A SURVEY ON THE RELATION BETWEEN VARIABLES INFLUENTIAL ON INTERIOR DESIGN OF WORK PLACE AND PERSONNEL'S DEGREE OF STRESS

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Abstract: Studies have revealed that work environment is even influential over personnel's mental condition. This study aims at identifying the relation exists between interior design related variables of workplace with the degree of stress experienced by personnel of a university. After identification of the related aspects including: sound and noise, environmental dimensions and congruence, congestion, furniture arrangement, light and transparency, questionnaires were distributed among personnel to assess the degree of their stress. The degree of stress was once again assessed after making some changes in the said variables. This research confirms that degree of stress is an effect of interior specifications of workplace and can be changed with making improvement in interior design.

Keywords: Interior Design , Stress, Personnel, Building Dimensions and Congruence, Light and Temperature.

I. INTRODUCTION

Environment, by definition, imply all objects that surround us, natural or artificial. However, one's special definition of environment depends on their perception of environment and on the purpose for which they utilize it. To geographers, environment means land, water and weather, to psychologists, environment means people and their personalities, to socialists it means social organizations and processes and to architects it means structures, open spaces and perspectives. There are so many nonphysical factors that can affect an environment. Natural environments are defined as factors that can diminish mental stress, although sometimes they turn to be cause of stress. Hence environment can be categorized through different methods and on different bases. One of the categorizations made in this regard, is the one made by John Lange. He categorizes the general concept of environment into different subgroups including: Anatomic Environment, Social Environment, Psychological Environment, and Behavioral Environment. Physical Environment consists of geographical and earthly environments, Social Environment includes institutes that consist of groups and individuals, Psychological Environment includes people's mental pictures and Behavioral Environment includes set of factors to which individuals react (Atashgar; 2007)

II. ARCHITECTURE & PSYCHOLOGY OF ENVIRONMENT

Environmental psychology is a complicated study of people and the environment that surrounds them. According to Gifford, environmental psychology is different from the main branch of psychology because it deals with physical environment. This science provides a framework of opinions, hypotheses and researches that allow us to have a better understanding of the reciprocal relation that exists between human and environment. Using this knowledge, assessments can be performed prior to design and construction, which is the best tool for professional designers. Proper designs of the past can be guides for efficient designs in the future. Such comparisons reveal how fundamental is the role played by environment to empower personnel and contribute to their satisfaction.

III. STRESS

Stress is a reaction of organism to external environment. It is a sensory reaction that allows adaptation based on individual differences and psychological processes. It is the consequence of external (environmental) stimuli, events and incidents that cause so many physical and mental demands in an individual (Ivancevich, John M.,& Micheal T. Matteson,1990).

IV. STRESS FACTORS

Studies have revealed that in addition to the potential factors exist outside an organization, the main factors generating stress in an organization are: 1- policies, 2- structures, 3- stages and processes, 4- tangible conditions, 5- congestion, 6- lack of privacy at work, 7- heat & cold, 8-loud noises, 9- improper arrangement of furniture or improper decoration, 10- lack of congruence in space and dimensions, 11- insufficient light (Marens,R., 1976). Some environmental stimuli can be directly or indirectly related to the architecture of the place and more importantly to the interior design of the place.

V. MENTAL EFFECTS OF INTERIOR DESIGN

Generally speaking, interior design can reveal its effect in two ways. One is the effect it has

on the designed place and the other is the effect of the designed place on individuals. Definitely, people who spend a longer time in a place are those affected by the place more. There are some diseases that can be cured by simply making changes in the spatial arrangement. For instance, when a depressed individual is concerned, the relatives are asked to make a change in the decoration of the work place and it is expected that the resulting mental effects can improve the individual's mental health. Colors and materials are also effective in this regard and each can induce a special sense. Interior design is important enough to be studied from various angles. Two various designs of one same place can prepare it for two completely different purposes (Dolatyar, 2008).

VI. ELEMENTS TO BE CONSIDERED FOR INTERIOR DESIGN

Many believe that professional interior design is luxurious, however nowadays it has expansive applications and follow scientific and engineering principles to develop higher levels of tranquility and safety. One of the main issues of concern in this domain is the users' needs based on their age, personality, social class, personal tastes and favorites. In fact, an interior designer actualizes an individual's or an organization's ideals and creates an environment which satisfies their needs. Another important issue of concern is ergonomics and knowing the dimensions of human body to make congruence among furniture, decoration and human's body. It is a designer's task to design any object based on user's size and dimensions. Other issues of concern in this domain include: Safety, optimum use of space and surface, budget issues, light, peace of family members, spatial specifications, functioning and method of using interior space of the place. Psychology of architectural space and decoration is a science dealing more with creating tranquil and beautiful spaces, and providing people with mental safety, than merely arrangement and construction method.

VII. DECORATION OR ARRANGEMENT OF FURNITURE

Human being perception process and his impressionability to environmental stimuli make it incomprehensible for an individual when they encounter some meaningless objects or face inharmonious decorations and create a sense of anxiety in them. Various visual stimuli are followed by mental processing, anxiety or lack of concentration. So many researches have been conducted to prove this and almost a great number of these studies revealed that low number of visual stimuli at an office or at home can lead to higher degree of mental power, concentration and mental peace. Although some people believes in exaggerated decorations at work or living place, the fact is that simplicity in the form or execution of a certain decoration (like same shape objects) does not degrade the artistic value of the decoration, rather, it makes the place organized and structured and the gift resulted from such decorations is mental peace (Khodamoradi, 2009, 48). Decoration design is not a surplus expense. Actually it is a technical measure taken to improve space and manage the place where we live at. Interior design is not a luxurious work. It is a requirement that needs special knowledge and skill. It is considered a surplus expense when designing is not accurate enough and when changes made are baseless and ineffective due to designer's insufficient knowledge (Sabahi, 2009)

VIII. CHANGE OF DECORATION;SURPLUS EXPENSE OR A REQUIREMENT

A common picture in people's minds-when interior design and decoration is concerned- is that it is luxurious. Even managers so often believe that it is a surplus expense. However, by a proper interior design, so other expenses can be controlled and it can be even cost effective. Interior design is not necessarily costly. It can be limited to a change in the color of the walls, making curtains wider, repairing old objects and changing their form, and rearranging furniture; and it is a job at which interior designers are expert; because they have a proper understanding of color, norm, rhythm, congruence, harmony and other visual elements. However, users' tastes and favorites should also be considered because the change can significantly affect their mental health. Hence, interior design is not necessarily accompanied with high expenses; rather, sometimes by simply changing the place of objects, a space can found its optimum status. Designing and architecture including construction, decoration and displacement, require precision and shall be concordant with human nature. On this basis, importance has been given to human-based attitude. This implies that a building design should be performed concordant with certain principles. What we make, should be on the basis of human desires and happiness (Zohourian; 2009). Unfortunately, most people fail to react meticulously towards interior design of their work place. Of course, this domain requires knowledge and expertise which are evidently lacked in common people.

IX. NOISE & SOUND

Nowadays, due to development of urbanization and industrialization and presence of large number of public transportation vehicles and cars and even due to using radio and television, noise is given importance as an environmental stress factor. The effect of noise pollution on people's social behavior is observable and risk of aggression

increases based on the intensity of the sound. The second adverse effect of noise is that it diminishes the productivity of people working in a noisy environment. Experiments prove that expectable noise factors cause less stress compared with unexpected noise factors and the third adverse effect of noise is that it makes people indifferent towards social indexes (Atashgar, 2007). There are evidences revealing that noise-related stress is one of the major reasons that puts human's health in risk. According to WHO[1]'s report, noise may be harmful to hearing and may cause sleep disorder and it results in the releasing of stress hormone (Cortisol) that can affect metabolism and safety system. It may also make people aggressive and may increase the risk of heart attack. According to statistics, 3% of hearts attacks occurring in Europe are noise related. Studies conducted in Cornell University in New York proved that people working in offices full of noises of machines and telephone calls show higher level of adrenalin in their blood compared with those working in a separate tranquil place. Adrenalin is released due to unbalanced body conditions and after experiencing stress and it widens veins in muscles and accelerates operation of heart and increases blood pressure. Since external earsplitting noises cause stress, it is essential to provide some facilities to prevent such noises enter through windows, walls and roofs.

X. TEMPERATURE

Normal body temperature is about 37. When the temperature raises, body responds by releasing heat, however, when the heat received by the body is more than a certain degree and yet body cannot release heat to decrease its temperature, it becomes warmer and this makes the person vulnerable to heat stress. Heat related diseases are physical problems caused due to heat. Such diseases occur when a person is doing heavy physical activities in warm and humid environment. This causes a negative response by person and since the person has less influence over it than other variables, the degree of undesirability of the effects is higher.

XI. DIMENSIONS AND CONGRUENCE

Proper design of space with proper height of roof (neither too long nor too short), stairs, and other architectural elements allow employees not to experience a sense of hobbling and it has a major effect on personnel's mental health. Angles, and up and downs should also considered (Dadkhah; 2010). Sure issues such as number and dimension of pillars, and personnel's visual limit are factors influential on the degree of stress caused in workplace. Leaving empty space in between furniture and leaving an open space for crowded routes allows easy movement and failure in considering such issues can cause stress and limits people's territorial behavior.

XII. LIGHT COLOR AND INTENSITY

Intensity and color of light and its quality directly affects human's body and soul. People who work and live in low light are usually depressed and anxious. Sufficient light, especially sunlight, gives a double energy and eliminates exhaustion. Since, even lights are different in their colors; they usually bring the effect of the pertinent color that is why more attention should be paid on selecting light source. For instance, white light is depressing when it is substituted by yellow light or when it is not combined with yellow light. We all need sufficient light not only for our physical health but also for our mental health and unquestionably sunlight is the best for this purpose. Scientists' researches prove that ultraviolet ray of sunlight affects serotonin hormone which plays a significant role in our emotions and brain activities. Hence, windows should be located in parts where sunlight can pass through at its most. On the other hand, colors have different shades depending on the degree of lights to which they are exposed and this should be taken into account when selecting the light to avoid undesirable colors. Intensity and quality of light directly affects human's soul and body. People living and working in low lights are usually depressed and anxious while those living and working in good lights are energetic people.

XIII. ENVIRONMENT COLOR

Various researches have revealed various effects of lights on human. There were also studies conducted within the past decades, that revealed why some colors are preferred to others, and also revealed the impact of colors on human's behavior and mentality, physical and mental balance, depression and joyance, peace of mind and anxiety. More recent studies carried out in recent years proved that using some special colors can have useful effects in mental health and balance and in peace of mind and body. Colors undoubtedly can be used for their economic results (selling products and services), social results (self-confidence, satisfaction and motivation), mental results (depression and happiness) and educational results (Pahlavan, 2004, 416).

Few studies have been conducted on the impact of color on clients and on efficiency of an organization and none have dealt with the issue specifically. This may be due to the variety of cultural and managerial aspects of an organization that together with considerable psychological aspects make it difficult to express a definite scientific idea in this regard (Ganji,112, 2008). To paint the interior space, various factors should be considered some of which are: 1- age, 2- type of activity, 3- natural color

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of the space, 4- aerodynamic form of the place, etc. Proper colors can help treating some diseases such as depression, hypertension, etc. For instance, blue, makes the heart pace slower and red makes it faster. Some colors also induce some special attributes. For example, blue induces purity and cleanness when used with white. That is why these two colors are recommended to be used in wet places such as washrooms. In brief, using colors and forms a place becomes applicable in an optimum way (Nasr, 2008).

Blue, green and blue-green can decrease stress and irritability (Adon & Schultz; 2009). Various researches prove that employees working in places painted with cold colors show fewer symptoms of exhaustion and customers feel more at peace in stores painted green or blue and ultimately they are more inclined to stay longer and spend more (Van Hagen, 2008).

XIV. STRESS OUTCOMES

One of the most important negative outcomes of stress is excessive exhaustion, disability in relaxation, insomnia, absence from work, hypertension, hypercholesterolemia, and heart diseases (Cummings, Thomas G. and Cary L. Cooper; 1980, 395-418), ulcer and joint pain (Bammer, K. and B.H.New Berry, 1982), horror and lack of social interaction abilities, drop of mental health level (Kilfedder et al, 2001), diminution of work quality and quantity (Schmitz et al, 2000 & Feghhi Farahmand, 2003, 543). Stress can also change an individual's viewpoint towards reality and can affect thinking process. It can also change the relationships and can change people's attitude towards life. (Porter, 1987).

XV. STRESS REDUCTION METHODS

Fighting against stress depends on various factors that can be categorized in two internal and external groups**.** ***Internal Group*****:** age, sex, genetic status, personality, philosophy of life, knowledge level. ***External Group***: Diet, medicine consumption, job type, work and living place, relation with others, social conditions (Kharazmi, 2001, 5). Various researches convey the fact that being exposed to stress within a long period of time can result in important physiological and mental changes and makes human's physical condition unstable.

As a result of this imbalance, symptoms of special diseases become apparent. Stress harms human's internal system and when the person fails to remove the negative effects of stress factors, exhaustion and feebleness become apparent in various types. Such disorders manifest themselves in various mental, emotional or behavioral types.

Research Question:

Is it possible to reduce stress through making changes in the interior design of the workplace?

XVI. SIGNIFICANCE OF TOPIC

Within the past decade, mental stress and the effects it has in organization have been given much importance. The facts prove that improper interior design is the base for a significant part of factors causing mental diseases and other exhaustion-related disorders (Abzari & Seraidaran, 1997). One of the major differences observable between developed and underdeveloped countries, is in the degree of attention paid to sublime architecture and its effect on people's performance. Architecture should be combined with humanities for interior design purposes otherwise the science will be deviated from its rout towards establishing a proper place for human activities. On this basis, recent researches introduced an interdisciplinary course named Psychological Architecture which combines artistic and innovative principles of designing and architecture with psychology. Architects design buildings based on a scientific principle, however, architecture and design should also take human nature into account in construction, decoration or displacement.

Theoretical Frame:

Research type**:** This research is an applied study as far as the goal is concerned and is descriptive as far as the method is concerned.

Research Society: The statistical society includes 60 employees of Kar Higher Education Institute.

Duration of Research: The research was conducted in 2011 and lasted for 4 months.

Data collection tools and Methods: The required data was achieved through virtual and real libraries, interviews and questionnaires. To enrich the research literature and increase its reliability, various domestic and foreign scientific websites and references have been used.

Research Hypothesis:

The research hypothesis is that "Employees' Stress can be Diminished through Improving the Interior Design of the Work Place". Secondary hypotheses have been defined based on indexes pertaining to the two major variables of stress and interior design.

Determination of assay indicator of variables:

In offices not constructed based on principles, corrective mechanisms can be used to decrease the destructive effects on personnel. Hence, among factors stated under theoretical fundamentals, the following five factors are totally related to architecture and researchers selected these factors depending on their special domain of study, as research variables: 1- Decoration or arrangement of

furniture, 2- Dimensions and Congruence in Space, 3- Light, 4- Temperature, 5- Sound & Noise.

Research Methodology:

The research was of an experimental plan. It is an advantage for such plans that the internal reliability variables can be controlled. During the research, pre-test and post-test plans were administered using a control group. The two groups underwent stress assessment test for two times in order to see the effects of changes made in the interior design. Through random sampling method, researchers placed half of the variables in the first group and the other half in the second. The two groups formed in this way are similar and the dependent variable of the research which here is the interior design of the work place is measured for both at one time and under same conditions (Delavar, 2005, 336).

Random Choice	Pre-Test	Dependent Variable	Post-Test	
R	T1	X	T2	Case Group
R	T1		T2	Control Group

Table1) Pre-test and Post-test Plans in Control Group

The workplace of one group was improved and the group was called Case Group. No changes were made in the workplace of the other group (Control Group). Comparing the degree of stress which is the dependent variable in the case and control groups allowed researchers to come to a conclusion. To assess the stress degree in pre-test and post-test groups, Hari S.Candran's stress questionnaire, Osipow's standard occupational stress questionnaire, and work life questionnaire based on Richard Walton's model, were accessible but Osipow's standard occupational stress questionnaire was used because it has been used repeatedly by researchers inside and outside the country and its validity and reliability are approved. This questionnaire is prepared in 6 parts and each part includes 10 questions. The first part referring to the role overload assesses the way a person respond to the workplace demands. The second part referring to role insufficiency assesses the congruence between person's skills, level of education, and experiments with the workplace demands. The third part referring to the role ambiguity assesses person's degree of awareness from priorities, expectations and evaluation standards of the workplace. The fourth part, referring to the role boundary, assesses the conflicts exist in employees with the role expected to be played by them. The fifth part, referring to responsibility, assesses employees' sense of responsibility towards others' welfare and efficiency. The sixth part referring to the physical place assesses the improper physical condition of workplace to which employees are exposed. Osipow's standard occupational stress questionnaire was first used by Osipow in 1987 and was called occupational stress measurement tool (Rahmani, 2008, 184).

Independent variable of research:

The independent variable of research was the physical environment of the university which has been studied based on theoretical bases of architecture and interior design. The variables considered here included arrangement of furniture, space dimensions and congruence, light, noise, and temperature. After preliminary studies, making some changes in secondary independent variables using above stated methods, seemed necessary. As to decoration of offices, since metal equipment of dark improper colors induce a sense of stress, the decision made was to replace this equipment with wooden equipment and light cold colors were used instead of the former colors. The sense of insecurity and strangeness caused due to excessive height of the ceilings was reduced by using false ceiling. The lassitude caused due to improper light was removed by combining yellow light with white light. No corner was left dark. The noises had two major roots: Managerial and architectural. The second was of concern of this research and through installing double layer windows and acoustic door, noises were controlled. The pertinent authorities were advised to keep the temperature of offices between 21-24˚C.

Research Findings:

In this part, the descriptive findings including mean, standard deviation, maximum and minimum scores pertaining to variables are investigated and data are presented in the pertinent table. Descriptive data (maximum and minimum scores, mean and standard deviation) show pre-test and post-test findings in case and control groups. The data convey that post-test mean of stress showed a decrease in case group compared with pre-test mean of stress. Moreover, Mean of stress of control group shows an increase in post-test. Generally speaking, through comparing the means of case group with those of the control group, it can be deducted that mean of stress of case group in post-test in lower than mean of stress of control group (Table 1).

Standard Deviation	Mean	Maximum Score	Minimum Score	Variables	Groups
3.93	35.63	44	26	Pre-test of Stress	Case
4.34	31.40	40	20	Post-test of Stress	
5.43	29.83	37	19	Pre-test of Stress	Control
5.17	30.76	40	21	Post-test of Stress	

Table2) Descriptive data of pre-test and post-test scores in case and control groups

To analyze the covariance, inferential statistics were used to test the hypothesis. In covariance analysis, post-test stress is considered a dependent variable and the pre-test stress is considered as a covariate. The following table illustrates findings achieved as to homogeneity of slopes of pre-test and post-test in operating levels (case and control groups)

P(Level of significance)	"F" ratio	Average squares	Total squares	Variable source
0.91	0.120	0.130	0.130	Pre-test Group
-	-	10.745	606	Error
-	-	-	66100	Total

Table 3) summary result of Assumption of homogeneity of slopes test and post-test scores in the level of factor (control and test group)

Findings of the above table reveal that no significant difference exists among the slopes in operating level. Hence, it is true that slopes are homogenous. The "F ratio" of this analysis equals 0.012 which is not statistically significant with P<0.913. To assess the authenticity of the main hypothesis of this research, covariance analysis is carried out through controlling pre-test variable.

P (significant level)	"F" ratio	Average square	Total square	Variable source
P <0.0001	65.814	701.459	701.459	Covariance (pre-test)
P <0.0001	39.998	475.650	475.650	Group
-	-	10.931	604.543	Error
-	-	-	66100	Total
P <0.0001	22.39	524.7	524.7	Group without covariance
-	-	22.537	1307.133	Error
-	-	-	66100	Total

Table4) Précis of the results of variance and covariance analysis in pre-test and post-test score

As illustrated in the above table, F ratio for case and control groups amounts to 39.998 and is statistically significant with P<0.0001. ***Hence the research hypothesis is authenticated***.

There is also a significant difference in the groups in their post-test score of covariance. The analyses carried out in this research certify that making positive changes in the interior design of workplace can reduce stress.

CONCLUSION AND SUGGESTIONS

The research findings proved that personnel's mental status, especially as far as stress in concerned, is improved when improvements are made in physical factors of the workplace. Since, in this decade, human resources are considered the most valuable capital of an organization, it is essential for managers and policy makers to make concordance between workplace and personnel's demands. For this purpose, the following suggestions may prove efficient:

1- Planning for continuous researches to be performed to investigate the relation exist between variables influential in the interior design of workplace and personnel's mental conditions.
2- Planning to develop congruency between improvement of these factors and interior designers' assessment.
3- Conducting research to see how interior designers familiar with humanities are different in efficiency from those not familiar with the science.
4- Holding scientific courses in the field of interior design and decoration and taking the relations of these with humanities into account.

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