

# ***THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT***

## **Ergonomics and Its Impact on Workplace Productivity with Special Reference to Employees of Various Sectors in Mumbai**

**Sarit Prava Das**

Professor, Institute for Technology and Management, Kharghar, Navi Mumbai, Maharashtra, India

**Parna Mishra**

Assistant Professor, Institute for Technology and Management, Kharghar, Navi Mumbai, Maharashtra, India

### ***Abstract:***

*Management's new challenge is to create a work environment that attracts, keeps, and motivates its workforce. The responsibility lies with managers and supervisors at all levels of the organization. Businesses must step outside their traditional roles and comfort zones to look at new ways of working. They have to create a work environment where people enjoy what they do, feel like they have a purpose, have pride in what they do, and can reach their potential. Today's workplace is different, diverse, and constantly changing. The typical employer/employee relationship of old has been turned upside down. Workers are living in a growing economy and have almost limitless job opportunities. This combination of factors has created an environment where the business needs its employees more than the employees need the business. The project is discussing the quality of the employee's workplace environment that most impacts on the level of employee's motivation and subsequent performance. The main objective of this study is to find out the relationship between office design and productivity. The purpose of this paper is to overview the ergonomics risk factors across various sectors. The objective is to give a basic introduction and clear definition of ergonomic. The study will include the ergonomics risk factors in relation of human and their nature of work. Based on the literature, the most significant ergonomics risk factors are awkward posture in handling job task, force and repetition of specific movement. Other ergonomics risk factor includes uncomfortable static position, contact stress of muscles and tendon and also extreme temperature condition. This study will enhance the awareness of the risk factors which may occur across various sectors. The sample size was 100 from Mumbai with age-groups ranging from 21 years and above. The tools utilized for the survey a close-ended questionnaire-Ergonomics Design and Environment Questionnaire.*

### **1. Literature Review**

K F H Murrell was born in 1908 and graduated in Chemistry. He worked in the Army Operational Research Group during the war, and later with the Admiralty. In 1948 he became head of the Naval Motion Study Unit and in 1949 invited a small group of likeminded people who had experienced human factors research, and had met US people with similar experiences, to a meeting to discuss a more formal group. From this meeting the Ergonomics Research Society was later formed, Hywel Murrell coining the term "Ergonomics" at the time. In the early '50s he formed the ergonomics department of Tube Investments Ltd., the first such department in industry. He was particularly interested in skill development and use, in ageing and in fatigue, and in the application of psychology and ergonomics to practical matters. He produced the first textbook on ergonomics in the UK and worked with standards bodies, trades unions and managements in the dissemination of ergonomics. It is the quality of the employee's workplace environment that most impacts on the level of employee's motivation and subsequent performance. How well they engage with the organization, especially with their immediate environment, influences to a great extent their error rate, level of innovation and collaboration with other employees, absenteeism and, ultimately, how long they stay in the job. Most people spend fifty percent of their lives within indoor environments, which greatly influence their mental status, actions, abilities and performance (Sundstrom, 1994). Better outcomes and increased productivity is assumed to be the result of better workplace environment. Better physical environment of office will boosts the employees and ultimately improve their productivity. Various literature pertain to the study of multiple offices and office buildings indicated that the factors such as dissatisfaction, cluttered workplaces and the physical environment are playing a major role in the loss of employees' productivity (Carnevale 1992, Clements-Croome 1997).

s defined by (Te-Hsin & Kleiner), "Ergonomics is a combination of the words, ergo, a Greek word meaning "work" and nomics, meaning "study" - the study of work. Ergonomics is the study of human abilities and characteristics which affect the design of equipment, systems, and jobs. "The science of studying people at work and then designing tasks, jobs, information, tools, equipment, facilities and the working environment so people can be safe and healthy, effective, productive and comfortable." (Ergonomic Design Guidelines, Auburn Engineering, Inc., 1998)According to (Hagberg et al.,) ergonomics and human factors are often used

interchangeably in workplaces. Both describe the interaction between the worker and the job demands. The difference between them is ergonomics focuses on how work affects workers, and human factors emphasize designs that reduce the potential for human error. While (Bongers et al) stress that by addressing traditional and environmental risk factors, it can keep workers injury free. The latest formal definition of Ergonomics is: "Ergonomics (or human factors) is the scientific discipline concerned with the understanding of the interactions among human and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance"(International Ergonomics Association Executive Council, August 2000). The name ergonomics officially proposed at a 1949 meeting of the British Admiralty (July 12), by Prof. Hugh Murrell. The name 'Ergonomics' officially accepted in 1950. The name Ergonomics was derived from the Greek words: Ergon - work; Nomos - natural law. First use of the word actually can be traced to a series of four articles written by (Prof. Wojciech Jastrzebowski in Poland in 1857). In Britain, The Ergonomic Society was formed in 1952 with people from psychology, biology, physiology, and design. In United States, The Human Factors Society was formed in 1957. In the US "human factors engineering" was emphasized by the US military with concentration on human engineering and engineering psychology. US efforts also focused on the "role" of an individual within a complex system.

Larson and Wick (2012) presented in their research paper on 30years of ergonomics in 3M that it had adopted 3 types of ergonomics strategies: micro-ergonomics (1980s – early 1990s) which was giving unique solutions to individual problems, participatory ergonomics (1990s) Collaborative efforts to create solutions to address ergonomics issues that cross department responsibilities and macro-ergonomics (Since 2000) Strategic focus using ergonomics to achieve business objectives. The EJA tool is based on information from leading ergonomics texts, research reports, and conference proceedings and is comprised of 40 elements commonly associated with MSD illness, in five general categories: 1 medical-response element, 2 excessive demands indicator elements, 32 body-part ergonomics-risk elements, 4 environmental ergonomics-risk elements, and 1 cognitive ergonomics-risk element. Applying ergonomics to the workplace can: reduce the potential for accidents, reduce the potential for injury and ill health and improve performance and productivity. Increasing medical evidence has supported the opinion that an individual's health can affect the manner in which work-related motions produce an effect on the human body (Werner, Franzblau, GeD, et al, 2005)By incorporating ergonomic principles into the functional design of a contemporary office, the workers become more productive and efficient. Each worker's tasks center around a workstation and the configuration of the workstation depends on the performance duties of each worker. The goal for each worker should be to maximize productivity and efficiency with minimal stress and injury. In a modern day office the centre of the worker's activity revolves around a computer, desk and chair. The application of ergonomics is most important to the activities that make up the bulk of the workers time. To prevent the worker from wasting energy by moving in and out of a chair, space must be used efficiently. The working area can be divided into zones. Zone 1 is the area containing materials most frequently accessed and therefore within a 12-inch reach. Those materials less frequently used are in zone 2 or within a 20-inch reach. Those materials that are seldom used are in Zone 3 or greater than 20 inches away from the worker. The idea is to use shelving and cubicles that are compactly designed to organized things into respective zones. Sometimes it is necessary to organize shelving into portable units such as carts with casters. For ease of operation these casters should have low rolling resistance and a centralized locking system. Unnecessary motions interrupt a smooth workflow and expend wasted energy. They also cause cumulative trauma to the back, neck and shoulders. Stretches and exercises can be performed at the workstation without disrupting the work routine. By taking a proactive role in initiating ergonomic programs the business bottom line is enhanced through worker productivity and decreased healthcare costs.

As per Cornell University Ergonomics Web, ergonomics includes study of the following:

#### Work Environment

1. Physical demands (e.g. lifting objects, moving objects)
2. Skill demands (e.g. typing at 110 words per minute)
3. Risk demands (e.g. running on an ice pavement)
4. Time demands (e.g. trying to finish all of the work by the end of semester)

#### Psychosocial Environment

1. Social (e.g. working in teams)
2. Cultural (e.g. pace of life is different in different countries)
3. Lifestyle(e.g. work vs. leisure time, and quality of life issues differ between countries)

#### Physical Environment

1. Physical agents (e.g. heat, noise, vibration)
2. Chemical agents (e.g. air pollutants)
3. Biological agents (e.g. airborne diseases)

#### Technology

1. Product design (e.g. designing product dimensions using anthropometrics, biomechanics data)
2. Hardware Interface design (e.g. designing controls and displays to meet user expectations)
3. Software interface design (e.g. designing icons and commands to meet user expectations)

#### Ergonomic Considerations

- a. Physical factors - ambient conditions; objects (tools, furniture, etc.)
- b. Biological factors - body dimensions, body capabilities, physiological processes
- c. Psychological factors - mental workload, information processing, training, motivation

- d. Work factors - job demands (time, rate, etc.), job design
- e. Organizational factors - organization type/climate, management regimes

There are 2 main objectives of ergonomics which are:

- a. Enhance the efficiency and effectiveness with which work is carried out - A vital difference between people and machines is that people make mistakes. If we look positively at how people make mistakes to decrease errors (error analysis), we can increase ease of use and reliability of performance. This can increase productivity and the effectiveness of the system.
- b. Enhance certain desirable human values at work - increase safety; increase comfort (of using technology); decrease fatigue of operator (e.g. by providing more rest breaks); decrease stress on individual; increase user satisfaction; and increase quality of life for all people (able and differently-abled people).

The research on the above mentioned areas ensued with particular emphasis on human operations. This offered the opportunity for early improvements in performance and safety, as significant modifications of equipment were unlikely under wartime circumstances. Attention was focused on operations analysis, operator selection, training, and the environment associated with signal detection and recognition, communication, and vehicle control. Concurrently, human factors work in industry was focused on efficiency, task analysis, and time-and-motion studies. A new quarterly journal, *Journal of Cognitive Engineering and Decision Making*, focuses on research that seeks to understand how people engage in cognitive work in real-world settings and on the development of systems that support that work.

The monthly *Human Factors and Ergonomics Society Bulletin* features timely news of conferences, elections, publications, employment opportunities, and local chapter and technical group activities; editorials; and other items of interest to human factors practitioners. The quarterly magazine, *Ergonomics in Design*, contains articles that describe applications of human factors research in a variety of areas. It also contains book and product reviews, interviews, and commentary. The *Annual Human Factors and Ergonomics Society Directory and Yearbook* provides biographical and geographical listings of members. It includes a summary of activities and a list of officers for the Society and each of its chapters and technical groups. The Human Factors and Ergonomics Society have chapters in the United States, Canada, and Europe, which sponsor local meetings and publications. Many jobs are better done by workers of a particular shape and size. The motor car is an obvious example; the seating and controls are designed to suit the majority of the driving population. The same approach should be used in the design of most controls. Whilst many design engineers use their general knowledge and experience for positioning controls, etc., there are statistical data used by ergonomists that give the dimensions of most parts of the body relating to percentages of the population. Using these data, the carmakers know fairly accurately the number of people who will not fit comfortably in their cars and can assess the cost of meeting their needs against the amount of lost sales.

## 2. Objectives of the Study

- To derive whether an association exists between ergonomics and healthy employees.
- It focuses on how ergonomics in the organization helps in bringing improvement in the health of the employees.
- To reason out if ergonomics can be a cause of the increase in productivity in an organization.
- To derive the relationship between good office equipments and the environment and productivity of employees.

## 3. Hypothesis

Hypothesis for this project was to determine that there exists a positive relationship between the following factors:

- Hypothesis 1- Whether there exists a relationship between different age groups and productivity if there is presence of ergonomics in the organization.
- Hypothesis 2- Whether there exists a relationship between furniture and employees' productivity if there is presence of ergonomics in the organization.
- Hypothesis 3- Whether there exists a relationship between noise free environment and employees' productivity if the organization is ergonomically sound.
- Hypothesis 4- Whether there exists a relationship between proper maintained temperature and employees' productivity if there is presence of ergonomics in the organization.
- Hypothesis 5- Whether there exists a relationship between lighting and employees' productivity if the organization is ergonomically sound.
- Hypothesis 6- Whether there exists a relationship between proper provision of spatial arrangements and employees' productivity if the organization is ergonomically sound.

## 4. Research Methodology

The methodology intended to be applied included development of a questionnaire, after which the primary job was to administer the questionnaire in order to obtain the representative views of executives across various sectors about ergonomics and its impact and importance on organization. Information hence received from these questionnaire responses gave a broad picture of the impact of ergonomics on employees' health. Convenience Sampling method was used. The unit of analysis was basically the employees of various organizations in Mumbai. The sample size was 100. The respondents were the employees across various sectors in Mumbai like IT, FMCG, Hospitality etc. (21years and above).

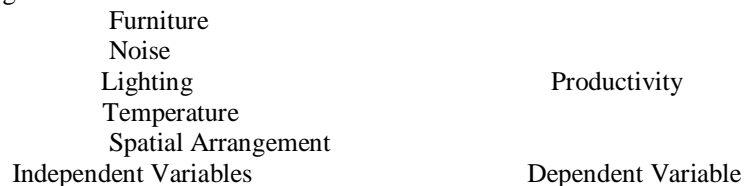
#### 4.1. Data Analysis Techniques

The tool utilized was a questionnaire: one mixed questionnaire, i.e., Ergonomics Design and Environment questionnaire (Refer Appendix 1.1) & were administered to employees across various sectors in various locations (age group of 21 years and above & 100 sample size).

The Ergonomic Questionnaire is a self-made questionnaire with the inputs, support from the project guide, on the basis of the objectives & Literature Review of the Project. Therefore, the questionnaire have not established Reliability and Validity. In all, it consists of 31 items out of which 9 items have 5 point-rating scale where the respondent can respond, by choosing any 1 of the 5 options ranging from 'Strongly Disagree' to 'Strongly Agree' for each of the question, 10 items have 5 point-rating scale where the respondent can respond by choosing any 1 of the 5 options ranging from 'Not at all' to 'Always'/'Completely', 2 items have 5 point-rating scale whose choices range from 'Cold' to 'Warm', 1 item has 5 point-rating scale whose choices range from 'No effect' to 'Bad effect', 3 items have 2 point-rating scale whose choices are either 'Yes' or 'No', 2 items in which the respondents had choices ranging from '0-2 hours' to '6-8 hours', 1 item whose choices range from '20%' to '100%', 1 item whose choices range from 'Extremely Dissatisfied' to 'Extremely Satisfied' and the remaining 2 items have varied choices of answers. Thus, the ergonomic questionnaire is a mixed questionnaire (both quantitative & qualitative types).

#### 4.2. Conceptual framework

Based on the literature review, the relationship between office design and productivity was conceptualized and depicted in Figure below. The relationship is defined in such a way that the set of factors impact on an individual, which in turn determine the final outcome in terms of increased or decreased productivity of that individual. These factors have different impacts on different employees based on their gender.



Five indicators of office design such as furniture, noise, temperature, lighting and spatial arrangement were considered for study in the survey.

The techniques used in the project are:-

### 5. Data Analysis

The one-way ANOVA test (Hypothesis 1) was used in order to find out whether the overall productivity would increase if the related office environment problems were solved in all the four age-groups are statistically significant or not. The F ratio was found to be 3.40. For df 3 (between groups) & 97 (within groups), this F ratio of 3.40 is significant at .05 level of significance, which is higher than the table F value of .021. It means that the variations occurring between the three age-groups are more than the variations that is occurring within these three age-groups. The trend which was seen in the age groups showed that there is not much difference between the Mean of the age groups. It signifies that an increase in age does not prove that they don't want an ergonomically designed environment. With an increase in age their productivity increases too when the ergonomically designed factors are provided to them. This helps in motivating their hygiene needs. As per Herzberg's 2 factor theory, ergonomics is also one of the hygiene factors which any employee is keen to have in his/her organization as that would make him feel safe and secure. (Refer Table 1 and Graph 1)

In order to analyze the data further the HSD Test (Honestly Significant Difference) was done which is basically a Post-hoc test, that enables us to know, out of these three means (groups), which is the mean that differ significantly from each other i.e., all the three means might differ from one another or two of them might be equal & differ from the third one. It is also done to minimize the probability of making the Type I error (to minimize the possibility of rejecting null hypothesis when is true). As the group sizes are unequal, the harmonic mean of the group sizes are used so Type I error levels are not guaranteed.

Hypothesis (H2) was done in order to find out whether the overall productivity would increase if the furniture in the organization is ergonomically designed. The correlation coefficient was calculated by using Pearson's Product Moment Correlation ( $r$ ) formula and its significance was found out by referring to the ' $r$ ' critical values table. The calculated correlation value ( $r$ ) between Furniture (employees' comfortability parameter) & employees Productivity was obtained to be 0.121 that is lower than the table ' $r$ ' value 0.229 at 0.01 levels. The correlation was considered as positive slight negligible relationship. The Mean values Furniture was 3.43 and the  $SD$  was 0.95 while that of Productivity was 2.47 and the  $SD$  was 1.18 (Refer Tables 2 and Graph Fig. 2)

The results shows that the organization's present Ergonomics (furniture requirements/paradigms) are excellent. The employees are satisfied with their one of the hygiene needs-Ergonomic factor (Herzberg's 2 Factor Theory of Motivation) which has resulted on the overall less impact on productivity. If the furniture in the office is arranged according to ergonomic standard then there then the productivity of the employees will increase and thus the correlation coefficient will be positive.

Hypothesis (H3) was done in order to find out whether the overall productivity would increase if the organization has no noise or any kind of distractions and is as per the ergonomic standard. The correlation coefficient was calculated by using Pearson's Product Moment Correlation ( $r$ ) formula and its significance was found out by referring to the ' $r$ ' critical values table. The calculated

correlation value ( $r$ ) between Noise (employees' comfortability parameter) & employees Productivity was obtained to be 0.101 that is lower than the table ' $r$ ' value 0.314 at 0.01 levels. The correlation was considered as slight, almost negligible relationship. The Mean values Noise was 3.02 and the  $SD$  was 1.05 while that of Productivity was 2.47 and the  $SD$  was 1.18 (Refer Tables 2)

The results shows that the organization's present Ergonomics (noise requirements/paradigms) are excellent. The employees are satisfied with this hygiene need of theirs-Ergonomic factor which has resulted in the overall less impact on productivity. It shows that when the workplace has no distractions, employees are able to work efficiently and their productivity also increases with an effectively designed and ergonomically sound work environment.

Hypothesis (H4) was done in order to find out whether the overall productivity would increase if the organization has well maintained working conditions and controlled temperature and is as per the ergonomic standard. The correlation coefficient was calculated by using Pearson's Product Moment Correlation ( $r$ ) formula and its significance was found out by referring to the ' $r$ ' critical values table. The calculated correlation value ( $r$ ) between Temperature (employees' comfortability parameter) & employees Productivity was obtained to be -0.073 that is lower than the table ' $r$ ' value 0.470 at 0.01 levels. The correlation was considered as positive slight negligible relationship. The Mean values Temperature was 2.93 and the  $SD$  was 0.78 while that of Productivity was 2.47 and the  $SD$  was 1.18 (Refer Tables 5)

The result shows that there is negative correlation between temperature and productivity of employees. As per many of the responses which I have been through employees had a grievance of not being able to control their temperature according to their own convenience. Most of the workplaces have centralized air conditioner so the scope for employees to be satisfied with the temperature reduces. Employees' productivity level starts differing slightly in this condition as the employees is unable to give him 100% when he is not feeling healthy or satisfied with the environment.

Hypothesis (H5) was done in order to find out whether the overall productivity would increase if the organization has proper lighting facilities and is as per the ergonomic standard. The correlation coefficient was calculated by using Pearson's Product Moment Correlation ( $r$ ) formula and its significance was found out by referring to the ' $r$ ' critical values table. The calculated correlation value ( $r$ ) between Lighting (employees' comfortability parameter) & employees Productivity was obtained to be 0.006 that is lower than the table ' $r$ ' value 0.915 at 0.01 levels. The correlation was considered as positive slight negligible relationship. The Mean values Noise was 3.41 and the  $SD$  was 1.40 while that of Productivity was 2.47 and the  $SD$  was 1.18 (Refer Tables 5)

The results shows that the organization's present Ergonomics (lighting requirements/paradigms) are excellent. The employees are satisfied with this hygiene need of theirs in terms of lighting in the office-Ergonomic factor which has resulted on the overall less impact on productivity. It shows that their workplace is provided with efficient light. As we have also seen in the Hawthorne Experiment on human behaviour, even when the lighting was increased in the workplace still the productivity of employees in that case did not change as much as in the case where lighting was less. This shows that basic lighting is enough for employees to remain productive.

Hypothesis (H6) was done in order to find out whether the overall productivity would increase if the organization provides its employees with good spatial arrangements and is as per the ergonomic standard. The correlation coefficient was calculated by using Pearson's Product Moment Correlation ( $r$ ) formula and its significance was found out by referring to the ' $r$ ' critical values table. The calculated correlation value ( $r$ ) between Spatial Arrangement (employees' comfortability parameter) & employees Productivity was obtained to be 0.051 that is lower than the table ' $r$ ' value 0.609 at 0.01 levels. The correlation was considered as positive slight negligible relationship. The Mean values, spatial arrangement was 2.47 and the  $SD$  was 1.18 while that of Productivity was 3.46 and the  $SD$  was 1.26. (Refer Tables 6)

The results show that there exists a positive correlation between spatial arrangements and the productivity of employees. This means that the workplace is well equipped with all the requirements (normal storage, movements). The employees are able to move freely in their workplace. They are satisfied with the cupboards or drawers provided for their important documents.

## 6. Conclusion

To more fully understand the degree to which the "people make the place," this study examined the relationship between individual personality, work environment preferences, and performance and commitment in organizations. The results suggest that a specific "place" variable--an employee's work environment preference for goal orientation--plays a predominant role in performance and commitment outcomes. The ability to attract, keep, and motivate high-performers is becoming increasingly important in today's competitive organizational environments.

## 7. References

- i. Larson, Na, and Wick, Hb, 30 Years of Ergonomics at 3M: A Case Study by
- ii. Ergonomics: The Study of Work U.S. Department of Labor Occupational Safety and Health Administration OSHA 3125 2000 (Revised)
- iii. OSHA Ergonomics Program Standard 19100.900, Occupational Health and Safety, 2000
- iv. Verônica de Miranda Prottesa, Nádia Cristina Oliveiraa and Alessandra Barbosa de Oliveira Andrade, Ergonomic work analysis as a tool of prevention for the occupational safety and health management system
- v. Auburn Engineers, 2003, Ergo Job Analyzer User Guide
- vi. Nicole Neubert, Prof. Dr. Ralph Bruder, Dr. Begoña Toled, 2012, The charge of ergonomics – A model according to the influence of ergonomic workplace design for economical and efficient indicators of the automotive industry

- vii. Workplace Ergonomics Reference Guide 2nd Edition- A Publication of the Computer/Electronic Accommodations Program Real
- viii. B. Bridger, (2003) HEALTH – It pays to invest in ergonomics, Health and safety at work
- ix. Andrew Marshall, (2003) - International Ergonomics Association
- x. Thomas J. Smith, (2012) - Integrating community ergonomics with educational ergonomics – designing community systems to support classroom learning
- xi. Carolina Bustos, Daniela Fischer, Lucimara Ballardin & Rudolf Nielsen- The ergonomics process of an automotive company in Brazil: A case study by
- xii. Regents of the University of Minnesota, © 2000, The University of Minnesota is an Equal Opportunity Employer and Educator
- xiii. American Society of Interior Designers (1999) “Recruiting and retaining qualified employees by design.”
- xiv. Caligiuri, P. M. 2000. "The Big Five Personality Characteristics as Predictors of Expatriate's Desire to Terminate the Assignment and Supervisor-rated Performance." *Personnel Psychology* 53 (1): 67-88.
- xv. Loureiro, I.F , Leão, C.P. and Arezes, P.M., 2012- Ergonomic tridimensional analysis: critical
- xvi. ergonomic factors identification in a commercial environmental
- xvii. Brill, M. Margulies S, Konar E, BOSTI (1984) Using Office Design to Increase Productivity. Vol. 1, 1984: Vol.
- xviii. Carnevale, D.G., (1992), Physical Settings of Work. *Public Productivity and Management Review*, 15, 4, 423-436.
- xix. Clements-Croome, D., Kaluarachchi, Y. (2000) An Assessment of the Influence of the In-door Environment on the Productivity of Occupants in Offices Design, Construction and Operation of Healthy Buildings
- xx. Neal, A., M. Griffin and P. Hart. 2000. "The Impact of Organizational Climate on Safety Climate and Individual Behavior."
- xxi. Drew Bossen, 2007 – Improved Workplace Performance and Productivity Through Movement: The Emerging Role of Adjustability

**Annexure**

**1. Summary Tables**

*1.1. Hypothesis 1*

<b>Descriptives</b>								
PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
21-31	47	2.8511	1.06278	.15502	2.5390	3.1631	1.00	4.00
31-41	23	2.0435	1.22394	.25521	1.5142	2.5727	1.00	4.00
41-51	19	2.3158	1.24956	.28667	1.7135	2.9181	1.00	4.00
51-61	12	2.0833	1.08362	.31282	1.3948	2.7718	1.00	4.00
Total	101	2.4752	1.17978	.11739	2.2423	2.7082	1.00	4.00

Table 1

<b>ANOVA</b>					
PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.252	3	4.417	3.402	.021
Within Groups	125.936	97	1.298		
Total	139.188	100			

Table 2

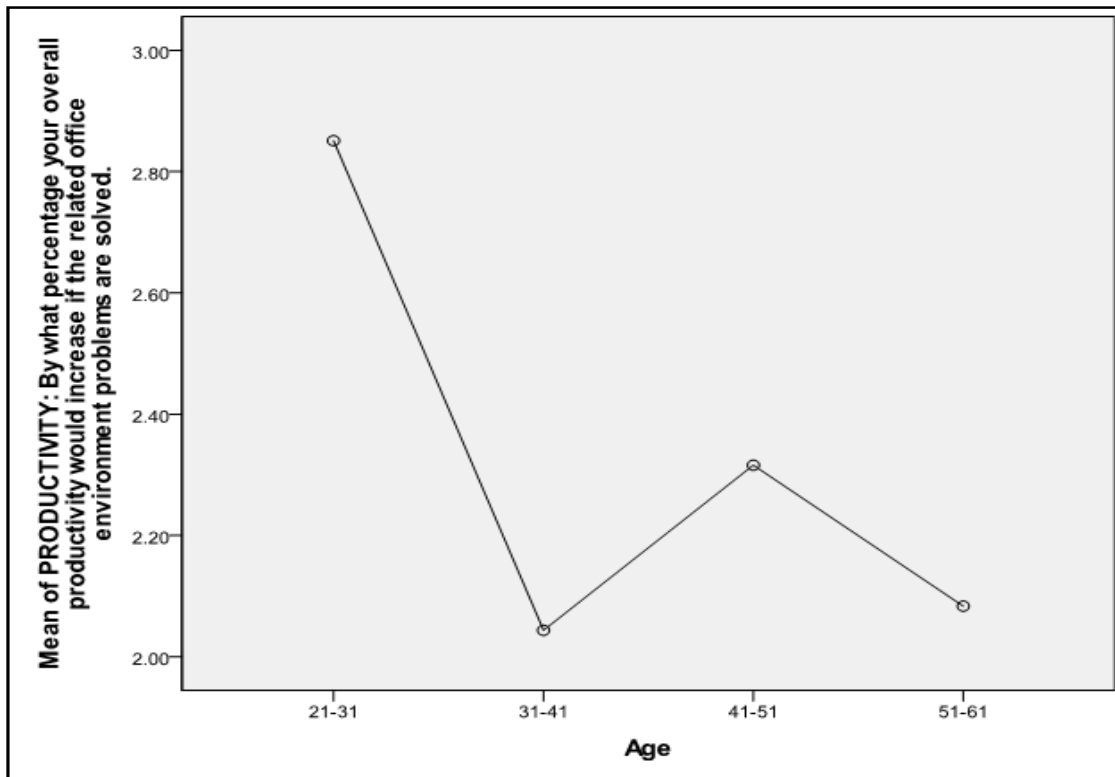


Figure 1

1.2. Hypothesis 2

<b>Correlations</b>			
		FURNITURE: Your furniture is comfortable enough so that you can work without getting tired till 5 p.m.	PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.
FURNITURE: Your furniture is comfortable enough so that you can work without getting tired till 5 p.m.	Pearson Correlation	1	.121
	Sig. (2-tailed)		.229
	N	101	101
PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.	Pearson Correlation	.121	1
	Sig. (2-tailed)	.229	
	N	101	101

Table 3

<b>Descriptive Statistics</b>			
	Mean	Std. Deviation	N
FURNITURE: Your furniture is comfortable enough so that you can work without getting tired till 5 p.m.	3.4257	.95233	101
PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.	2.4752	1.17978	101

Table 4

1.3. Hypothesis 3

<b>Correlations</b>			
		NOISE: Your work environment is quiet.	PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.
NOISE: Your work environment is quiet.	Pearson Correlation	1	.101
	Sig. (2-tailed)		.314
	N	101	101
PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.	Pearson Correlation	.101	1
	Sig. (2-tailed)	.314	
	N	101	101

Table 5

<b>Descriptive Statistics</b>			
	Mean	Std. Deviation	N
NOISE: Your workplace has many noise distractions.	2.6733	.93924	101
PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.	2.4752	1.17978	101

Table 6



1.4. Hypothesis 4

<b>Correlations</b>			
		TEMPERATURE: To what extent your room temperature affects your normal level of productivity.	PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.
TEMPERATURE: To what extent your room temperature affects your normal level of productivity.	Pearson Correlation	1	-.073
	Sig. (2-tailed)		.470
	N	101	101
PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.	Pearson Correlation	-.073	1
	Sig. (2-tailed)	.470	
	N	101	101

Table 7

<b>Descriptive Statistics</b>			
	Mean	Std. Deviation	N
TEMPERATURE: To what extent your room temperature affects your normal level of productivity.	2.9307	.77791	101
PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.	2.4752	1.17978	101

Table 8

1.5. Hypothesis 5

<b>Correlations</b>			
		LIGHTING: Ample amount of light comes in into your office	PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.
LIGHTING: Ample amount of light comes in into your office	Pearson Correlation	1	.006
	Sig. (2-tailed)		.950
	N	101	101
PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.	Pearson Correlation	.006	1
	Sig. (2-tailed)	.950	
	N	101	101

Table 9

<b>Descriptive Statistics</b>			
	Mean	Std. Deviation	N
LIGHTING: Ample amount of light comes in into your office	3.4158	1.40191	101
PRODUCTIVITY: By what percentage your overall productivity would increase if the related office environment problems are solved.	2.4752	1.17978	101

Table 10

## 1.6. Hypothesis 6

<b>Correlations</b>			
		<b>PRODUCTIVITY:</b> By what percentage your overall productivity would increase if the related office environment problems are solved.	<b>SPATIAL ARRANGEMENT:</b> Your work area is sufficiently equipped for your typical needs (normal storage, movements)
<b>PRODUCTIVITY:</b> By what percentage your overall productivity would increase if the related office environment problems are solved.	Pearson Correlation	1	.051
	Sig. (2-tailed)		.609
	N	101	101
<b>SPATIAL ARRANGEMENT:</b> Your work area is sufficiently equipped for your typical needs (normal storage, movements)	Pearson Correlation	.051	1
	Sig. (2-tailed)	.609	
	N	101	101

Table 11

<b>Descriptive Statistics</b>			
	Mean	Std. Deviation	N
<b>PRODUCTIVITY:</b> By what percentage your overall productivity would increase if the related office environment problems are solved.	2.4752	1.17978	101
<b>SPATIAL ARRANGEMENT:</b> Your work area is sufficiently equipped for your typical needs (normal storage, movements)	3.4653	1.26146	101

Table 12