

Technology stress among university personnel in North Sulawesi.

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Abstrak

The requirement of Pangkalan Data Pendidikan Tinggi Indonesia (PDDIKTI) to upload all university data and information to this web-site has created a certain kind of stress among its stakeholders. This study assesses the level of technology stress that academic staff members in an Indonesian university endure in dealing with this requirement. There were forty-five respondents of a Christian University in North Minahasa region- Sulawesi, Indonesia who participated in this study. As users of the university application system their degree of technology stress was assessed and measured, based on their occupation and their involvement in the stressors associated with technology, including technology overload, technology complexity, technology insecurity, and technology uncertainty. Descriptive statistics and Analysis of variance method were used to analyzed the data. Out of the twenty-three contributing factors that were examined, the study discovered that only four factors contributed to very high stress and six factors contributed to high stress. The remaining thirteen components were responsible for the mild to moderate stress. With a mean score of 2.40, the study concluded that the respondents exhibited moderate levels of technology stress overall. Technology overload has a mean of 2.86, technology uncertainty's mean is 2.51, technology invasion's mean is 2.38, technology complexity's mean is 2.21, and technology insecurity's mean is 2.02 are the contributors with the moderate level of stress. ANOVA analysis revealed no significant differences in the degree of technology stress experienced by the various users ($p=0.94 > 0.05$), but it did reveal significant differences in the degree of technology stress across contributors ($p= 0.0025 < 0.05$). The research praises the PDDIKTI for offering sufficient training and consistent socialization of its program to all stakeholders.

Keywords— *technology invasion, technology overload, technology uncertainty, technology insecurity, technology complexity.*

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PENDAHULUAN

Web-based information technology, a necessary component of today's workplace, is now a significant cause of stress at work. The dual nature of information and communication technologies (ICTs) has long been recognized by the ICT academic community. ICTs have significantly increased productivity, improved organizational effectiveness, and fostered creativity; yet, it is important to recognize that these benefits have not come without drawbacks for both people and businesses. ICTs caused significant sources of stress known as technostress by causing disruptions in company processes, staff roles, and responsibilities, among other areas of technology [1]. According to Feng, any detrimental impact that technology use has—directly or indirectly—on people's attitudes, beliefs, behaviors, and

psychology may be classified as technostress [2], which can be identified by their technology stress creators namely: technology overload, technology complexity, technology insecurity, and technology uncertainty [3].

Furthermore, the negative consequences of technostress on workers may also affect their working behavioral like reduced performance, productivity, and job involvement as well as cognitive and psychological symptoms including computer anxiety, information fatigue, and feelings of work overload and discontent[4]. Most importantly, technology stress brought on by a lack of knowledge on the technologies used and the way they interact which affects faculty members and system operators within the institution, and moreover also undermines the fundamental aspects of data quality within the system [5].

High levels of technostress among employees have been linked to workplace technostress, which is brought on by expertise gaps to high-quality knowledge, especially in the gap of performance between employees with low exposure to employee with high-quality technology skills and knowledge [6]. Additionally, Choi's study on the impact caused by technostress on employee work behavior discovered that the digitization of work settings and information and communication technology improvements have made technostress more prevalent in contemporary workplaces [7].

As of how well the faculty and staff of the university adapt and be familiar to the requirement of Pangkalan Data Pendidikan Tinggi Indonesia (PD DIKTI), a web-based application for the Database of the Indonesian Ministry of Education and Culture- Higher Education, this study examined and compared the perception of technostress experienced by university personnel who deal with university information and communication technology (ICT) application systems [8].

I. RESEARCH METHODS

The study uses quantitative statistical method to analyze the data. Descriptive statistic measures and describes the respondents' technology stress using mean (M) and standard deviation (SD). Further analysis was done to find out the differences degree of technology stress experienced by the respondents, using analysis of variances (ANOVA) method.

Participating in this study were forty-five respondents from a particular Christian university in North Minahasa-Sulawesi, Indonesia. These respondents included five deans, five department chairmen, twenty-three lecturers, eight secretaries, a chair for quality assurance, and three employees or system operators. They are the faculty and staff members in charge of uploading and maintaining the data from the institutions, lecturers, study programs, students, and all other relevant information on research, teaching, and community service activities.

The respondents were given a questionnaire consisting of twenty-three factors from the technology stress instrument, which was created by Tarafdar et al. [9] and modified by Chou [10]. The items included six factors of technology overload, three factors of technology invasion, five factors of technology complexity, five factors of technology insecurity, and four factors of technology uncertainty. The respondents were asked to rate their level of technology stress on a 4-point Likert scale: 1.00–2.00 (low stress), 2.01–2.50 (moderate stress), 2.51–3.00 (high stress), and 3.01–4.00 (very high stress).

With the use of SPSS 26, the internal consistency reliability test of ≥ 0.70 , revealed that the questionnaire Cronbach's alpha values are as follows: 0.87 for technology overload, 0.93 for technology invasion, 0.86 for technology complexity, 0.92 for technology insecurity, and 0.79 for technology uncertainty.

The mean (M) and standard deviation (SD) of descriptive statistics as well as ANOVA analysis were utilized to gauge and contrast the levels of technology stress experienced by faculty and staff.

RESULT AND DISCUSSION

Table 1 displays the degree of stress caused by twenty three technology stress contributors, which shows four factors of technology stress contributors possessing very high stress: the requirement to work faster (M = 3.40; SD = 0.8), change in work habits to adapt to new technology (M = 3.33; SD = 0.67), constant changes in technology used (M = 3.16; SD = 0.64), and fear of being replaced by new technology updates (M = 3.07; SD = 0.78).

Six factors contribute to high technology stress: requirements to do more work than one can handle (M = 2.91; SD = 1.04); requirement to work during holyday or vacation (M = 2.78; SD = 1.02); incapable of dealing with new technology compared to newly recruited employees (M = 2.76; SD = 0.83); forces to work with very tight time schedules (M = 2.73; SD = 0.78); higher work overload caused by the increased technology (M = 2.53; SD = 0.92); constant changes of dealing with new technology compared to newly recruited employees (M = 2.76; SD = 0.83); forces to work with very tight time schedules (M = 2.73; SD = 0.78); higher work overload caused by the increased technology (M = 2.53; SD = 0.92); constant changes in the organization's computer software (M = 2.51; SD = 0.82).

Table 1. Stress degree of Technology stress contributors

<i>Description of 23 techno stress contributors</i>	<i>Mean</i>	<i>SDev</i>	<i>Degree of stress</i>
Technology requires to work much faster (TO)	3.40	0.89	very high stress
Change in work habits to adapt to new technologies (TO)	3.33	0.67	very high stress
Constant changes/developments in the technologies used (TU)	3.16	0.64	very high stress
Fear of being replaced caused by constantly technology skills update (Tins)	3.07	0.78	very high stress
Technology requirements to do more work than one can handle (TO)	2.91	1.04	high stress
Technology requirement to work during holyday/vacation (Tinv)	2.78	1.02	high stress
Incapable in dealing with new technology compared to newly recruits (TC)	2.76	0.83	high stress
Technology forces to work with very tight time schedules (TO)	2.73	0.78	high stress
Higher work overload caused by the increased technology (TO)	2.53	0.92	high stress
Constant changes in organization's computer software (TU)	2.51	0.82	high stress
Frequent computer network upgrades (TU)	2.47	0.89	moderate stress
Constant changes in computer hardware (TU)	2.38	0.75	moderate stress
Personal life is being invaded by this technology (Tinv)	2.24	0.88	moderate stress
Spending less time with my family due to this technology (TO)	2.22	0.97	moderate stress
Feeling incapable in technology to handle job satisfactorily (TC)	2.11	0.75	moderate stress
Feeling not have enough time to upgrade technology skills (TC)	2.11	0.65	moderate stress
Constant needs to update technology skills to avoid being replaced (TC)	2.07	0.75	moderate stress
Constant threat to job security due to new technologies (Tins)	2.07	0.72	moderate stress

Sacrifice vacation & weekend time to keep up on new technologies (Tinv)	2.04	0.82	moderate stress
Too complex to understand and use new technologies (TC)	2.00	0.83	moderate stress
Threatened by co-workers with newer technology skills (Tins)	1.93	0.81	low stress
Less of knowledge sharing for fear of being replaced (Tins)	1.53	0.69	low stress
Not share knowledge with coworkers for fear of being replaced (Tins)	1.47	0.73	low stress

TO- technology overload; TC- technology complexity; Tinv- technology invasion; TU- technology uncertainty; Tins-technology insecurity

The following ten factors are known to contribute to moderate technology stress: frequent upgrades to computer networks (M=2.47; SD=0.89), constant changes in computer hardware (M=2.38; SD=0.75), the invasion of personal life by technology (M=2.24; SD=0.88), less time spent with family due to technology (M=2.22; SD= 0.97), the feeling that one is not technologically capable of handling their job satisfactorily (M=2.11; SD=0.75), the constant need to update one's skill set in order to avoid being replaced (M=2.07. SD=0.72), the constant threat to job security due to new technologies (M=2.07. SD=0.72), the sacrifice of vacation and weekend time to stay up to date on new technologies (M=2.04; SD=0.82), and the belief that technology is too complex to understand and use (M=2.00; SD= 0.83).

Finally, only three factors contribute to a low degree of technology stress: being threatened by co-workers with newer technology skills (M = 1.93; SD = 0.81), sharing less knowledge for fear of being replaced (M = 1.53; SD = 0.69), and not sharing knowledge with coworkers for fear of being replaced (M = 1.47; SD = 0.73).

Table 2 showed that overall, the study found moderate technology stress was demonstrated among the respondents (M = 2.40; SD = 0.37). Contributors with the highest level of stress are technology overload (M = 2.86; SD = 0.12), followed by technology uncertainty (M = 2.51; SD = 0.38), technology invasion (M = 2.38; SD = 0.32), technology complexity (M = 2.21; SD = 0.10), and technology insecurity (M = 2.02; SD = 0.21).

Table 2

Descriptive statistics and ANOVA analysis

SUMMARY	Mean	StDev.
Dean	2.31	0.49
Department chair	2.42	0.44
Secretary	2.39	0.40
Staff	2.42	0.27
Lecture	2.44	0.36
All respondents	2.40	0.37
Techno overload	2.86	0.12
Techno invasion	2.38	0.32
Techno complexity	2.21	0.10
Techno insecurity	2.02	0.21
Techno un-certainty	2.51	0.38

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Users	0.05726	4	0.014315	0.189557	0.940372	3.006917
Stress contributors	1.986466	4	0.496616	6.576083	0.002501	3.006917
Error	1.208297	16	0.075519			
Total	3.252023	24				

The examination of the technology effects on individual positions and job responsibilities displays that the technology stress level among different levels of positions and different job responsibilities is fairly moderate, between 2.31-2.44, with a standard variation of 0.27-0.49.

ANOVA analysis showed significant differences in technology stress degree between technology stress contributors $p = 0.0025 < 0.05$ ($F=6.57 > F$ critical= 3.007). but showed no significant differences in the degree of technology stress experienced by the different users $p = 0.94 > 0.05$ ($F=0.189 < F$ critical= 3.007).

Further investigation of ANOVA analysis was done to deeply investigate the level technology stress caused by each technology stress factor with in each technology stress contributor.

Technology overload

As shown in table 3, the respondents felt being overloaded and very stressful by the requirement to work faster, forced to adapt to new technology and must do more work than they could handle. The respondents also experienced high stress caused by very tight time schedule, higher workload complexity, which caused them to spend less time with their family.

Table 3

Analysis of technology-overload factors

SUMMARY	Mean	StDev	Degree of Stress
Forced to work much faster	3.40	0.89	very high stress
Adaptation to new technologies	3.33	0.67	very high stress
More work than one can handle	2.91	1.04	very high stress
Very tight time schedules.	2.73	0.78	high stress
Higher workload complexity.	2.53	0.92	high stress
Spend less time with my family	2.22	0.97	high stress

ANOVA of Technology-overload

Source of Variation	SS	df	MS	F	P-value	F crit
Users	47.14	5	9.43	17.68	1.03E-14	2.26
Techno-overload factors	90.87	44	2.07	3.87	1.52E-11	1.43
Error	117.36	220	0.53			

Total 255.37 269

ANOVA analysis concluded that there is significant different level of stress caused by each technology overload factor as well as the significant different level of stress experienced by each user as shown in the $p=1.52E-11 < 0.05$ ($F=3.87 > F$ critical =1.43) for technology overload factors and $p=1.03E-14 < 0.05$ ($F=17.68 > F$ critical=2.26) for the users.

Technology invasion

Only one factor of technology invasion contributor that caused high stress: working during holiday and vacation. And though their personal life were being invaded and they must sacrifice vacation and weekend time, the respondents only felt moderate stress.

ANOVA analysis concluded that there is significant different level of stress caused by each technology invasion factor as well as the significant different level of stress experienced by each user as shown in the $p= 9.82E-12 < 0.05$ ($F=5.40 > F$ critical= 1.51) for technology invasion factors and $p=1.26E-07 < 0.05$ ($F= 19.14 > F$ critical= 3.10) for the users.

Table 4
Analysis of technology-invasion factors

SUMMARY	Mean	StDev	Degree of Stress
Work during holyday/vacation	2.78	1.02	high stress
Personal life is being invaded	2.24	0.88	moderate stress
Sacrifice vacation & weekend time	2.04	0.82	moderate stress

ANOVA of technology-invasion

Source of Variation	SS	df	MS	F	P-value	F crit
Users	12.93	2	6.47	19.14	1.26E-07	3.10
Techno-invasion factors	80.27	44	1.82	5.40	9.82E-12	1.51
Error	29.73	88	0.34			
Total	122.93	134				

Technology complexity

There is only one factor of technology complexity that caused high stress: Incapable in dealing with new technology. The remaining three factors gave the respondents moderate stress: Incapable to handle job satisfactory, Not have enough time to upgrade technology skills and Constant needs to upgrade technology skills,

Table 5
Analysis of technology complexity factors

SUMMARY	Mean	StDev	Degre of Stress
Incapable in dealing with new technology	2.76	0.83	high stress
Incapable to handle job satisfactorily	2.11	0.75	moderate stress

Not have enough time to upgrade technology skills	2.11	0.65	moderate stress
Constant needs to update technology skill	2.07	0.75	moderate stress
Too complex to understand and use new technologies	2.00	0.83	moderate stress

ANOVA of technology-complexity

Source of Variation	SS	df	MS	F	P-value	F crit
Users	17.18	4	4.30	13.69	9.68E-10	2.42
Techno-complexity factors	72.78	44	1.65	5.27	9.7E-16	1.45
Error	55.22	176	0.31			
Total	145.18	224				

ANOVA analysis concluded that there is significant different level of stress caused by each technology complexity factor as well as the significant different level of stress experienced by each user as shown in the $p=9.7E-16 < 0.05$ ($F=5.27 > F\text{ critical}=1.45$) for technology complexity factors and $p=9.68E-10 < 0.05$ ($F=13.69 > F\text{ critical}=2.42$) for the users.

Technology insecurity

Three of technology insecurity factors are considered as low stress contributors, but one factors perceived to contribute very high stress- Fear of being replaced caused by technology skills update.

Table 6

Analysis of technology-insecurity factors

SUMMARY	Mean	StDev	Degre of Stress
Fear of being replaced caused by technology skills update	3.07	0.78	very high stress
Threatened by co-workers with newer technology skills	1.93	0.81	low stress
Less of knowledge sharing for fear of being replaced	1.53	0.69	low stress
Not share knowledge with coworkers for fear of being replaced	1.47	0.73	low stress

ANOVA of technology-insecurity

Source of Variation	SS	df	MS	F	P-value	F crit
Users	74.16	4	18.54	38.19	5.51E-23	2.42
Techno-insecurity factors	37.36	44	0.85	1.75	0.005986	1.45
Error	85.44	176	0.49			
Total	196.96	224				

The three factors are Threat by co-workers with newer technology skills, less of knowledge sharing for fear of being replaced and not share knowledge with coworkers for fear of being replaced.

ANOVA analysis concluded that there is significant different level of stress caused by each technology insecurity factor as well as the significant different level of stress experienced by each user as shown in the $p = 0.005986 < 0.05$ ($F = 1.75 > F \text{ critical} = 1.45$) for technology insecurity factors and $p = 5.51E-23 < 0.05$ ($F = 38.19 > F \text{ critical} = 2.42$) for the users.

Technology uncertainty

Technology uncertainty was the only contributor that showed three different level of stress. One factor showed very high stress: constant changes/developments in the technologies used, one factor

Table 7

Analysis of technology uncertainty factors

<i>SUMMARY</i>	<i>Mean</i>	<i>StDev</i>	<i>Degre of Stress</i>
Constant changes/developments in the technologies used	3.16	0.64	very high stress
Constant changes in organization's computer software	2.51	0.82	high stress
Frequent computer network upgrades	2.47	0.89	moderate stress
Constant changes in computer hardware	2.38	0.75	moderate stress

ANOVA for technology uncertainty

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Users	17.13	3	5.71	19.02	2.59E-10	2.67
Technology uncertainty factors	67.31	44	1.53	5.10	1.94E-13	1.47
Error	39.62	132	0.30			
Total	124.06	179				

with high level of stress: constant changes in organization's computer software, and two factors with moderate level of stress: frequent computer network upgrades and constant changes in computer hardware.

ANOVA analysis concluded that there is significant different level of stress caused by each technology uncertainty factor as well as the significant different level of stress experienced by each user as shown in the $p = 1.94E-13 < 0.05$ ($F = 5.10 > F \text{ critical} = 1.47$) for technology uncertainty factors and $p = 2.59E-10 < 0.05$ ($F = 5.71 > F \text{ critical} = 2.67$) for the users.

Discussion

These Indonesian university staff reported moderate levels of technology stress, similar to those in the US and China, according to Feng's study on the subject. Chinese employees, on the other hand, showed significantly higher levels of technology stress brought on by technological invasion than did the Indonesian staff. According to the findings of Feng's study on technology stress in China and the US, the technology stress experienced by these

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Indonesian university staff was similar to that of the US and China, which also reported moderate levels of technology stress; however, Chinese employees showed significantly higher levels of technology stress due to technology invasion than did US employees [11]. In contrast, Abd Aziz, Kader, and Ab Halim's study on techno-stress among Malaysian workers revealed that techno-complexity contributes more to employees' stress than technology uncertainty does. Nonetheless, the findings clearly suggest that there is no discernible relationship between employees' stress levels and technological overload and insecurity [12].

The evaluation conducted by Siswoyo, Sanusi, and Iriantara [13] on the implementation of the PDDIKTI data base's application system, reveals that there is a gap in data and information due to a number of inhibiting factors and a management system that isn't yet based on complete data. Meanwhile, Syakina [14] discovered that the novelty of this program, which is integrated with the current management system, suffers from a lack of a grand design that maps all the data and information needs of both internal and external customers. It should be a customer-oriented system but not supported by socialization for customers. Additionally, the issue of integrating existing application systems, such as databases and online communication networks, as well as inadequate infrastructure, includes hardware, bandwidth capacity and high-speed accessibility of information.

According to a different study by Sofyan [15] in order to preserve the quality of higher education, Indonesian private universities must be independent, competitive, and have a sustainable reach. They also need to have an integrated information network. Actually, not every postsecondary school has an abundance of highly skilled personnel to fulfill these expectations. Private higher education institutions are under pressure to adapt to the policy's adjustments, which go beyond the criteria set by the central government, as the policy on higher education standards (SNDikti) has grown in significance [16]. The external environment and any changes to laws governing policies in higher education may have an impact on the institutional decisions and activities that higher education chooses to take in order to adapt and adopt new institutions. Examining various field findings from this study has shown various points of view, including how regulations have grown to be very important, organizational and work cultures at other institutions, national, regional, and international perspectives, the impact of inter-institutional cooperation, and evaluation of international accreditation [17].

Understanding the types of technologies utilized in the digital workplace, how they interact with one another, and how they impact technology is important as workplaces increasingly transform into digital workspaces. This knowledge can help workplace designers and developers avoid techno-stress. Because different technology profiles have different effects on those who create technology stress, research and analysis regarding the characteristics of factors related to technology stress should be conducted based on the characteristic profiles of multiple technologies used at the respondent's digital workplace. [18]

The Feeder PDDIKTI database application system was created by the Indonesian Ministry of Education to serve as a community resource for critical information about higher education and as a source of information for government decision-making. However, the vast amount of academic data that needs to be uploaded by numerous unfamiliar operators, coupled with their lack of knowledge or proficiency in using this kind of technology, has led to a high level of technological stress among administrators, staff, and operators in higher education [19].

As suggested by Hariyanto and Hernawati [20], the study also commends the PDDIKTI for providing sufficient trainings and ongoing programs that socialize all changes

made to the application, reducing the techno-stress among its users from high levels to moderate levels. Additionally, the study suggests that all users have additional web-based service client applications to help all levels of users be more easily accessible as well as easily process of sending PDPT data, which will reduce or even eliminate the technology stress caused by the issue of accessing, processing, and sending PDPT data.

CONCLUSION

The study concludes the most of the respondents experience moderate degree of technology stress caused by technology overload, technology complexity, technology uncertainty, and low degree of technology stress caused by technology insecurity.

The degree of stress experienced by the respondent can be traced to the twenty-three technology stress contributors, which shows four factors of technology stress contributors possessing very high stress: the requirement to work faster, change in work habits to adapt to new technology, constant changes in technology used, and fear of being replaced by new technology updates. Six factors contribute to high technology stress: requirements to do more work than one can handle; requirement to work during holyday or vacation; incapable of dealing with new technology compared to newly recruited employees; forces to work with very tight time schedules; higher work overload caused by the increased technology; constant changes of dealing with new technology compared to newly recruited employees; forces to work with very tight time schedules; higher work overload caused by the increased technology; constant changes in the organization's computer software.

Ten factors contribute to moderate technology stress: frequent upgrades to computer networks, constant changes in computer hardware, the invasion of personal life by technology, less time spent with family due to technology, the feeling that one is not technologically capable of handling their job satisfactorily, the constant need to update one's skill set in order to avoid being replaced, the constant threat to job security due to new technologies, the sacrifice of vacation and weekend time to stay up to date on new technologies, and the belief that technology is too complex to understand and use. Finally, only three factors contribute to a low degree of technology stress: being threatened by co-workers with newer technology skills, sharing less knowledge for fear of being replaced, and not sharing knowledge with coworkers for fear of being replaced.

ANOVA analysis showed that different stress contributors may cause difference level of technology stress, however the study also found that no significant difference in the degree of technology stress experienced by the respondents in dealing with different technology stress contributors.

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