

ASSESSMENT OF ERGONOMIC HAZARDS AND TECHNO-STRESS AMONG THE WORKERS OF OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, OSUN STATE, NIGERIA

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ABSTRACT

Advances in Information and Communication Technology (ICT) provide organization opportunities for access to information and enable new work arrangements that were previously not possible. However, ICT have also brought about increasingly complicated ways of doing business in the workplace with its attendant physical and emotional stress on workers which resulted in higher levels of turnover and absenteeism, higher cost of retraining staff and negative effect on productivity. The main focus of this paper therefore, is to examine the prevalence of ergonomic hazards and associated techno-stress among the academic and non-academic staff and also to ascertain the effect of techno-stress on the performance of individual university employee. Obafemi Awolowo University, Ile-Ife, Nigeria was used as a case study. Cross sectional survey design using questionnaire to collect primary data to assess the degree of ergonomic hazards experienced by the staff, the relationship between ergonomic hazard and techno-stress as well as the impact of techno-stress on their productivity was adopted as the methodology for this study. Descriptive and inferential statistics were then used to analyse data. Findings revealed that university staff are suffering from ergonomic hazards; quite a number of them lack knowledge of health problem and stress associated with ICT usage; and that there is positive relationship between ergonomic hazards and techno-stress; and finally techno-stress have negative consequences on individual worker's performance.

Keywords: *Ergonomic, Ergonomic Harzards, Techno-stress, Information and Communication Technology*

1. INTRODUCTION

The advancement in information and communication technology has brought about increasingly innovative ways of doing business in the workplace. Even though ICT might enhance the productivity of individuals and enable new forms of working, there are also concerns regarding negative consequences of ICT advances in organizations and individuals' life. The rapid introduction of technology in the workplace may cause organizations to suffer from a combination of technology fatigue and aversion (Ahmad, Amin and Ismail, 2009). It has become commonplace that organizations are dispersed, and consist of individuals working by means of ICT in new organizational forms (Melchionda, 2008).

The development of internet and electronic network resources encouraged the development of new services such as digital libraries. However, this might pose a great challenge since the internet was also seen as a threat and as it created a lot of uncertainty (Melchionda, 2007). In the process of adapting to the increasingly complex technologies, more users and staff have been experiencing physical and emotional stress (Saunders, 1999) which resulted in higher levels of absenteeism and turnover, higher cost of retraining new staff and increase in litigation costs related to workplace stress (Harper, 2000). Among key issues related to optimal human interaction with computers were the physical layout of the computing environment, lighting levels and sound levels, chair and table setting.

Previous studies have investigated the negative relationship between computer related techno-stress and individual productivity (Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2007), as well as organizational outcomes

(Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008) in other sectors different from education, where computer usage is on the increase to process daily routine work. However, relatively fewer studies in the organizational behavior and information systems (IS) literature provide insights on how to effectively reduce computer-related hazards and techno-stress perceived by employees and increase IT productivity in education settings. Therefore, it is important from the management perspective to address the issue of ergonomic hazards and associated techno-stress among university staff for two reasons which include the health costs attributed to stress and the productivity losses of employees among university staff.

Office Ergonomics is the branch of ergonomics dealing specifically with the office environment. In recent years the main focus of office ergonomics has been on computer work due to the rapid increase in computer use in the modern office and the associated increase in injuries. Ergonomics is a tool which business owners and managers can use to help prevent these injuries in the office. Ergonomics attempts to reduce the risk of injury by adapting the work to fit the person instead of giving the person to adapt to the work. In addition to injury prevention, ergonomics is also concerned with enhancing work performance, by removing the barriers that exist in many work places that prevent employees from performing to the best of their abilities. Therefore, another benefit of applying ergonomics to office work is that it helps people work more effectively, efficiently and productively at their jobs.

Therefore, the focus of this paper is to examine the prevalence of ergonomic hazards and associated techno-stress among the academic and non-academic staff of the Nigerian universities. The effect of techno-stress on the performance of individual university employees is investigated.

The aim of this study is to provide answers to the following questions:

- i. What is the degree of ergonomic hazard experienced by the university staff?
- ii. What is the relationship between ergonomic hazards and techno-stress?
- iii. What is the impact techno-stress on the staff productivity?

2. LITERATURE REVIEW

2.1 Techno-Stress

The concept of 'techno-stress' has been used in many different ways. Techno-stress refers to the state of mental and physiological arousal, and consequent pressure, observed in employees who are dependent on technology in their work (Weil and Rosen, 1997). Some consider techno-stress to be a modern disease caused by the inability to cope with new technologies in a healthy manner (Brod, 1984). In this study, techno-stress refers to strain caused by individuals' interaction with ICT. The concept of techno-stress is discussed to an extent (Brod, 1984; Sami and Pangannaiah, 2006; Tu et al., 2005; Weil and Rosen, 1997), as identified earlier. Clear symptoms of techno-stress include the inability to concentrate on a single issue, increased irritability, and the feeling of loss of control (Ibrahim, Bakar, and Nor, 2007).

Davismilis (1998) identified techno-stress as a condition whereby a person has to adapt to a new technology especially when there is inadequacy of the equipment support, or the technology itself. Other terms that were synonymous with techno-stress used by other researchers include computer phobia, computer anxiety, computer stress and digital depression (Darndell and Haag, 2002; Mustaffa, Yusuf, and Saad, 2007).

2.2 ERGONOMIC HAZARDS

Ergonomic comes from two Greek words, "ergos" (work) and "nomos" (natural laws). It is the scientific study of people, their work and their environment. Ergonomics is essentially about "**fitting work to people**". It is the process of designing or arranging workplaces, products and systems so that they fit the people who use them. Ergonomists use the data and techniques of several body sizes, shapes; populations and variations biomechanics: muscles, levers, forces, strength environmental physics: noise, light, heat, cold, radiation, vibration body systems: hearing, vision, sensations applied psychology: skill, learning, errors, differences social psychology: groups, communication, learning, behaviors.

Ergonomic Hazards impact on employers and workers and their families. Poor workplace design, awkward and repetitive body movements and other ergonomic hazards induce or contribute to a staggering number of cumulative trauma disorders (CTD) which affect hands, wrists, elbows, arms, shoulder, the lower back and the cervical spine area. Structures involved include tendons muscles bones, nerves, and blood vessel. It refers to workplace conditions that pose risk of injury to the musculoskeletal system of the worker. Examples of musculoskeletal injuries include tennis elbow (an inflammation of a tendon in the elbow) and carpal tunnel syndrome (a condition affecting the hand and wrist) (Adedoyin, Idowu, Adagunodo and Idowu 2004). Ergonomic hazards include repetitive and forceful movements, vibration temperature extremes and awkward

postures that arise from improper work methods and improperly designed work stations, tools and equipment and ergonomic injuries include strains which can be caused by performing the same motion over and over again (such as vacuuming).

2.3 THE USE OF ICT IN OBAFEMI AWOLowo UNIVERSITY (OAU), ILE-IFE

Since the introduction and use of computer and internet in the educational institutions, Obafemi Awolowo University (OAU), Ile-Ife, Osun – State, Nigeria is among the early adopters both on the job relating to academic and non-academics. Techno-stress in OAU was also found to stem out from organizational factor. For example, inadequate staff and insufficient number of printer' terminals and work stations which caused the staff to share equipments were more likely to lead to frustration. According to Harper (2000) identified two forms of techno-stress affecting academic staff; the physical form and the psychological form. Complaints of headache, back strain, eyestrain and muscular dysfunctions were some of the physical forms of techno-stress while psychological forms experienced by lecturers includes feeling drained, information overload identified with technology, under work and doing routine jobs. The non-academic staff of the University had fear of having their duties being taken over by the use of computer which consequently led to feelings of job insecurity, loss of motivation and team spirit.

Ahmad, Amin and Ismail (2009) quoting an online survey by Kupersmith (2006), confirming that techno-stress existed in the academic setting. He stated that more than half of academic staff surveyed (59%) felt that stress had increased in the past five years and almost two third of the respondents believed that the problem was somewhat serious. It was also revealed by the study that the leading causes of techno-stress were information overload, networking problem, security issues and computer hardware and ergonomics.

2. METHODOLOGY

This is a cross-sectional survey design and primary data is generated using a questionnaire adopted and slightly modified to suit the purpose of this study. Pretest of the questionnaire which includes ergonomic hazards and techno-stress experience was administered on 20 academic members in another tertiary institution (Foreign Links Campus, Moro, Osun – State, Nigeria.) During the pretest process, the reliability coefficient was .60 for the questionnaire items. Based on this, the definitions and measurement of items were revised. Factor analysis was performed on each sub dimension to assess unidimensionality and discriminant validity of the questionnaire. Reliability score (Cronbach's alpha) was used to assess scale consistency. The final reliability coefficient was .85 and which reflects that the questionnaire is reliable enough to be used for the purpose of this study. The population for the present study comprises both academic and non-academic staff of the Obafemi Awolowo University, Ile Ife. The cluster sampling technique was used to select 200 samples across the faculties in the university, that is 100 academic and 100 of non-academic staff were randomly selected to participate in the study.

3. EMPIRICAL RESULTS

The respondents of the administered questionnaire for this study comprise one hundred (100) academic staff and one hundred (100) administrative or non-academic staff. All these people are proficient in computer usage.

The socio-demographic characteristics of the respondents used in this study are discussed, considering gender, male are (118)59% and female (82) 41% having the following qualifications; Ph.D (17%), M.Sc. (26%), B.Sc./HND (25%), ND/NCE (17%) and O/Level (14%). Out of the 200 respondents only 42% are having additional qualification in ICT ranging from certificate to M.Sc.

The age range of the respondents is 36-45 years (39%), 21-35 years (37%), above 46 year (24%). Forty two percent of the respondents had more than 15 years of experience, thirty two percent have been in service for over 10 years and twenty six percent had less than 5 years experience.

The period of computer usage in years among the respondents was analyzed in the range of 1-2 years (35%), 3-5 years (48%), 6-8 years (6%) and above 8 years (10%). This confirmed that all respondents for this study had sufficient years of experience on computer usage and they were appropriate for the study. Also, the length of time spent on computer on daily basis was summarized thus: Fifty nine percent of non-academic staff spent 3-5 hours daily with computer while sixty four percent of the academic staff used 1-2 hours per day. These results showed clearly that non-academic staff spent more time on the use of computer than their academic counterparts. The usage had been seen as an integral part of the university system. The University staff members used computer for various assignments and functions. The purposes of computer usage as reported by the respondents are presented in the table 1 below:

Table 1: Purpose of Computer Usage

S/N	Purpose of Computer Usage	Academic Staff %	Non-Academic staff %
1	Secretarial duties	0.5	73
	Accounting duties	5	99
	Internet/university web	91	64
	Application software (SPSS, STATA)	62	39
	Research/Teaching	85	3
	Computer game	75	47

Source: Researchers' survey, 2013

Most academic staff (fifty six percent) from the total number of 100 respondents accessed 40% of their lecture note from the internet, fifty seven percent prepared 80% of their lecture with power point, ninety-four percent accessed 80% of their research materials from the internet, fifty four percent gathered 40% of their information and materials from hard copies and finally eighty percent of academic staff used computer to process 90% of their assignments and result computation.

Furthermore, the importance of computer in achieving employees daily work goals was determined. Out of 200 respondents, 122 (60.5%) described that computer usage is important in the accomplishment of their work goal. However, out of 122 university staff that reported computer is important, 69% and 31% are non-academic and academic staff respectively.

Having described the characteristics of the respondents and computer usage culture in the study area, the objectives of study are addressed in the next part of this section.

The main focus of this paper is to examine the prevalence of ergonomic hazards and associated techno-stress among the academic and non-academic staff of the universities. Also, it aims to ascertain the effect of techno-stress on the performance of individual university employees. In addressing these objectives, three research questions were coined around the main objectives and which are analyzed below:

i. What is the degree of ergonomic hazards experienced by the university staff?

To answer this question, the responses of the respondents on their current works station design by staff of the university were subjected to descriptive analyses.

The results in table 2 showed clearly that the university staff experience ergonomic hazards during their routine office work. On specific experience of the respondents, both academic and non-academic reported to have experienced 'shoulder, finger, thumb and arm pain' (50% and 60%) respectively. Academic staff reported that they sometimes experienced 'knees and legs swelling' (47%) while increased number of respondents 78% of non academic staff reported "often" and 77% experienced 'lower and central back pain'. 'Neck pain' was another popular ergonomic hazard 'sometime' reported (55% and 25%) and (66% and 22%) by academic and non academic respectively. Although, majority (50%) of non-academic staff 'often' experienced headache, eye, and chest pain than academic staff. Hearing problem were not common among the university staffs (91% and 82%) of academic and non- academic staff were not predisposed to any hearing problem through the use of computer. It is worth-noting, that the results of the present study gave more insight into the fact that both academic and non academic staff of the university, at one point or the other experience one or more ergonomic hazards making them more prone to organizational techno-stress through the use of computer to process daily routine work.

Table 2: Ergonomic Hazards as Experienced by the University Staff

Ergonomic Hazards	ACADEMIC N=100					NON-ACADEMIC N=100				
	VO	O	S	R	N	VO	O	S	R	N
Lower and central back pain	0	28	44	28	0	0	77	18	3	1
Knees and leg swelling	0	4	47	47	2	0	78	14	8	0
Shoulder, fingers, thumb, wrist, and arm pain	2	50	41	6	1	13	60	14	11	0
Neck pain	0	37	55	8	0	17	48	25	7	1
Headache, eye and chest pain	1	21	66	12	0	18	50	22	7	1
Hearing problem	30	61	0	0	0	39	43	1	0	0

VO=Very Often, O=often, S= Sometime, R=Rarely, N= Never

Several other factors could be responsible for the vulnerability of the university staff towards ergonomic hazards. Knowledge of the respondents about the sources of ergonomic hazards was one of the factors. Further descriptive analysis was performed to ascertain knowledge level of the respondents on the various sources of ergonomic hazards as can be seen in the table 3 below.

The findings below showed that (75% and 77%) of the respondents were not aware of the health problem and stress associated with ergonomic hazards respectively. Interestingly, vast majority of the respondents (eighty three percent) did not clearly understand the concept of ergonomics. This had a serious implication on the management - based intervention programme to propagate proper ergonomic principle in the university system.

Table 3: Knowledge of Ergonomic Hazards

S/N	Knowledge of Source of Ergonomic Hazards	Yes	No
A	Awareness of health problem associated with ergonomic hazard	24	75
B	Awareness of stress associated with ergonomic hazard	22	77
C	Your chair and table is comfortable with use of computer	55	33
D	Positioning of your computer on the table	54	45
E	Your proper sitting posture before your computer	55	45
F	Your computer screen to protect you from radiation	40	60

Source : Researchers' Survey, 2013.

ii. Relationship between Ergonomic hazards and Techno-stress.

Items for measuring ergonomic hazards and techno-stress were converted to form a scale, the two scales were then subjected to a correlation analysis and the result was presented in table 4.

The result presented in the table 4 below shows that Pearson correlation coefficient, $r = .011$ is statistically significant ($p < 0.05$). This shows a positive correlation between ergonomic hazards and techno-stress. The effect size was estimated to be between small and medium levels. This implies that the more the respondents were exposed to ergonomic hazards, the more they were vulnerable to techno-stress through the use of computer.

Table 4: Relationship between Ergonomic Hazards and Techno-stress

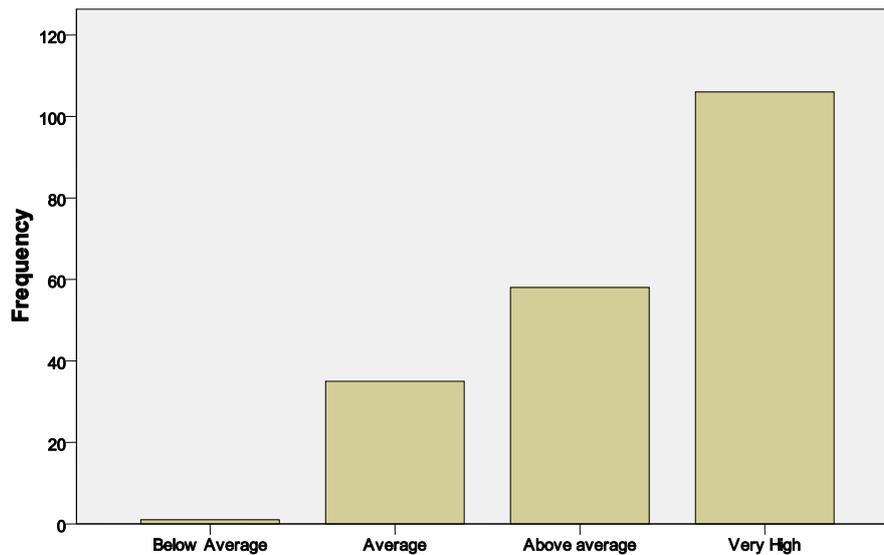
Ergonomic Hazards experienced	Pearson (r)	.011**
	Sig. (2-tailed)	.876
	N	196
Techno-stress		

iii. Impact of techno-stress on staff productivity?

The effect of ergonomic hazards on the work performance of university staff was also investigated (see table 5 & figure1). To answer this question, the responses to the questionnaire were scored in such way that Very Low response was scored 1, Below Average was scored 2, Average scored 3 while Above Average response was scored 4 and Very High response was scored 5. The high score assigned for Very High response is to indicate strong agreement and Very Low to indicate strong disagreement that ergonomic hazards do not influences employees work performance. The resulting scores were then categorized using this range to build a measure of ergonomic effect.

Table 5: Ergonomic Hazards and Work performance

Scale	Frequency	Percent	Range
High	106	53	1-2.5
Moderate	58	29	2.6-3.5
Low	36	18	3.6-4.5
Total	200	100	

Figure 1: Rating the effects of health problems on performance

Based on the opinion of the respondents, the result demonstrated that Ergonomic hazards have a significant influence on the work performance of the employees.

4. DISCUSSION

In recent times, the risks and dangers to one's health from the use of computers or general ICTs explain why several studies in this area of ergonomics are focusing on the danger posed by ergonomic hazards and its associated techno-stress. There is growing consensus that poor workstation design and organization culture can significantly contribute to pandemic of ergonomic hazards (Ahmed-Refat et al., 2008). The present study also has its central focus on determining the prevalence of ergonomic hazards and associated techno-stress among the academic and non-academic staff of the Obafemi Awolowo University. The effect of techno-stress on the work performance was investigated.

The findings of this study reflected that the university staff were predominantly experiencing the ergonomic hazards ranging from pain in the "shoulder, finger, thumb and arm", "knees and leg swelling", lower and central back pain", "headache, eye and chest pain" which is in line with Adedoyin, et al., (2004). This finding showed a strong similarity to what was reported in other studies (Kryger et al., 2003). There are possible explanations for the results (Johnson et al., 2008; Ahmed-Refat et al., 2008; Mahalakshmi & Sornam, 2011) including empirical study (Johnson et al., 2008) conducted in Obafemi Awolowo University confirmed the high use of ICT facilities including the use of computer for processing daily routine work for both academic and non academic staff. Many computer users were probably assumed bad postures when working on the computer due to the poor workstations design and the negative attitudes of some users that were not willing to comply with ergonomic principles as it was observed in (Johnson et al., 2008). As it is shown in our findings, majority of university staff had experienced lower and central back, neck, knees and legs swelling and pain (Adedoyin et al., 2004). Caple (2007) emphasized that foot rest is useful to avoid low back pain when sitting for longer time working for 3-5 hours consecutively with computers as reported in this study (Idowu et al., 2005).

This study found that more than 75% of the respondents were not knowledgeable about health problems associated with ergonomic hazards while 77% did not know the associated stress. Similar result was also obtained in studies (Namita et al., 2011; Johnson et al., 2008; Harper, 2000; Ahmed-Refat et al., 2008). According to Sawyer (2004), the levels of ergonomic knowledge and priority given to ergonomic computer use were low irrespective of location and the caliber of user. Educational qualification and the work environment were not determinants of positive behaviour towards ergonomic principle. Good posture according to Hedge (1993) was essential and naturally suitable for human body and it was the basis of good workstation ergonomics which can serve as one of the ways to avoid ergonomic hazards.

In an attempt to establish any possible nexus between ergonomic hazards and techno-stress, our study found significant positive relation between ergonomic and techno-stress. The implication of this result was that, the more the computer users were predisposed to ergonomic hazards the more such users were prone to associated stress (techno-stress) (Namita et al., 2011).

It was also found that techno-stress affect performance of the computer users. It was observed that nearly 53% reported that the effect of techno-stress on the productivity was high on their performance. This result posed a serious danger on the overall organizational productivity (Ragu-Nathan, (2007).

5. CONCLUSION

Ergonomic hazards and resultant effects as techno-stress is becoming a nightmare caused by technological advancement. However, the necessity to get work done in a modern way through the application of innovative invention “computer” and other ICTs facilities has become inseparable from our daily lives. The health related problems as a result of computer usage which for the sake of its negative impact on both human and material resources, even on the overall organizational productivity has caused researchers to direct their search light towards developing good ergonomic principle that will support users health and higher productivity. Therefore, this study also investigated the prevalence of ergonomic hazards, the relationship between ergonomic hazards and techno-stress and determine the influence of techno-stress on work performance.

Based on the key findings from this study, it can be concluded that majority of the academic and non academic staff experience ergonomic hazards and this prone them to the associated techno-stress and grossly affected their daily work performance. Increased numbers of university staff lack basic knowledge about the associated health problems and stress with ergonomic hazards. In view of the above findings, periodic trainings/seminars and intervention programmes on ergonomic principles for all the university staff, establishment of ergonomic principles and safe work practices.

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