AN APPRAISAL OF OFFICE SPACES AND THEIR EFFECT ON WORKFORCE EFFICIENCY IN SELECTED PUBLIC BUILDINGS

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Abstract: The workplace can actually be a source of major stress for workers, therefore some issues in the work place needs to be talked, that will go a long way in improving the atmosphere at work. The appraisal seeks to evaluate the effect of spatial perception on workers efficiency. Through a review of literature and quantitative survey methods, the study determined that the size, has physical effect on thermal comfort and configurations, opening and colour has a psychological effect on workers mood. This in turn has an effect on the length of time and quality of effort put in by the workers. The study concludes and makes recommendations on internal space configurations that enhance worker efficiency.
Keywords: Colour Perception, Workspace Planning, Worker Efficiency

INTRODUCTION

Designers make several considerations in office workspace planning including room size and orientation, colour and illumination and ventilation. Frequently, problems arise when a building is operated or maintained in a manner that is inconsistent with its original design or prescribed operating procedures particularly public buildings, which are known for their poor maintenance culture. Low worker productivity is often attributed to poor building design or occupant activities. Office space design has an effect on workers, several offices particularly in Nigeria are not designed to measure or maximise worker efficiency. There is the need for a set criteria and minimum standard of design to achieve maximum efficiency. The aim of this study is to evaluate the effect of spatial perception on workers efficiency through appraisal of office spaces and evaluation of their effect on workers efficiency; identification of spatial perception by selected office workers and evaluation of user satisfaction levels in selected office spaces. The outcome of this study would be useful to architects and other interior

space designers in office space planning. It would also be useful to administrators to better understand productivity level in the office.

LITERATURE REVIEW

Open office spaces are commonly incorporated by organisation to increase communication. However more distractions occur in an open plan than in conventional offices (Brennan, Chugh& Kline, 2002). In general, studies of the ambient features of office environments including noise, lighting, temperature, existence of windows and others suggest that those elements of the physical environment influences employee attitudes, performance behaviour and satisfaction (Crouch &Nimran 1989).

Noise or unwanted sound, is a common compliant in offices. Several studies have indicated noise as the most frequent compliant amongst or in the office by workers. Today many companies, organisations use open-office design intended to increases teamwork, communication and productivity. However a lot of studies indicate that these open –office foster noise in the workplace. Researchers studying effects of noise on office workers have however found that prolonged exposure to noise may have serious health ramification such as increased illness (e.g. elevated blood pressure) accidents (both inside the workplace and outside the workplace) and stress. Physiological indicators of stress have been noted as a consequence of exposure to noise in offices even when self-report of stress have been negative (Evans 2000).

Table 1: Common Sounds and Levels

SOUND	DECIBELS	INTENSITY
Whispering	34 dB	low
Conversation	60 dB	fair
Vacuum cleaner	69 dB	loud
Heavy traffic	90 dB	very loud
Airplane over head	115 dB	very loud
Human Pain threshold	120 dB	dangerous

Source: Hirschorm (1989)

Components of Healthy Work Space

Health is vital part of an individual well being; a major factor of employee productivity, a healthy, happy workforce is a vital component of a

productive, successful business in the long term. Furthermore there is overwhelming evidence which demonstrate that the design of an office impact the health, well being and productivity of its occupants. Evidently factors like Indoor Air Quality (IAQ), thermal comfort, daylight and lighting, noise, Interior layout Aesthetics and Tactility active design and exercise.

Space integration in planning refers to how easily a space can be reached compared to the other spaces in the layout and how well connected it is with other spaces (Peponis and Wineman, 2002). Studies have shown that properties of spatial configuration affect movement and communication increased between research groups who are closer to the space of movement. There is a relationship between communication pattern and integration of the layout where occupants who are linked to the integrated corridors have more communication with each other, Offices that are well integrated within a whole building to a greater degree are likely to promote collaboration and communication among academics. Perception of room spaciousness, which is influenced by the physical properties of the environment has an effect on user satisfaction (O'Neill, 1994; Stamps, 2007). Herzog (1992), defined spaciousness as "the as the feeling of openness or room wander".

Herzog defines spaciousness is a subjective rather than physical variable. Spaciousness was correlated to the physical characteristic of the environment by Coeterier (1996). According to Coeterier (1996), perception of spaciousness is enhanced by the integration of physical cues such as size, form and open spaces. The light level of space complexity is another factor that affects spatial perception. Complex spaces are perceived darker and confined. Lighting level was observed be related to the perceived spaciousness disparity in judgment attributed to the amount of light (Oldham &Fried,1987) A larger room was perceived more positively than the smaller room (Bharucha-Red and Kiak, 1982), and adjusting the ambient level of light can make a room appear larger or smaller (Stamps,2007). Location of room on the upper or lower floor is also related to perceived spaciousness, as rooms on the upper floors of a building might look more spacious due to expanded views (Kaya and Erkip, 2001).Manav (2007) concluded that an increase in illumination levels improve levels of comfort and feeling of spaciousness. Different illuminations affect the perception of the same space; different lighting levels could be used to enhance spaciousness, relaxation, pleasantness

and order of a room. All these findings suggest that perceived spaciousness changes according to room lighting and location conditions. The study highlights the effects of aesthetics in office environment; especially lighting conditions how it may affect user perception of their rooms, highlighting the need to identify floor plans that are most conducive to supporting collaborative behaviours in office workers.

Colour and Space Perception

Spatial dimensions and colour are primarily visually conveyed; therefore their experiences and perception cannot be absolutely independent. In actual fact normative architectural knowledge makes provisions for some rules of thumbs concerning the influence on colour perceive on room dimensions. Generally cool saturated and light colours are considered to increase spaciousness, whereas dark saturated and warm colours tent to have the opposite effect on space. These characterisations fit well to the at least qualitatively well documented phenomenon of colour perception (Bailey Grimm &Davoli 2006).

Molcan (2015) identifies the best five colours that increase productivity. He highlighted these colours and their effect on psychology of human behaviour, dividing colours into two basic divisions of warm and cool colours, red spectrum colours are warm colours which includes red, orange and yellow, a space painted with theses colours convey energy and cheerfulness, and encourages social interaction and are usually the right choice for interiors spaces. However these spaces evoke the feeling of anger and hostility. For examples red clothing might not help people in negotiation or confrontations. Furthermore when considering the use of one colour in your office know that warm colours increase alertness and to some extend it can be overwhelming therefore people spend less time in a room that is red than in one that is blue. Warm colours are therefore suitable for non-production areas like entrance, corridors and locker-room. Colours on the blue spectrums are known as cool colours and include blue, purple and green they are psychologically soothing and tent to create calm and quite mode and encourages concentration that is the reason why colours are mostly picked as interior paints for production area, maintenance shops and can make reception appear specious and welcoming. Table 2 outlines colours and gives a description of their psychological effect on individuals and work efficiency.

Table 2:   Colour and its effect on Individuals

COLOUR	EFFECT	PERFORMANCE
Blue	people are more productive in blue rooms Blue stimulates workers in higher performance. Interestedly blue clothing is recommended to Job interviews because it symbolises loyalty.	High
Green	Green symbolises nature and it helps to evoke relaxed mood. It is currently the most popular decorating colour. Thus backstage where actors wait to appear on television or on stage are painted with green as it calms the nerves and people are more relaxed	Moderate
White	White is popular in decorating because it is light, natural and matches with everything. White areas seem more spacious, reflect more light and usually gives people optimistic mood. Therefore white and other light colours and used in production areas, small room, hallways. White is a symbol of cleanliness and sterility, thus it is used in hospitals and various medical centres.	High
Red	it is the most emotionally intense colour that stimulates a faster heartbeat and breathing. Red is recommended by decorator as the ideal colour of furniture since it attracts attention.	Moderate
Yellow	Yellow is considered as optimistic colour that enhances concentration, however it is too bright for the eyes to take in. people lose their temper more often in yellow rooms.	Low

Source: Molcan (2015)

Correlations between Colour and Productivity

Clement-Croome(2000), states that productivity depends on four cardinal aspects, personal, social, organisational and environmental. Furthermore not only should indoor air quality and thermal comfort be taken into consideration but also the quality of lighting, sound levels, layout of materials, indoor carbon dioxide concentration, radiation and electromagnetic field, dust levels and biological contaminants. In order to comply with workers comfort they should be asked their preferred choice of colour as getting input from the workplace increases their involvement and ownership which should positively impact productivity.

Brette(1996)states that job that requires great concentration requires a natural colour scheme, jobs like that of accountants and attorney requires a stronger colour scheme, while journalists would perform best in exciting and energetic colours with great contrast value. Interior workplace should be designed to consider workers need resulting in positive changes in productivity of the workforce (Sogawa et al., 2002) among the elements highlighted is colour planning. Garris and Monroe(2005), states that colours influences not only mood but also wellness and productivity. Brette(1996)indicates that peoples reaction to different colour schemes

depends on their culture, education, genetic and socio-economic levels in that case behaviour and productivity in the work place are largely influenced by space, structure, colour, lighting and activity. Every colour has its effect on the human body, we all experience colour in our own ways. There should be right choices as regards colours so as to maintain quality and productive work. According to O'Brien(2007),a blue office is ideal for someone who must focus and concentrate on numbers. Green is great choice for management office as it has balancing effect and yellow is suitable for sales office. It is clear that colours assist in creating attention, this is crucial for workers especially in performing work. Without concentration and attention the product will be low quality and productivity.

Relationship between Workplace and Productivity

Many executives are under the mistaken notion that the level of employee performance on the job depends on the size of employee's compensation package. Although without doubt, remuneration is one of the extrinsic motivation tools (Ryan and Decci, 2000). However, that in itself has a limited and short term effect on the employees' performance. More acceptably a better work place environment will spur employees to yield better results. The American Society of Interior Designers (ASID) were able to show that the physical work design is one of the top three factors in (1999) which has effect on job satisfaction and performance in their study carried out. Brill, Margulis and Koner (1984) ranked factors in accordance to their importance, the factors are sequenced based on significance: furniture, noise, flexibility, comfort, communication, lighting, temperature and the air quality. Springer Associates (1986) stated that "an insurance company in a study reveals that the best organic furniture improve performance by 10-15%".

METHODOLOGY

The setting for the study was Federal Secretariat Jos, Nigeria. This is the largest office building within Jos, housing primarily the Nigeria Immigration Service among other Federal Government parastatals and ministries. The sample population was drawn from office space users (including visitors).A case study method and a questionnaire was used to gain the user perceptions and satisfaction.

Plate ii: Aerial View of Building
Source: Google Earth (2015)

Plate ii: Approach View of Building
Source: Skyscrapercity.com (2015)

RESULTS

The collected data was analysed to determine worker satisfaction with the work spaces provided(size) and to determine if factors mentioned affect levels of productivity in the office. Data are presented by respondents' response to the work space as recorded in Tables 1 to 5. Table 1 reveals that majority of the respondents i.e. 40.8% feel comfort level of their office is poor while just 4.1% of the respondents find their office comfort excellent while 16.3% of respondents feel the level of comfort good 20.4% feel very good describe the comfort level in their office 18.4% however believe the office is very poor in terms of comfort level. Table 2 shows that majority of respondents (71.4%) agree that the office space provided was adequate. while 30.6% say space provided was not adequate for their work. 55% of respondents felt that their offices were well ventilated while 48% felt the offices were poorly ventilated (Table 5). Regarding the colour of office furniture 30.6% are bright colour furniture another 30.6% feel they prefer dull colours. However 38.8% don't know if dull or bright works for them (Table 6). 38.8% of respondent prefer working at home while 40.8% prefer the office (Table 7).

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Table 1: Sample Distribution by Respondents Perception of Office Comfort Level

Comfort Level	Frequency	Percentage %
Excellent	2	4.1%
Good	8	16.3%
V. good	10	20.4%
Poor	20	40.8%
V. Poor	9	18.4%
Total	49	100

Table 2: Sample Distribution by Respondents Perception of Adequacy of Work Space

Status	Frequency	Percentage %
Yes	34	71.4%
No	15	30.6%
Total	49	100

Table 3: Sample Distribution by Respondents Perception of Effect of Work Space

Status	Frequency	Percentage %
Not Adequate	20	40.8
Adequate	19	38%
Not sure	10	11.2
Total	49	100

Table 4: Sample Distribution by Respondents' desire for additional work space

Status	Frequency	Percentage %
More	19	38%
Less	20	40.8%
Total	49	100

Table 5: Sample Distribution by Respondent's Perception of Ventilation Levels

Status	Frequency	Percentage %
Adequate	27	55.1%
Inadequate	24	48.9%
Total	49	100

Table 6: Sample Distribution by Respondents Preference for Office Furniture Colours

Comment	Frequency	Percentage %
Bright Furniture	15	30.6%
Dull Furniture	15	30.6%
Not sure	19	38.8%
	49	100

Table 7: Sample Distribution of Respondents Location Preference for performing official tasks

Comments	Frequency	Percentage %
Home	19	38.8
Office	20	40.8
Total	49	100

DISCUSSION

Majority of the respondents are civil servants (59.2%).40.8% of respondents feel the comfort level of their office is poor due to improper ventilation, lighting, circulation and the appropriate furniture. Just 4.1% find comfort level of their office excellent, possibly the Chief Executive or Director who have air-conditioning and well organised offices. according to the data,16.3% perceive the comfort level is good while 18.4% feel it is very poor, therefore most respondents find their office condition sun comfortable. Majority of respondents71.4%.agree the space provided is adequate for the work to be done in the office. Some of the spaces are not adequate for use however based on the response of 40.8% who said they needed more space while 38% said they needed less. Lack of proper space allocation is responsible for the disparity space therefore can be said to be used since more said they require more space. The response to feeling dull/feeling alert was to ascertain the effect of the environment due to colour feel level of illumination (lighting). 40.8% feel alert while 38% of the respondent feels dull. The questionnaires reveal that more offices are ventilated and a good number are still not properly ventilated i.e 55.1% are properly ventilated against 48.9% of poorly ventilated offices of respondent. The nature & colour of office furniture the question is to investigation how colour of the office equipment can affect the space user. The presence of light colour furniture according to Molcan (2015). Cool colours are better than bright colour because they increase concentration and relax the nerves while bright colours increase alertness and that can

be over whelming.30% prefer bright 30% also prefer cool 38% are at a point of indecision. Preference of working at home or in the office is geared toward understanding the office in general meet satisfy the factors that increases productivity a good number of respondents prefer to work at home equally a good number in the office. It shows that the office have partly met and also partly does not meet the requirement for productivity.

CONCLUSION AND RECOMMENDATIONS

A well-defined office space is key to its users productivity. Work spaces overtime have not been properly planned often leading to low productivity in most offices, with this study I believe Architects, would be able to come up with an improved design in subsequent design of offices and office complex with good and adequate specification in terms of space requirement, furniture and paintings and also give users the desired comfort, which in turn enables better productivity in office in the future not only in our states but the nation and world at large.

The following recommendations are proffered:

1. Before offices space are generated a proper case study should be carried out and collate the function the space is intended for now based on that findings or information the actually size, furniture, paint colour and finishing can be obtained.
2. When designing offices proper ventilation and illumination or to be noted to maintain a good internal environment if productivity must be improved in offices.
3. The use of the cool colours as paint in the office space is infact the best so when designing selecting interior painting for the office warm colours should be discourage and cool colours encouraged
4. The researcher recommends good circulation and less noisy location within the office space as that can hamper productivity of employees.

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