

## PERSONALISATION OF INTERNET BASED BUSINESS OFFICE LAYOUT

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### Abstract

In current era, the nature of business is ever-changing where communication and interaction between office workers are encouraged as the scope of work for office is expanding. Traditional offices with identical cubicles separated with panels are ineffective because not all workers are in the same activity mode at the same time. Providing and maintaining a comfortable and healthy office environment is vital consideration in designing an office. The interior layout design parameter involved are the comfortability of furniture, surrounding temperature, amount of lighting provided, the quality of indoor air, spatial arrangement, the condition of environment in terms of noise and privacy, and finally the 2D horizontal and vertical layout. This research seeks to identify the factors of interior layout design parameter that will affect the productivity and performance of the workers. The research is conducted using quantitative method. Questionnaire is distributed to the building occupants to evaluate and obtain their opinion on the satisfaction level of the layout at their workplace. The user satisfaction and perception on the existing interior layout design are gathered by using a questionnaire survey. The study proves that the workers are most satisfied with the lighting and least satisfied with the furniture at their existing interior layout design. The workers from both case studies agreed that the interior layout design parameter that has the most effect on the productivity is the environment noise and privacy; while 2D horizontal and vertical layout has the least effect.

**Keywords:** building user performance, internet based business, interior layout design parameter, office layout, satisfaction.

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### INTRODUCTION

Most people spend fifty percent of their time in indoor environments, which greatly influences their mental status, actions, abilities and performance (Sundstrom, Town, Rice, Osborn, & Brill, 1994). A workplace environment is crucial as most of the employees spend most of their time in the office. Particularly, internet based business employees spend most of their time in front of the computer to liaise with customers (Awang & Denan, 2016). Offices with better physical environment enhance and motivate the employees and ultimately improve their productivity (Awang & Denan, 2016). In addition, highly sophisticated employees demand an environment that attracts them, satisfies their needs and eventually provides an incentive to stay (Savage, 2005). As a result, the traditional design knowledge is no longer appropriate in solving complex client demands (Manzini, 2009). Maintaining the traditional layout and structures will lead to dissatisfaction as the complexity increases (Brill, 1990).

Many organizations have implemented open-plan offices to encourage teamwork and interaction among workers. The overall setting of the office is made according to the flow of work. Whereby, the work flow conducted by the workers is identified and analyzed. This ensures smooth running of work in the office without and interruptions (Miller, 2007). Generally, a better workplace environment produces greater job output and better results. Mostly, the design of an office is according to the nature of business and the individuals who will be working there. At the corporate level, productivity and performance of the workers are affected by many factors such as the physical environment of the office, technologies provided and the objectives of the organization (Duffy, 2005). A study proved that the productivity of employees will increase up to 5-10% when an improvement is done to the office environment. Numerous researches demonstrated the impact of office design towards employees' productivity such as cluttered workplace leads to employees' dissatisfaction. Thus, the physical environment can be a major factor in the loss of employees' productivity (Clements-Croome, 1997). Furthermore, Miller (2007) noted that a better workspace can improve comfort, the ability to get work done and reduce stress, which lead to greater productivity and better health. Generally, it is known that when employees are satisfied with their surrounding physical working environment, they are more likely to produce a better output and results. Thus, this study

seeks to identify the factors of interior layout design parameter that affecting the productivity and performance of the workers in an organization.

### FACTORS OF INTERIOR OFFICE LAYOUT AND FLEXIBILITY

An office layout specifies where individuals work, the amount of space they have, the furnishings and equipment they use. The layout, together with the aesthetic design, projects a certain corporate image. However, the importance of layout design is often underestimated and hence affects occupants' satisfaction level (Kubba, 2003). As argued by Kamaruzzaman and Ahmad Zawawi (2010), workers comfort and satisfaction level are crucial as these two aspects would result in the overall productivity of the organization. In particular, the office layout has a major effect on the ease of carrying out the work or job. It also affects the people who are likely to meet and influences the way they interact. Furthermore, the office layout has an effect on the amount of background noise and other disruptive activities. Therefore, an excellent facilities manager or interior designer should be able to create an office space that is both effectively functional and aesthetically pleasing.

The design process involved is very complex and systematic. The design process begin by studying the space that need to be designed and conduct survey to identify the factors that need to be considered. Over the years, many companies and organizations have implemented various designs and techniques to ensure a comfortable working environment thus increase their performance and productivity. Many authors noted that the organizational performance and employees' productivity can be improved by providing a comfortable and efficient physical workspace layout, along with a well-organized management processes (Leaman & Bordass, 1993; Uzee, 1999).

Research done by Kamaruzzaman, Egbu, Ahmad Zawawi, Abd Karim, and Chen (2015) revealed that occupants who are more satisfied with their workplace are more productive. As supported by Zhang and Barrett (2010), comfortable space is considered to be a fundamental condition for providing a liveable, healthy and productive environment. There are many factors to be considered in designing and providing comfortable workplace. However, these factors are not consistent across existing studies in this area. Different parameters that contribute to occupants' satisfaction as demonstrated in Table 1 are therefore required to be studied.

Table 1: Factors influencing occupants' comfort and satisfaction

Factors	Sources
Lighting	(Kamaruzzaman et al., 2015; Kamaruzzaman, Egbu, Ahmad Zawawi, Ali, & Che-Ani, 2011; Montazami, Wilson, & Nicol, 2012; Muhamad Salleh, Salim, & Kamaruzzaman, 2016; Zhang & Barrett, 2010)
Spatial arrangement	(Muhamad Salleh et al., 2016; Zhang & Barrett, 2010)
Indoor air quality	(Kamaruzzaman et al., 2015; Kamaruzzaman et al., 2011; Montazami et al., 2012; Muhamad Salleh et al., 2016; Puteh, Adnan, Ibrahim, Mohamed Noh, & Che Ahmad, 2014; Zhang & Barrett, 2010)
Noise and privacy	(Kamaruzzaman et al., 2011; Montazami et al., 2012; Muhamad Salleh et al., 2016; Zhang & Barrett, 2010)
2D horizontal and vertical	(Frontczak et al., 2012; Kamaruzzaman et al., 2015; Muhamad Salleh et al., 2016; Zhang & Barrett, 2010)
Temperature	(Kamaruzzaman et al., 2015; Kamaruzzaman et al., 2011; Montazami et al., 2012; Muhamad Salleh et al., 2016; Puteh et al., 2014; Zhang & Barrett, 2010)
Furniture	(Frontczak et al., 2012)

Occupants' comfort and level of satisfaction are closely associated with indoor environment quality factors such as lighting, air quality, noise and temperature (Kamaruzzaman et al., 2015; Kamaruzzaman et al., 2011; Montazami et al., 2012; Muhamad Salleh et al., 2016; Puteh et al., 2014; Zhang & Barrett, 2010). For example, poor design lighting and constant exposure to noise can make workers extremely irritable, distracted and dizzy. Subsequently, this situation leads to low productivity at the workplace. In addition to indoor environmental parameters, various studies highlighted the contribution of physical characteristics of workplace such as aesthetic appearance and furniture to occupants' satisfaction (Frontczak et al., 2012; Kamaruzzaman et al., 2015; Muhamad Salleh et al., 2016; Zhang & Barrett, 2010). As modern technology is part of the business, workers are spending more time on machines, dealing with clients and performing tasks using machines. Improving the adjustability of furniture and comfort of sitting in front of a computer for long hours help the workers performing their task in a comfortable environment (Harris & Moran, 1996). Modern interior spaces have integrated new technologies to create a functional, efficient and comfortable working space.

## METHODOLOGY

Two case studies were chosen based on its unorthodox workplace layout. These two case studies have similar characteristic in term of nature of business, hours spend at workplace and location as shown in Table 2. The case studies chosen were internet-based business office. The working hours spent in the office were much longer compared to other nature of businesses. In order to evaluate and obtain occupants' opinion on the satisfaction level of the layout at their workplace, the research adopted quantitative method by distributing questionnaire to the building occupants. The questionnaire was divided into 3 main sections. Section 1 covered respondent particular, while section 2 included questions to evaluate the satisfaction level towards the layout of workplace. A 5-point Likert scale was used to measure all the variables. The scale varies from 1 (strongly disagree) to 5 (strongly agree). Lastly, section 3 consisted of open-ended questions to obtain the respondent's opinion on how to improve the current workplace.

Table 2: Similarity of case studies

<i>Case study</i>		
<i>Similarity</i>	<i>Case Study A</i>	<i>Case Study B</i>
<b>Nature of Business</b>	Internet Based Company (e-learning)	Internet Based Company (e-market)
<b>Hours spend at workplace</b>	> 6 Hours	> 6 Hours
<b>Location</b>	Klang Valley	Klang Valley

The questions in the questionnaire were divided into various factors on the employees' perception towards the effect of environment comfortability in the workplace. Table 3 indicates the scope for each of the questions based on the related factors.

Table 3: The scope for each question based on the related factors

<i>Scope / factor</i>	<i>Question No.</i>
Respondent's particular	1.1 – 1.5
Furniture	2.1.1 – 2.1.4
Temperature	2.2.1 – 2.2.4
Lighting	2.3.1 – 2.3.4
Indoor air quality	2.4.1 – 2.4.4
Spatial arrangement	2.5.1 – 2.5.4
Noise and Privacy	2.6.1 – 2.6.4
Two-dimensional horizontal and vertical layout	2.7.1 – 2.7.4
Individual opinion	3.1 – 3.6

The examples of each type of questions are shown as follows:-

(i) Likert style question

2.1.1 The furniture is flexible to adjust, rearrange or reorganize my workspace.

Strongly disagree 

1	2	3	4	5
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 Strongly agree

(ii) Open-ended question

3.1 In your opinion, how can your workspace improve and help you in increasing productivity and comfort?

A total of 50 set of questionnaires were distributed to the employees at each case studies. Then, 87 questionnaires were returned and considered valid. Gillham (2000) stated that the response rate must be at least 30% for a result to be considered reliable and acceptable. Thus, the response rates for both case studies were 87%, which were more than the acceptable range.

## FINDINGS

### Case Study A

Case Study A believes employees deserve a work environment that inspires creativity and fuels their productivity. The employees are provided with state-of-the-art and unique workstation. Instead of the traditional office design with desks, chairs and boards as partitions, Case Study A provides long desks with comfortable chairs. The workers sit next to each other without any partitions to encourage interaction and communication rather than working alone. Meanwhile, the workspace includes high tables and soundproofed cubbyholes for those who prefer to work on their feet rather than sitting on a chair. The main concept of the workplace is the employees can choose to execute their work anywhere at the office. This helps to avoid the employees facing the same workspace every day and

gradually feeling uncomfortable. The design allows the employees to work by standing up or sitting down, they have the freedom to choose. Besides the sitting and standing options, the workplace includes a cosy window-side banquette upholstered. Moreover, a 'tree house' is available as a workspace at the office. A cosy space for the gathering of the minds is also provided. It can act as a small private meeting area and four cubicles with sound-dampening walls, for groups of four to gather or for individuals who is looking for a more private space to work. If privacy is not a concern, a more comfortable space is provided under the artificial tree with beanbags and a small table. It is sort of a picnic area with artificial grass.

Like every other office buildings, there should be a meeting room. The meeting rooms provided are equally unique. This office is also equipped with an amphitheatre. The amphitheatre can accommodate up to 150 guests with a speaker stage, customizable seating with colourful beanbags, tiered seating on one end, a built-in sound system, a backstage room and a kitchen space for catering. The main idea of this space is to create a town hall kind of atmosphere with a lot of collaborative space.

### **Case Study B**

Case Study B is a global leader of local commerce and the place where people start when they want to buy just about anything, anytime and anywhere. Case Study B office main theme is fun and interactive. By providing a fun working environment, the strain and stress of works can be reduced by enjoying the entertainment room provided. The employees are provided with a fun and collaborative workspace. The workplace provided is fitted with a sizable window to provide abundant natural lighting. The employees are arranged closely together to encourage interaction among them. The partition provided is not too big to provide an open layout space. The material used for the wall installed at the workspace is red brick to provide aesthetic value to the workspace. The material used for the wall of meeting rooms is wood and glass to enhance the aesthetic value around the office. The tempered glass partitions used reflect the culture and beliefs of the company, which is being 'transparent' in what they do. By using tempered glass, the use of artificial lighting can be reduced. In terms of dealing with stress, the company provides an entertainment area for the employees. The entertainment area is equipped with a pool table, a ping-pong table and a television with PlayStation-a video game console.

### **Case Study A vs Case Study B**

Both companies have different principles related to the design of the office layout. Case Study A's core value is "Happiness is the new productivity". The questionnaire distributed to the workers of Case Study A proves that the companies prioritize the physical working environment that inspires creativity and fuels their productivity. The employees are provided with the state-of-the-art and unique workstation. At Case Study B, one of the main values is "Great people make great companies". Case Study B is a home for creative, problem-solvers and innovators alike. The company values the workers; they are rewarded with a fun and inclusive workplace.

At Case Study A, five principles are adopted from various sources to the workplace, which transform it into one of the world's best places to work. The principles include happiness, a noble mission, the gamification of the workplace, a focus on personal growth, and tribal dynamics. While at Case Study B, five implemented main values that enable it to be listed as one of the coolest offices in Kuala Lumpur include start with the customer, great people make great companies, intolerant of mediocrity, build for the long term, and making life less boring.

In encouraging productivity among the workers in an organization or company, the office must be able to provide a comfortable and stimulating work environment. The findings of both case studies are in accordance with the argument of Kamaruzzaman and Ahmad Zawawi (2010), stating that the workers comfort and satisfaction level are crucial as these two aspects would result in the overall productivity of the organization. To provide the workers with support in executing their tasks and responsibilities as well as to maximize their contribution to the company, the office must also be functional, efficient and flexible. Meeting these goals requires the company to plan strategically and design the facilities effectively.

### **User Satisfaction**

The user satisfaction towards the existing interior layout design parameter was investigated and the mean as well as the ranking were calculated as shown in Table 4 and Table 5.

Table 4: User satisfaction towards the existing interior layout design parameter for Case Study A

<i>Existing interior layout design parameter</i>	<i>Mean</i>	<i>Mode</i>	<i>Ranking</i>
Lighting	4.05	5	1
Indoor air quality	3.75	4	2
Spatial arrangement	3.35	4	3
Noise and privacy	3.35	3	4
Temperature	3.3	3	5
2d horizontal and vertical layout	3.15	3	6
Furniture	2.15	2	7

For Case Study A, the workers are most satisfied with the lighting provided. This is mainly due to the sufficient amount of natural lighting provided at the office by having large windows to maximize the natural lighting entering the building. By having a sufficient amount of natural lighting, the necessity of mechanical lighting is not necessary. In addition, most of the employees agreed that their workplace is adequately equipped with sufficient storage and space. According to the workers at Case Study A, the furniture provided was not flexible to adjustment and rearrange. Some of the employees also stated that the furniture is not adequately comfortable. As seen in Table 4, the second least satisfied factor is the indoor temperature of the office environment. Through the questionnaire survey, the main reason the workers are not satisfy with the indoor temperature is that they could not control the airflow speed of the air conditioner.

Table 5: User satisfaction towards the existing interior layout design parameter for Case Study B

<i>Existing interior layout design parameter</i>	<i>Mean</i>	<i>Mode</i>	<i>Ranking</i>
Lighting	4.15	5	1
Spatial arrangement	3.95	3, 4	2
Indoor air quality	3.85	3	3
Noise and privacy	3.45	3	4
2d horizontal and vertical layout	3.45	3	4
Temperature	3.2	3	5
Furniture	2.4	2	6

For Case Study B, the most satisfied parameter is the lighting provided. The windows provided were large enough enabling a sufficient natural light entering the building. According to the employees, their workspace provided has sufficient lighting allowing them to carry out their task with ease and without strain on their eyes. The second most satisfied parameter is the indoor air quality. The employees stated that the surrounding indoor air quality is good and healthy. The ventilation and airflow at their workplace is sufficient resulting in no stagnant of air and bad odour. On the other hand, the least satisfied parameter is the furniture as seen in Table 5. The furniture provided there is not adequately comfortable and not flexible to adjust. The employees were also not satisfied with the 2D horizontal and vertical layout because their workplace did not provide variety of floor and ceiling colour. The colour provided is dull and the wall is not decorated with attractive wallpaper. This creates a dull and lacklustre environment, which does not promote productivity and affect it negatively.

The user perceptions towards the degree of importance for interior layout design parameter and the effect it has on the productivity were investigated as well. Both case studies ranked noise and privacy as the most important parameter in designing office building. The employees believed that providing a workplace with adequate acoustical and visual privacy is the most important factors as those allows them to have a quiet environment and without any noise disturbance. The findings supported the argument of Muhamad Salleh et al. (2016), where the occupants particularly expect the noise control in working environment. However, the employees of Case Study A ranked temperature while Case study B ranked furniture as the second parameter that has the biggest effect on the productivity. Whereby, Kamaruzzaman et al. (2015) revealed that maintaining comfortable temperature contributes to healthier indoor environment. The employees at Case Study A believed that having a suitable temperature would greatly affect their productivity. On the other hand, Frontczak et al. (2012) stated that furniture adjustability and comfort affects the occupants' satisfaction in office space. So, the employees at Case Study B believed that having comfortable and flexible furniture is equally important in improving their productivity. Since they spend most of their time at the office on a chair, sitting in front of a computer, having comfortable furniture is vital in maintaining their productivity.

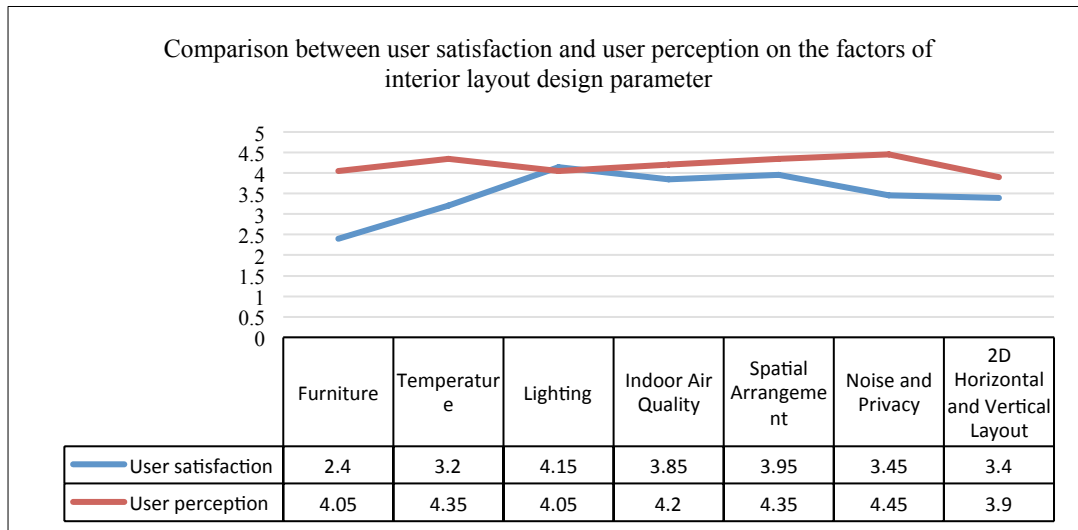


Figure 1: Comparison of user satisfaction and user perception for Case Study A

The user satisfaction and user perception were compared to identify the factor of interior layout design parameter that is above the acceptable level. This was done for both case studies, so effective recommendations can be proposed. The comparison of user satisfaction and user perception for Case Study A can be seen in Figure 1 while the comparison of user satisfaction and user perception for Case Study B can be seen in Figure 2.

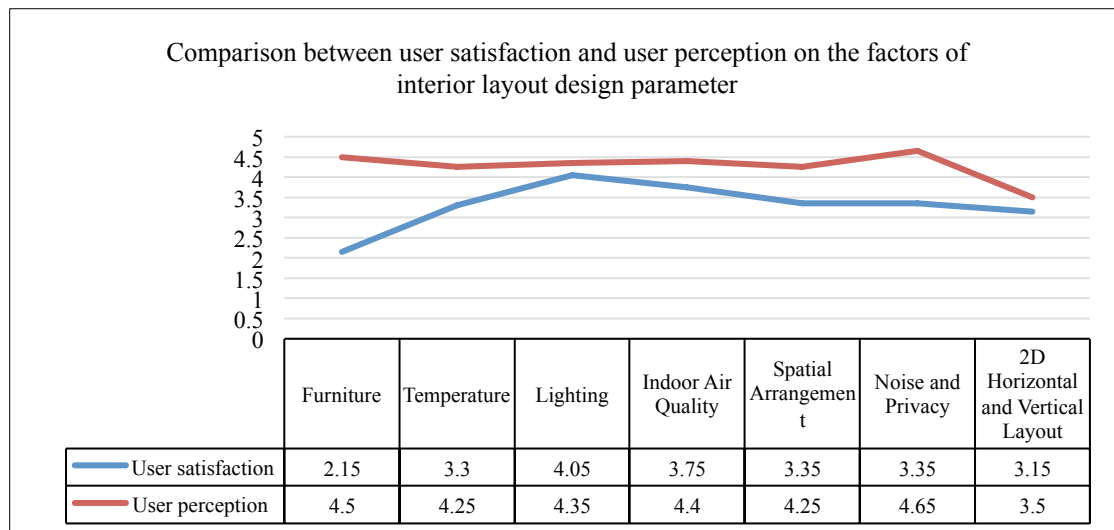


Figure 2: Comparison of user satisfaction and user perception for Case Study B

For Case Study A, only one interior layout design parameter that was above the acceptable level, which was lighting as seen in Figure 1. While other factors of interior layout design parameter were not above the acceptable level (mean rating more than 4, which means very satisfied). While for Case Study B, it was similar to Case Study A where only lighting parameter above the acceptable level as seen in Figure 2. Therefore, the factor that had the highest acceptable level was lighting.

The user perceptions at both case studies were compared to verify which interior layout design parameter has the most and least impact on the productivity. As seen in Figure 3, the interior layout design parameter that had the most impact on the productivity was the noise and privacy while the least impact on the productivity was 2D horizontal and vertical layout. Noise and privacy was the most influential parameter towards productivity because they would affect the concentration level of the occupants in the particular space (Montazami et al., 2012).

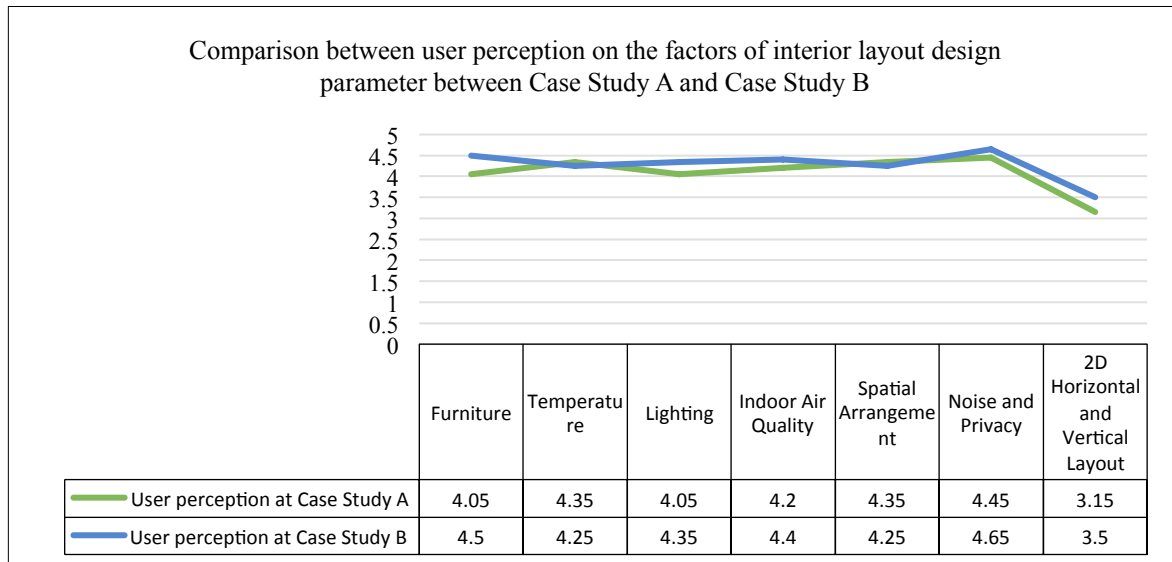


Figure 3: Comparison of user perception between Case Study A and Case Study B

## CONCLUSIONS

Base on the extensive literature review, there are seven main factors that affect the productivity and performance of the workers in an organization. The factors include furniture, temperature, lighting, indoor air quality, spatial arrangement, noise and privacy, and 2D horizontal and vertical layout of an office. Analysis of the collected data revealed that office design had a substantial impact on the employees' productivity. The user satisfaction towards the existing interior layout design parameter was evaluated. As a result, lighting was the factor of interior layout design parameter that was the most satisfying while furniture was the factor of interior layout design parameter that was the least satisfying. It can be concluded that the factor of interior layout design parameter that has the most impact on the productivity is the noise and privacy while the least impact on the productivity was the 2D horizontal and vertical layout.

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