotion aspect (b = 0.796, p < .001 and R^2 = 63.4%). The results support the findings that in the process of adapting complex technologies more user experienced physical and emotional stress [16]. This stress has been documented to have a variety of physical manifestation. This stress resulted in headache, back pain, eyestrain, and other muscular problems [17].

IV. CONCLUSION AND RECOMMENDATION

A. Conclusion

Based on the findings of the study, the following were the conclusion:

Majority of the respondents were a young adult who can adapt and learn the technology advancement in the workplace more efficiently and effectively. Females were highly considered in BPO industries because of their excellent interpersonal skill and can efficiently manage stress. College graduates were most preferred because having formal education are expected to have knowledge of computer in general. Majority of respondents stay for a short period due to stress experienced at work and lack of career growth. Most respondents were working during the night shift to serve the customers from American and European countries. The inbound call service was leading provider by most of the BPO industries because of extensive services offered.

The assessment of the respondents in terms technostress, the techno-overload had the highest assessment which indicates that users experienced work and information overload due to technological advancement used in the workplace. As to the effect of technostress in the workplace, physical aspect had a general influence on technostress which implies that prolonged used of technology can cause work stress. With regards to ergonomics risk factor, work body posture was considered high risk as technology introduced in the workplace.

The interplay of technostress and ergonomics risk factors predicted in the work body posture and workplace design. This implied the direct relationship of technostress to workstation design and work body posture as well. The ergonomics intervention strategies were developed to mitigate technostress.

B. Recommendation

Based on the findings and conclusion of the study, the researcher developed a proposed ergonomics intervention strategy that will focus on workplace engineering design and administrative control.

The results of the study may also be used by the BPO Industries as their basis to strengthen their program on how to reduce stress among their employees particularly an aspect of technology advancement in their workplace. It was also suggested to introduce training or workshop programs related to office ergonomics and stress management.

For the future researcher, they may conduct the same study but consider a more comprehensive scope or may explore the entire BPO industries in the Philippines. It was suggested to perform qualitative research about technostress to enhance further and validate their experience in the workplace.

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