

ENVIRONMENTAL PSYCHOLOGY OF WORKSPACE

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ABSTRACT

The environmental psychology of workspace is a rich and diverse field of study that is growing fast and gaining popularity. As the human beings are spending major time in these areas, the effect of the environment on occupant's performance, health urgently needs to be taken care of. The review paper studies the objectives and themes of basic parameters of functional comfort criteria leading to the enhancement of productivity and efficiency of the user of the workspace. The criteria are space planning, air, thermal and lighting, aural comfort, furniture and ergonomics and energy efficiency. The analysis is performed qualitatively and quantitatively.

Keywords: Comfort criteria, space planning, air quality, thermal quality, acoustical comfort, and energy efficiency.

1. INTRODUCTION

Human beings in all parts of the world are constantly associated with built environment and spend major time in various interior spaces as homes, workspaces, recreational, entertainment etc. These spaces in turn create an impact on occupant's performance, productivity and comfort. The focus is on the study of human behavior in a physical setting (built environment) as enclosed spaces and how these spaces are responsible for creating an impact on the user. Spaces are designed for human activity and as per user's requirements, needs and aspirations. User as a human being plays a vital role and reacts in terms of responses to any kind of situation.

It is not only the functional comfort but also the quality of space which creates an impact on human behavior. The various parameters are shape, scale, proportion, volume, colour, texture, light and sound leading to spatial, thermal, air quality, and aural comfort to be achieved in the design. It is the relationship between the individual and the environment that determines how they perceive space and react to it. Both mental and physical stimuli affect behavioral responses. Perception of one's environment is affected by sociological needs, psychological state and individual differences.

Sociological Needs: This encompasses privacy, personal interactions levels, territoriality, crowding, intimate space, social space and public space. **Psychological State:** This encompasses perception, cognition, spatial behavior, environmental expectation. **Physiological Needs:** This encompasses functionality, ergonomics, life safety, vision, hearing, comfort and efficiency.

For every need and want, there must be an adaptive response, an adaptive design strategy. These needs are satisfied by every human being through exploitation of the environment, processes that form the complex varieties of human environmental relationships. These needs are satisfied by every human being through exploitation of the environment, processes that form the complex varieties of human environmental relationships. Creative design and planning, integrated design process established a proper relationship between human beings and construct of built environment.

2. SCIENTIFIC CONTEXT AND PURPOSE

Though the typology covers spaces as residential, commercial, workspaces, recreational and hospitality, this literature review focuses on the inquiry how people experience environmental conditions at workplace. The main objective is to define basic parameters and theories of environmental psychology of workspace as the impact factors as efficiency, productivity and comfort is easy to get correlated. This review studies the various parameters which can have an implication on the overall performance of the users of the space. The space explained as workspace has no clear cut demarcation as working hours or non-working hours. In today's scenario, workspace is diversified, mobile, and non-territorial. Companies are applying quality, comfort and cost criteria to workspace design.

The literature review deals with various themes and parameters in detail with qualitative and quantitative approach leading to establishment of correlation between the work space design and its impact on the comfort, efficiency and productivity of the worker. A workspace can be defined as the place to meet, to use technology, public places where work occurs and the amenities to support workers. The productivity and performance is individual, group or organizational which leads to

Positive or Negative impact. Positive is imposed speed and accuracy of task performed and Negative is higher error rate, slower time for task completion and adverse effect on health of workers (Jacquie 2008).

2.1 Individual performance:

Workspace desk and office, micro environment, lighting and visual conditions, variations in temperature and humidity, furniture ergonomics and acoustics.

2.2 Group Performance:

Work group size, proximity of team members, position of work group area, shared space, access to shared tools and equipment, floor layout and furniture, height and density of workstation partitions, accessibility to file and work storage, furniture design and dimension.

Organizational Performance: Ease of access, manageable distances, fast elevators, convenient bathrooms, adequate parking and attractive eating areas (Jackie 2008).

3. FUNCTIONAL COMFORT CRITERIA OF WORKSPACE

To establish the correlation of workspace design and its impact on the user, the workspace design needs to follow various parameters and a thorough qualitative (Subjective) and quantitative (objective) analysis is dealt systematically and efficiently. The environmental aspects of workspace include ambient environmental conditions. The conditions include proper lighting, air and thermal quality, placement of activities, furniture layout, ergonomics and acoustical comfort. The literature review discusses about the major functional comfort criteria thematically as- Space Planning Considerations, Energy Efficiency, Indoor Thermal and Air Quality, Acoustical Comfort, Furniture Layout and Illumination.

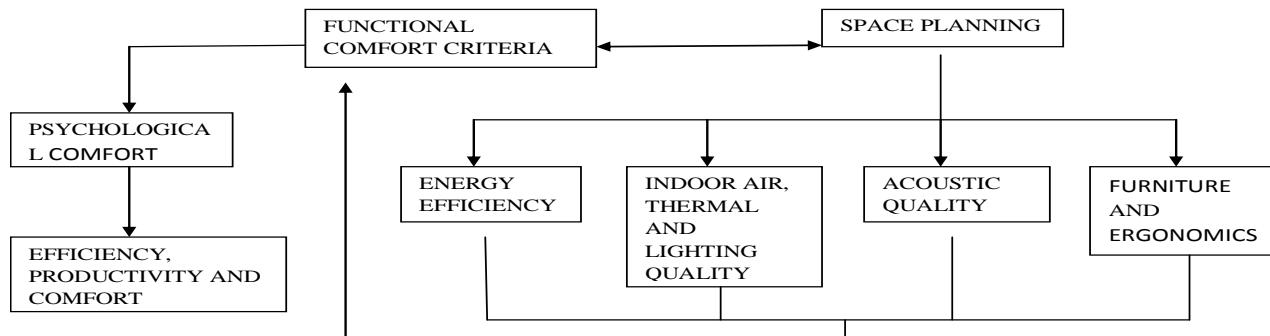


Fig 1

3.1 Space Planning as Functional Comfort Criteria

The location, orientation and placement of activities play a major role in achieving functional comfort. The results of a post occupancy evaluation of qualitative analysis were studied of a US based office in terms of 'perceived quality' of space. At the time of survey it was found that office workers are dissatisfied with open plan' office, (Jackie 2008). The reasons attributed are noise levels, distraction lack of privacy of sameness of cubicles. Open plan has an advantage of facilitating communication and exchange of information is rapid and informal. Whereas it is also stated that open plan office is cheaper to construct and more flexible to recon figurate than a conventional or cellular office layout (Filbert 2007). It has been observed that space planning, utilization pattern and system control strategies that deviate from those designated during the design stages of offices results into discomfort for office workers. Changes in interior planning frequently create a negative impact on the user (Filbert 2007). These planning considerations have an overall impact on productivity and performance at work and leads to either a positive impact or negative impact.

3.2 Energy Efficiency (Air, Thermal And Light) as Functional Comfort Criteria

Various simulation programs were used with a quantitative approach for a UK based office layout (five types), utilization densities and intensities using software packages as TAS (Thermal Analysis Software), Lightscape and Excel Software Package. TAS simulates the dynamic thermal performance of buildings and their systems. TAS Ambians is a 2D CFD package that produces the microclimatic variation in space. Lightscape simulates the physical properties of light and materials. It quantifies the photometric performance of lighting designs. It has already been referred as established by Duff

et al (1998) that office buildings are typically 50% empty. The study focuses on 50% occupancy in analysis, lower 20% and higher 75% is taken into consideration. The procedure involved simulation model layout for light ventilation and thermal environment.

Another two simulation programs were used as archiCAD and RADIANCE, the most advanced lighting simulation program, it has tried to find whether width or height has a stronger influence on the size impression of the room. Psychological aspects of lighting were taken in to consideration as perceptual clarity, evaluative impression and spaciousness. Placement of windows adjacent to the side walls, higher side wall luminance apparently enlarged the width of room and added to the spaciousness (Barbara 2008). Whereas in the analysis of perception of crowding related to a bank space a survey of employees of 49 banks and outside volunteers has given an adverse result that higher illumination meant higher crowdedness and unpleasantsness for both the groups (Ananthakrishna 2008).

3.2 Acoustical Efficiency as Functional Comfort Criteria

The review deals the issue of aural comfort in an office space. It gives importance to planning consideration for design and construction of office buildings from acoustical point of view. Even though (USGBC 1996) i.e. US green building has given specifications of levels of background noise, privacy and guidelines are provided by ASHRAE –HVAC and BCA green mark design, the problem is dealt qualitatively and quantitatively.

The background study tells:

- The performance and comfort criteria of office workers depend upon the control of noise levels in the building.
- The elevated noise levels are capable of distracting the concentration of the workers.
- The acoustic performance of the building affects the users psychologically, physiologically, sociologically.

Objective being to achieve acoustic performance of an office area for ease of communication, privacy and reducing effect on user to achieve productivity, team performance and satisfaction (Alam Sheikh 2010). The post occupancy evaluation (POE) of a three storied office building is conducted by adopting a scientific approach of Total Building Performance (TBP). Guidelines were followed for weighted sound pressure level (SPL), background noise criteria (NC) and reverberation time (RT).

The success of any research depends upon how data is collected and the subjects are sampled. Use of qualitative methods, in which research investigates subjects without using formal psychometric instruments (questionnaire) and quantitative methods in which biological and behavioral variables are measured with instruments and techniques of known validity and reliability. And effective total building performance evaluations is done with an excellent combination of both the methods.

3.3 Furniture Placement as Functional Comfort Criteria

There is an impact of physical and manmade environment on the socio- psychological processes in the interior environment. The placement of tables and chairs in the classrooms and libraries may influence the interaction among the users. Architectural environments encourage behavior with which they are congruent (Ananthakrishna 2008). It was found that office workers are dissatisfied with open plan' office, (Jackvie 2008). The reasons attributed are noise levels, distraction lack of privacy of sameness of cubicles whereas it is also stated that open plan has an advantage of facilitating communication and exchange of information is rapid and informal. The office layouts differ and there is a dynamics of change in office density. They are classified on the basis of user's interaction and autonomy. Interaction refers to the face to face contact that is necessary to carry out office task. Autonomy is the degree of control, responsibility and discretion each office worker has over the context, method, location and tools of work process (Filbert 2007).

4. CONCLUSIONS

- The major functional comfort criteria has a direct correlation between space planning, space utilization, indoor air thermal and lighting conditions, acoustical conditions and energy efficiency.
- The environmental psychology of workspace encompasses the sociological, psychological and physiological needs of the user.
- If all these criteria fulfilled this leads to psychological comfort of the user and enhances the productivity and efficiency.
- The quantitative approach of using computer simulation program as TAS, Lightscape, archiCAD and Radiance gives the desired results for enhancing the air, thermal and lighting conditions of a workspace.

- In two studies the qualitative and quantitative approach shows the use of computer simulation programs. The third case gives the post occupancy evaluation by adopting a scientific approach of Total Building Performance (TBP).
- In two studies the qualitative and quantitative approach shows the use of computer simulation programs. The third case gives the post occupancy evaluation by adopting a scientific approach of Total Building Performance (TBP).
- It can be concluded that POE of every workspace should follow the Total Building Performance (TBP) approach to get the desired functional comfort results of any workspace.

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