Original Research Article

A structural equation model to analyze correlation between technostress, organizational climate, job satisfaction and organisational commitment of faculties in higher education during COVID-19

Veerendrakumar Kumar[1], Shreedevi Shintri[2,*]

[1]*Dept. of Management, B.L.D.E.A's V.P. Dr.P.G.Halakatti College of Engineering and Technology, Vijayapura, Karnataka, India*
[2]*Dept. of Management, Visvesvaraya Technological University, Karnataka, India*

A B S T R A C T

There are several points of intersections on findings of authors on social and personal characteristics which brought diverse changes in personal and professional life, impacted social organizations and human relations (Lévy, 2001). Human relations are built on cyber culture which is more evident during COVID-19. This led to new ways of thinking and communicating among the individuals. Despite the substantial body of literature concerning different management models aligned with technostress and employee's job satisfaction in the business field have not yet grown significantly. This paper aims to analyze and establish relation between technostress and employee's job satisfaction by fitting a structural equation modeling approach. Analyses of the measurement model confirmed its convergent validity, composite reliability and discriminant validity. The analysis of the structural model showed discrepancies in some constructs, which, to some extent, disconfirm theoretical assumptions regarding the systemic and balanced relationships among the concepts. On the other hand, the results confirm the relationship between the variables. The study revealed the variables having impact on technostress, job satisfaction and organisational commitment in different proportions. Technostress also showed to have impact on job satisfaction and organisational commitment. The study used Structural Equation Modeling (SEM) method to find the relationship between technostress creators and Job satisfaction. The findings showed a negative impact of technostress creators on job satisfaction.

1. Introduction

Undoubtedly, COVID-19 Pandemic resulted in diverse changes in personal and professional life, affecting the human relations and in turn social organisations. It is imperative it is observed that not only individuals even organisations and business establishments immersed in cyber culture. This drastic change in cyber space forcing organisations for the adoption of information technology is a much more comprehensive concept that involves new forms of process management and people in public initiative, focused on transparency, effectiveness and efficiency (Diniz, Barbosa, Junqueira, & Prado, 2009).

However, the literatures were focused on the posive aspects of using information technology. One cannot forget the negative effects accompanied with the new innovations. Growing number of studies reveal that technological innovations cause distress in employee's working in the organisations (Danilo Magno Marchiori et al 2020). Studies carried out in Brazilian context stressed to understand these undesirable phenomena and fill the gap by minimising them. Stress occurs when a state of disequilibrium exists

---

* Corresponding author.
E-mail address: veerumn@gmail.com (S. Shintri).

within the system of variables relating people to their environments. Hart and Cotton (2003) stated that this state of disequilibrium brings change in people's normal levels of psychological wellbeing. Murphy and Cooper (Murphy & Cooper, 2000) opined that with the growing technological usage in every walk of our lives, will face stress and related consequences. Technological advancements not only making the jobs more efficient and effective, but also adding ongoing pressure on employees to adopt and adapt to recurring, continuous changes and upgrades in technology, which is increasing workplace stress. Technology is necessary and unavoidable in personal life and work life, but cannot deny the negative effects of adoption of technology.[1–6]

Technostress is a sort of stress caused by the constant and excessive use of digital technology (Chiappetta, 2017). Inability to cope with technological advances can cause worry and panic, resulting in a condition known as 'Technophobia' (fear of technology). In 1984 Craig Brod, stated that technostress causes psychological reactions such as the pressure of the eye, back pain, headaches, neck and joint pain, insomnia, anxiety, depression, over-related emotional, physical, mental and behavioural disorders and other electronic devices.

With the unexpected COVID-19 pandemic forced the faculties to adopt innovative technologies to communicate with students such as What's App, Google Classroom, Zoom, Facebook etc., without prior training, made the faculties to face problems to swith to technology based platform. This new way of teaching learning process was unthought and put the teachers and students in dilemma due to network related issues and in fact world was not prepared with such infrastructure. There are four dimensions to technostress – disbelief, discomfort/fatigue, anxiety, ineffectiveness and each dimension describes two characteristics of technostress (Techno anxiety and Techno fatigue) (Carlotto, M. S., Welter Wendt, G., & Jones, A. P, 2017).[7–12]

After the pandemic hit the world, many researchers have worked to establish on the impact of technostress on job satisfaction, employee performance, mental wellbeing, employee efficiency, etc. But very little researches are done to consider teaching staff as a sample for the study. The current study will help to assess the technostress among the faculty members by fitting structural equation model.

2. Classification of technostress

Technostress instrument developed by T. S. Ragu-Nathan, Qiang Tu & Monideepa Tarafdar (2008), for the assessment of technostress is classified into two broad heads. Technostress Creators and Technostress Inhibitors. Technostress Creators are those aspects that examine factors that create technostress and techno inhibitors examine factors that are prevailing in the organisation which directly

or indirectly contribute to creating technostress among the inhabitants of the organisation.

1. Technostress Creators	2. Technostress Inhibitors
a. Techno-Overload	a. Literacy facilitation
b. Techno-Invasion	b. Technical support provision
c. Techno-Complexity	c. Involvement facilitation
d. Techno-Insecurity	d. Job satisfaction
e. Techno-Uncertainty	e. Organisational commitment
f.	f. Continuance commitment

3. Purpose of The Study

With the usage of new ICT tools without proper training increasing stress among the faculty members significantly affecting teaching learning process, which is worldwide phenomena (Parray et al, 2016). This technostress not only affecting their job satisfaction, but also their commitment towards organisation.

4. Objectives of The Study

1. To assess the impact of technostress, Job satisfaction & Job Commitment among the faculties of higher education.

4.1. Hypothesis

Considering the objective of the study, the following alternative hypothesis may be stated:

1. H1: Technostress has a negative relationship with job satisfaction.
2. H2: Technostress has a negative relation with commitment.
3. H3: Job satisfaction is positively related to the commitment.

5. Literature Review

5.1. Technostress creator factors

The negative effects of usage of technology on female teachers are referred to as technostress and are associated with the adaptation problem as faculties are accustomed with conventional method of teaching(Penado Abilleira, M., et.al.2021 and Tarafdar et al., 2007). Saim M. A. S. M, Rashid W. E. W & Ma'on S. N. (2021) and Tarafdar et al., 2007 identified and confirm the relation of technostress creators and work-life balance. They listed factors that create stress: techno-overload, techno-complexity, techno-insecurity, techno-invasion and techno-uncertainty. Brennan F. (2021) noticed technostress among teachers due to adoption of new ICT tools for teaching. Tecno-complexity was observed to insufficient

capacity to cope with paradigm shift in technological innovations (Weems-Landingham.V.,2021). Also stated that technoinsecurity occurs due to continuous learning owing to constant change in the organization's system. Tecno-invasoion refers to the occurrence of stress resulting from intereference of technology into the work life separating personal life. Techno-Complexity is refers to complexity in using technological instruments due to paradigm shift.

The studies revealed that the introduction of IT strengthens the already existing organizations efficiently and effectively. But, employees are negatively impacting satisfaction, commitment, their productivity and consequently the quality of service (La Torre, Esposito, Sciarra, & Chiappetta, 2018; Marchiori et al., 2018; Ragu-Nathan et al., 2008; Tarafdar, Monideepa; Tu, Qiang; Ragu-Nathan, 2011; Tarafdar et al., 2007).[6,13–19]

5.2. Job satisfaction

The concept of job satisfaction was broadened over time and related to external factors working conditions, perks and remuneration, job security and growth opportunities etc,. However, internal factors such as age, gende, education also have effect on job satisfaction (Cappi & Araujo, 2015). They opined that the satisfaction must be addressed with multi-factorial approach. Gorla, 2012, observed the enhanced level of job satisfaction among the faculties by providing technological know-how. The various studies revealed that job satisfaction in work like will influence on the several other aspect of motivation such as image in the society (Taylor, 2014), productivity (Hoboubi, Choobineh, Kamari Ghanavati, Keshavarzi, & Akbar Hosseini, 2017) and stress at work (Bhatti, Hashmi, Raza, Shaikh, & Shafiq, 2011). It is evident from the studies that the stress caused due to introduction of new technologies in the work environment have negative impact on satisfaction and organisational commitment.

6. Organizational commitment

Commitment is the relationship of the individual with the intuition in which he operates (Bourgeois III, 2010; Im, Campbell, & Jeong, 2016). The literature indicates three dimensions how the relationship takes place: affective commitment, normative commitment and instrumental or continuous commitment. The instrumental commitment arise from the fear of a job loss. As a result they continue to work based on the fear of losing their job, consequently, their source of income and survival (Im et al., 2016; Lizote, Verdinelli, & Nascimento, 2018). Hence it is evident from empirical studies that the technostress creators are negatively related to organizational commitment of employees (Hwang & Cha, 2018; Kumar, Lal, Bansal, & Sharma, 2013). Further studies indicate the existence of a relationship between job satisfaction and organizational

commitment (Fu, 2014; Fu & Deshpande, 2014; Lizote et al., 2018).[20–28]

7. Research Methodology

The random sampling method was adopted for the research. Faculty from technical and non-technical courses responded to the study. The research based on quantitave and descriptive approach involving a Sample of 84 faculty members, teaching in two technical colleges (Engineering) and three non-technical Degree colleges located in 3 districts from north Karnataka, India; participated in the study. The workers were asked to answer an electronic questionnaire, structured and not disguised. A structured questionnaire, comprising of thirty-five questions was administrated for the study. The questionnaire comprised of a five-point Likert scale measurement of technostress, assessing dimensions like – Techno-overload, Techno-invasion, Techno-complexity, Techno insecurity and Techno-uncertainty. The questionnaire also evaluates Job satisfaction, Organisational commitment and Continuance commitment. For the present study, the five dimensions of technostress were evaluated for their influence on Job Satisfaction and Organisational Commitment.

In order to fit structural equation model (SEM), data analysis performed with the aid of IBM, SPSS, IBM and AMOS statistical packages. Based on hypothesis presented, the specification of a structural model constructed. For this purpose, the confirmatory factor analysed, divided into two-step (Anderson & Gerbing, 1988). Thus, the first step was to specify the structural sub model of measurement, for which we used all 31 variables collected in the questionnaire. To analyze the degree of fit of the model, we used the χ^2 statistic, the degrees of freedom associated with (DF), as well as the division of the χ^2 by DF. We calculated several goodness of fit indexes such as GFI (goodness of fit index); CFI (comparative fit index); TLI (Tucker-Lewis index); RMSEA (root mean square error of approximation); PCFI (parsimony-corrected fit index); PGFI (parsimony goodness of fit index); as well as the indicator SRMR (standardized root mean square residual). Thus, after designing the model, we calculated the adjustment indicators and the factor loadings related to the observed and latent variables, which resulted in insufficient values.

We also calculated reliability levels (CR), as well as the values of the average variance extracted (AVE), which allowed to test the convergent and discriminant validity of the constructs used in the model. Table 1 presents the results in detail, accompanied by the acceptance criteria of each test, considering Hair et al. (2009).

7.1. Dimensions studied

1. F1: Techno-Overload – stress that arises due to too much usage of technology at work.
2. F2: Techno-Invasion – stress due to interference of technology into work
3. F3: Techno-Complexity – stress due to complexity of the technological tools/ instruments while usage.
4. F4: Techno-Insecurity – stress that rises fear of job loss or job replacement due to technology taking over.
5. F5: Techno-Uncertainty – stress that is due to the uncertainty of the results, changes, duration, and usage of the technological devices for the work.
6. F6: Job satisfaction – a sense of fulfilment doing a particular job.
7. F7: Organisational Commitment – a sense of responsibility towards an organisation.
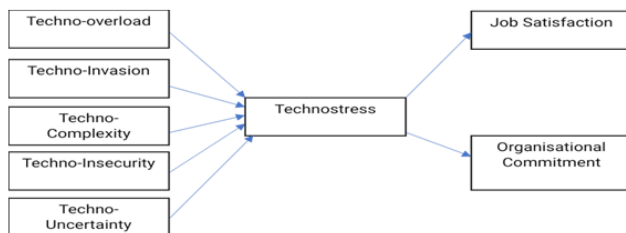
7.2. The conceptual framework

Fig. 1: Conceptual framework showing the relationship between dimensions of techno-stress, job satisfaction and organisational commitment

The conceptual framework (Figure 1) attempts to understand the relationship between Technostress dimensions and technostress; and the relationship between technostress and job satisfaction and organisational commitment.

8. Results and Discussion

All the composite reliability indicators (CR) of the constructs were found to be satisfactory (i.e. above 0.70). The result corroborates the findings of Hair et al. (2009). The results of the convergent validity analysis related to all constructs had an AVE higher than the reference value of 0.5 (Hair et al., 2009). Finally, the discriminant validity indicators were satisfactory for all constructs. Thus, we proceeded to structural equation model, according to the assumptions made in the present research.

As an intermediate step, however, a new construct, the techno-stress, was specified using second order factor analysis techniques, Marôco (2014). That is, the correlation trajectories existing among the 5 creators of the technostress were eliminated, as well as the respective residue indicators. We then insert the new construct, linked to technostress

creators, with the objective of testing the theory proposed by Ragu-Nathan et al. (2008). Following, the other proposed relationships were drawn in the presented hypotheses, resulting in the final structural model used in the sequence of the present research.

The hypothesis framed for the study were proved by using various statistical tests and aimed to understand effect of techno-stress and its impact on job satisfaction and commitment. The factor analysis was done with 7 factors viz., Techno-overload, Techno-invasion, Techno-complexity, Techno uncertainty, Techno-insecurity, Satisfaction and commitment. The confirmatory factor analysis (CFA) and the values resulted for the model fit justified the structural modeling. Second order confirmatory factor analysis (CFA) was done to examine the relation of the two variables under study –occupational role stress and job satisfaction. The structural model proved presence of inverse relationship between occupational role stress and job satisfaction. The model depicts that the improvement in job satisfaction as stress among the faculty will decrease.

8.1. The model fit analyses of the model were as follows

Referring to the Model fit summary table, it was noted that the estimated values fall well within the threshold limits and the model development is possible. The structural model thus was developed to assess the impact of organizational climate on occupational stress. The regression weights showed a significant relationship between organizational climate and occupational stress. The CFA with -0.995 shows a perfect inverse correlation between Organizational Climate and Occupational role stress.

We then proceeded to the execution of the last stage of the CFA, that is, the specification of the causal model, which allowed to relate all the constructs involved and to test the presented hypotheses. Thus, the first point should be given to the fact that the trajectory between techno-uncertainty, one of the factors pointed out by Tarafdar et al. (2007) and Ragu-Nathan et al. (2008), did not present statistical significance for the second order construct (P = 0.786). That is, the results indicate that techno-uncertainty, as conceived and measured in the present study, would not be sufficiently related to the hierarchically superior factor presented as technostress. Thus, we opted for the removal of the construct techno-uncertainty of the structural model. Likewise, we detected no statistical significance in the relationship between technostress and organizational commitment. Thus, we eliminated the direct relationship from the model, as shown in Figure 1 . The other trajectories were statistically supported. We obtained the results from a structural model with high goodness of fit indexes.

Table 1: Reliability and validity indicators of the constructs

Construct	Reliability		Convergent CR>=0.7					AVE >=0.5	AVE > r2 r2
	CR	AVE	TOV	TIV	TCO	TUC	TIS	SAT	COM
Techno	0.973	0.763	0.873						
Techno	0.972	0.774	0.503	0.880					
Tecuncertai	0.970	0.761	0.491	0.464	0.873				
Techno	0.925	0.605	0.420	0.448	0.506	0.778			
Techno	0.854	0.594	0.458	0.409	0.445	0.391	0.771		
Satisfac	0.824	0.539	0.409	0.302	0.353	0.265	0.277	0.734	
Commitment	0.806	0.582	0.506	0.523	0.480	0.522	0.478	0.369	0.763

Table 2: Model fit measures (CFA-Second Order)

Measure	Threshold	Calculated Estimate
CMIN	–	1629.758
DF	–	1167
CMIN/DF	Between 1 and 3	1.397
CFI	>0.95	0.975
SRMR	<0.08	0.0428
RMSEA	<0.06	0.032
PClose	>0.05	1.000
GFI	>0.90	0.858
AGFI	>0.90	0.845
PGFI	>0.80	0.786
RMR	<0.08	0.077
NFI	>0.90	0.917
IFI	>0.90	0.975
TLI	>0.90	0.974
RFI	>0.90	0.913

Table 3: Significance of effects

			S.E.		C.R.		P	
Satisfaction	<—	Technostress	-0.155	0.056	-2.762		0.006	
Techno-overload	<—	Technostress	0.580	0.072	8.074		***	
Techno-invasion	<—	Technostress	0.589	0.083	7.088		***	
Techno-complexity	<—	Technostress	0.481	0.068	7.061		***	
Techno-insecurity	<—	Technostress	0.281	0.047	6.015		***	
Commitment	<—	Satisfaction	0.540	0.071	7.603		***	

9. Conclusion

Adoption of new technologies is the only way to avoid technostress. In fact, earlier adaptation and familiarization with the necessary educational ICT is a requirement of the hour and a standard for the foreseeable future. The paper calls for further research on external factors such as technical and technological assistance (Strudler & Hearrington, 2008), organisational infrastructure (Thomas & Knezek, 2008), managerial support (Dexter, 2008), and a variety of other factors (Kirschner, Wubbels, & Brekelmans, 2008) may have an impact on faculty technostress. The Institutes through their various initiatives can conduct regular training programs to the faculty as and when a new technology to support learning and teaching emerges in the

market. Support in terms of advanced ICT infrastructure and empowerment to the teachers to try new gadgets, software, platforms and applications can be given to the teachers to enable them to learn, clarify their doubts and practice before it is implemented. This will give time for the faculty to practice and get themselves comfortable with the ICT and this, in turn, will reduce the stress they encounter in their teaching and learning.

The various tests executed on the data answered the hypothesis framed for the study. The first hypothesis aimed to understand the influence of demographic variables like age, gender, marital status, years of experience, course and hierarchy on organizational climate and occupational role stress. The regression analysis across each variable and the multivariate regression analysis proved that marital
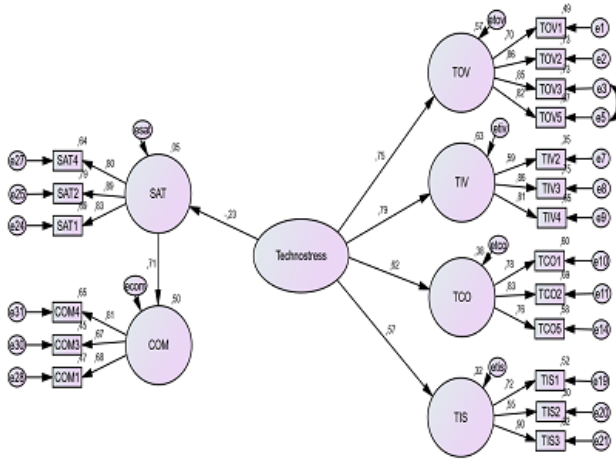
Fig. 2: Structural equation model fit (SEM).

status influenced the organizational climate and hierarchy of the faculty influenced the occupational role stress. However, the influence of each variable was observed to be having minimal effect. Further, factor analysis reduced the items into 7 factors. 3 factors measured the organizational climate and 4 factors measured the occupational role stress. The factors were coded as F1, F2, F3, F4, F5, F6 and F7, representing supportive climate, developmental climate, goal-oriented climate, resource stressors, self-fulfillment stressors, transactional stressors and expectancy stressors, respectively based on the characteristics of the items comprising the factors. The confirmatory factor analysis (CFA) and the values obtained for the model fit justified the structural modeling. To examine the relation of the two variables under study – organizational climate and occupational role stress, 2nd order CFA was done. The structural model proved a high inverse relationship between organizational climate and occupational role stress, meaning as organizational climate improves, occupational stress among faculty will decrease, thus proving the 2nd hypothesis – "There is a significant impact of organizational climate on occupational role stress". Further, assessing the structural model of the individual factors, it was noted that expectancy stressors was influenced to 39% by organizational climate factors, followed by resource stressors (33%), self-fulfillment stressors (30%) and lastly with transactional stressors (20%).

10. Source of Funding

None.

11. Conflict of Interest

None.

References

1. Agbu JFO, Simeon OK. Technostress in the age of information communication technology: A case study of distance education. *Educ Res*. 2011;2(11):1654–60.
2. Ahmad UNU, Amin SM, Ismail WKW. Moderating effect of technostress inhibitors on the relationship between technostress creators and organisational commitment. *Sains Humanika*. 2014;67(1):51–62.
3. Al-Ansari MA, Alshare K. The impact of technostress components on the employees satisfaction and perceived performance: the case of Qatar. *Jo Global Inf Manag*. 2019;27(3):65–86.
4. Brennan F. Technostress and leadership: a case study in higher education during the COVID-19 crisis; 2021. Available from: https://www.theseus.fi/bitstream/handle/10024/380031/Brennan_Fintan%20.pdf?sequence=3&isAllowed=y.
5. Brooks S, Califf C. Social media-induced technostress: Its impact on the job performance of it professionals and the moderating role of job characteristics. *Computer networks*. 2017;114:143–153.
6. Mayank Y, Singh A. Effects and Measures of Technostress among Librarians in selected University Libraries of Delhi. *Librar Philos Pract*. 2015;0(1):1–13.
7. Carlotto MS, Wendt GW, Jones AP. Technostress, career commitment, satisfaction with life, and work-family interaction among workers in information and communication technologies. *Actualidades en Psicología*. 2017;31(122):91–102.
8. Chiappetta M. The Technostress: definition, symptoms and risk prevention. *Chiappetta M Senses Sc*. 2017;4(1):358–61.
9. Çoklar AN, Akçay A. Investigation Of Techno-Stress Levels Of Teachers Who Were Included In Technology Integration Processes. *The Turkish Online J Educ Technol*. 2016;4(1):9–9.
10. Cotton P, Hart PM. Occupational wellbeing and performance: A review of organisational health research. *Aust Psychol*. 2003;38(2):118–27.
11. Jena RK. Impact of technostress on job satisfaction: an empirical study among Indian academician. *Technology*. 2015;15(3):117.
12. Jena RK, Mahanti PK. An Empirical study of Technostress among Indian Academicians. *Int J Educ Learn*. 2014;3(2):1–10.
13. Johnson T, Wisniewski MA, Kuhlemeyer G, Isaacs G, Krzykowski J. Technology Adoption in Higher Education: Overcoming Anxiety through Faculty Bootcamp. *J Asynchronous Learn Networks*. 2012;16(2):63–72.
14. Kirschner P, Wubbels T, Brekelmans M. Benchmarks for teacher education programs in the pedagogical use of ICT. In International handbook of information technology in primary and secondary education. Springer; 2008. p. 435–47.
15. Maruyama GM. Basics of structural equation modeling. SAGE Publications; 1998. p. 311.
16. Murphy LR, Cooper C. Healthy and Productive Work. CRC Press; 2000. p. 208.
17. Parray WM, Kumar S, Awasthi P. Stress among teachers: A theoretical examination. *Int J Indian Psych*. 2016;3:88–97.
18. Abilleira MP, Rodicio-García ML, Deus MRD, González MJM. Technostress in Spanish University Teachers During the COVID-19 Pandemic. *Frontiers Psychol*. 2021;12:496.
19. Qiu W. Impact of technostress on job satisfaction and organizational commitment: a thesis presented in partial fulfillment of the requirements for the degree of Master of Management (Management; 2013. p. 1–8.
20. Ragu-Nathan TS, Tarafdar M, Ragu-Nathan BS, Tu Q. The Consequences of Technostress for End Users in Organizations: Conceptual Development and Empirical Validation. *Inf Syst Res*. 2008;19(4):417–33.
21. Rebman CM, Kitchens FL. A model for testing technostress in the online education environment: an exploratory study. *Int J Educ Develop using Inf Commun Technol*. 2014;15(2):9.
22. Saim M, Rashid WEW. Technostress creator and work life balance: a systematic literature review. *Romanian J Inf Technol Automatic Control*. 2021;31(1):77–88.
23. Saras H. Shocking Statistics of Workplace Stress You Never Knew. Harish Saras; 2018. Available from: https://www.harishsaras.com/

stress-management/shocking-statistics-of-workplace-stress/.

24. Strudler N, Hearrington D. Quality support for ICT in schools. In: International handbook of information technology in primary and secondary education. Springer; 2008. p. 579–96.

25. Syvänen A, Mäkiniemi JP, Syrjä S, Tammi KH, Viteli J. When does the educational use of ICT become a source of technostress for Finnish teachers? *Seminar net*. 2016;12(2):15.

26. Thomas LG, Knezek DG. Information, communications, and educational technology standards for students, teachers, and school leaders. In International handbook of information technology in primary and secondary education. Springer; 2008. p. 333–48.

27. Landingham VW. Embracing Technostress to Overcome Online Teaching Challenges; 2021. Available from: https://files.eric.ed.gov/fulltext/EJ1268930.pdf.

28. Zainun NF. Technostress in Relation to Job Satisfaction and Organisational Commitment among IT Professional. *Int J Sci Res Publications*. 2013;3(12):1–3.

Author biography

Veerendrakumar Kumar, HOD

Shreedevi Shintri, Research Scholar