

21st Century Office Design: Ergonomic Assessment in Malaysian Government Sector

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ABSTRACT

The study was carried out to conduct ergonomic assessment in Malaysian government sector. The areas of ergonomic assessment include office lighting, office furniture and office temperature. The study identify whether the variables affect the employees' productivity. The study was based on 152 out of 250 office workers in three selected government sectors in Dungun. The government sectors involved were Dungun District and Land Office, Dungun District Education Office, and Dungun Municipal Council. The data for this study mainly obtained from administrative department. The researchers used stratified random sampling to make sure the sample size represent all three selected government sectors involved in this study. For this research study, the researchers used the non-experimental which was correlational. The questionnaires were distributed to the office workers selected in Malaysian government sectors as data collection procedures. The questionnaire used Likert-type scale to gather all the information. The information gathered was analysed quantitatively using the SPSS version 2.0. The techniques used to analyse the data from collected questionnaires were descriptive statistics and inferential statistics. Finding of the study found that independent variables and dependent variable has a significant positive and moderate relationship. Therefore, the hypotheses for this study were accepted.

KEYWORDS: government, managers, variables, equipment and machines

INTRODUCTION

The study was conducted to assess ergonomic in modern office at Malaysian government sector. There are two areas covered in the ergonomic assessment including office lighting and office furniture. Employees' productivity could contribute an impact toward organization effectiveness as when the employees' productivity was low and then it will give disadvantages toward the organization [1]. Thus, the study was to identify whether the variables which were office lighting and office furniture affect the employees' productivity among office workers in Malaysian government sector. An office is a place where people conducted their daily operations, assisted by variety of equipment and machines. The office environments were influenced by lighting and furniture [2]. Lighting and furniture should not be taken lightly as they may contribute to injuries and accidents in the office.

These days, office environment seems to be unsafe and unhealthy due to several factors which includes the office was poorly designed such as the office furniture was not suitable and inappropriate use of lights [3]. Thus, employees working in that environment tend to be exposed to sick building syndrome and indirectly affect their productivity. In many organizations, ergonomic issue plays an important role in terms of increasing employees' productivity as most of the employees will have to confront work-related issues that may lead to delay in completing work, frustration and so forth. The factors of office environment also greatly affect the work-life balance, lifestyle, health and fitness whether towards positive or negative [3]. A comfortable working environment in the organization can boost the level of employees' productivity from time to time [4].

The office environment can be defined as a location where a task is carried out. According to [5], it stated that the location of a task completed typically involves the factors such as the quality of the air and the factors related to the place that involves with the employees. Apart from that, the office environment could also be defined as the environment for office workers were fit with their task. This physical work environment might include the lightings, furniture, and temperature [3]. In [2] added that the elements of physical office environment must be properly applied so that the office workers will be stress-free when completing task. It mentioned that the physical elements were crucial in developing the network and relationship at work. In order to gain an achievement of positive employees' productivity, it was necessary to maintain a good workflow in an organization. As for the employees to perform the job in etiquette and disciplinary criteria, an office environment should be built up in friendly culture [6]. In [6] also added there are numerous benefits of the good office environment that could enhance the employees' productivity in which employees can learn how to maintain their punctuality, to have a good attitude and get highly motivated.

LITERATURE REVIEW

Managers were under pressure of the wrong assumption about employees' productivity was driven by their compensation plan. Managers also assume that if they provide a good office environment, they actually motivate the workers to improve their productivity [7]. Hence, it was important to provide them with the right and suitable office environment for the lighting and furniture to ensure that employees can perform their duties with efficiently and effectively. The employees' productivity was measured by the work done by the same input used and it was part of their performance. The managers expect their employees' productivity was affected by employees themselves, technologies and goal setting of the organization. Aside from that, productivity was also depends on the workplace environment and the employees' well-being [2].

21st Century Office Design

There are tremendous changes in our office design nowadays. Old office design is gone where employees could not adjust any furniture to meet individual requirements. New generation take over all the vacancy left behind by baby boomers workers. The world will occupy approximately a total of 75% of global workforce by year 2025. Suppliers and designers offer new office design to meet all demand in workplaces. The latest office design should be more ergonomically than the previous office design. Environmental psychology of workspace concerns about the feeling of the workers in their workplace [9]. According to [8], factors of office environmental are about the employees and their surrounding in the workplace. In [10] define office environment as "arrangement of workspace so that work can be performed in the most efficient way".

Office Lighting

The lighting condition can have a negative or positive effect on employees' productivity that relates with office environment in the organization. According to [11], the lighting condition was considered as the work environment where the employees working in dim or over bright that may resulted in eyestrain, headaches, irritability, inevitably and reduces productivity and performance. Lighting can also be defined as the sources of light which was included the sun, creating the unwanted glare, reflections, and shadows in the office that may lead distraction and low employees' productivity. According to [6], high quality lighting may lead to a comfortable environment and contributes to achieve a highest level of productivity, the physical comfort and satisfaction in doing task. Meanwhile, the low level of lighting quality may cause a headaches, eyestrain, stress and visual fatigue. Therefore, lighting condition give a huge impact on office environment.

According to [12], there was one certain factor that influences the employees' productivity, which is lighting. The bad lighting condition can harm employees' eyes and this will affect the employees' productivity in an organization. The increasing number of employees give complain about the disfavour about the lighting condition in their office environment has become the relevant fact now. Furthermore, there were two common factors contributing to poor office lighting in the office which were whether the light was too dim or too harsh. Inadequate lighting can cause eye strain, headaches and result in drowsiness and lack of focus. Meanwhile, excessive lighting may cause harmful to the eyes leading to inability and difficulty to focus.

According to [10], the lighting was the crucial features in office environment. In [10] also stated that between male and female employees, the male employees show a low productivity when working in improper lighting condition. Therefore, the conclusion for this problem was due to poor lighting in working area has lowered the productivity of male employees. Meanwhile, for the female employees, the results obtained showed that their productivity was not affected by lighting. By comparing these data, the result showed that the office lighting have different effect on gender differences. In many organizations, the office environment includes the lighting as one of the factor that gives an impact to the performance of employees. Therefore, a poor lighting system can reduce the employees' productivity as poor lighting systems may contribute to a serious problem such as eyestrain, headaches and fatigue. On the other hand, good lighting condition it will increase employees' productivity. The lighting can be divided into two kinds of lighting: natural light and artificial light. The natural light was the kinds of light from the external environment. Meanwhile, the artificial light was invented by human such as fluorescent lighting [11].

Office Furniture

The physical elements of an office environment can have a direct impact on the productivity, health and safety, comfort, concentration, job satisfaction and morale of the employees within the organization [11]. In [11] also added that the office furniture comprises of desks chairs, the filing system, shelves, drawers and others that have a specific role to play in the proper functioning of any office and the productivity and the efficiency of the employees. In [13] suggests that because of the health risks posed by poor posture and repetitive stress, proper ergonomics were too important to ignore. One of the most significant things that should be considered while purchasing office furniture was to ensure whether the furniture were ergonomic or not. Employees' productivity, health and safety, comfort, concentration, job satisfaction and morale may be indirectly affected by the physical

elements of the office environment [11]. The quality and quantity of work performed by employees are strongly affected by the office environment. Therefore, poor environmental conditions can cause employees productivity to decline. Ergonomics of office furniture is important because an employee has to work with them for the entire time that he or she is in the office [2]. If the furniture in a bad condition and not user friendly, their working style and productivity are determined as jeopardized, in turn affecting the overall organizations performance.

Non-ergonomic office furniture can also lead to health problems among employees such as causing back pain, eye strain, headache, dizziness and others. This actually reduces the motivation of employees in completing their work and resulted increases the sick leave among employees. In an article written by [14], the introduction of newly designed furniture with adjustable features showed a moderate and a marked improvement in their sitting posture for children. Even though the study focused on children, adults should be also considered the same as the adults spend more time on working in the office environment.

Thus, an office with ergonomic furniture is crucial to every organization. Such components might be an adjustable chair, a protected computer monitor, ergonomic keyboard and others. Nowadays, many organizations recruit ergonomic experts to assist them in giving advice for ergonomic requirements. Having ergonomic office furniture also helps to reduce the risk of getting injury because the design focused on the security and safety of the user. The chair for example should allow the user to adjust their elbows based on individual preferences while using computer. In addition, it also should allow appropriate sitting posture as it was one of ways to prevent health problem such as musculoskeletal problems [14]. According to [15], a static posture and prolonged sitting in a forward bending position can be puts a considerable physiological strain on the muscles and ligaments on human body. Office furniture in one aspect helps the organization tremendously in increasing its productivity, and at the same time it contributes to the organization by taking care of the employees' health.

Office Temperature

Indoor temperature problem was caused by improper maintained systems [16]. The indoor temperature influence several human body responses such as thermal comfort, perceived air quality, sick building syndrome symptoms and performance at work. In [17] stated that there are few researchers found that performance increases with temperature up to 21-22°C and decreases with temperature above 23-24°C. In addition, the result obtained from the study shows that the highest productivity of employees is at temperature of around 22°C. For example, at the temperature of 30°C the performance is only 91.1% of the maximum. Increased evidence shows that indoor environmental conditions substantially have an impact on employees' health and productivity. Many cases were recorded on commercial buildings, resulted from many failures of building design or structure and other related surrounding factors [17]. Many industrial and commercial buildings do not design a suitable condition to provide thermally comfortable conditions for employees. Such buildings often allow a high radiant heat loading on the occupants, for example through lack of insulation in roof spaces, or large glass areas in the walls. In order for an employer to ensure and improve thermal comfort for employees, some alterations and renovations may need to be made to the building itself. Many organizations only think initial cost and maintenance costs were typically considered before implementing the best office work condition to the employees.

Employees' Productivity

Productivity was a major multidimensional construct aimed to achieve results and has a strong link with planned goals of an organization [18]. Productivity was the key multi character factors intended to attain outcomes which has a major connection with planned objectives of the organization [19]. In [20] stated that based on his research upon productivity, a pilot research project held among 170 people in six office buildings reveals that there was a clear relationship between job stress, job dissatisfaction and the indoor environment.

Furthermore, a productivity increase of 10% was observed following improvements to the indoor environment. According to [21], organizations where employees were exposed to stressful working environments, performances were negatively influenced and that there is a negative impact on the delivery of service while if working in a good environments, performance of employees can be increased and thus there was a positive impact on the delivery of service.

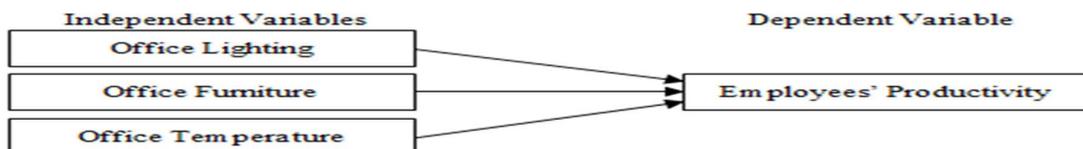


Figure 1: Conceptual framework

METHODOLOGY

Research Design

There were few types of research design which were the non-experimental and the experimental. Under the non-experimental, they were divided into four research design which was descriptive, historical, correlational and qualitative research. Meanwhile, for the experimental research included the correlational design. The correlational research design can be defined as there were the relationship between independent variables and dependent variables. Thus, it becomes the main reason for the researchers to use correlational research design as the purpose of the study was to investigate the relationship between ergonomic and employees' productivity at Malaysian government sector. These are the hypotheses that have been derived:

H₁: There is a correlation between office lighting and employees' productivity.

H₂: There is a correlation between office furniture and employees' productivity.

H₃: There is a correlation between office temperature and employees' productivity.

Sampling Frame

The sampling frame was the source from which a sample was drawn. This sampling frame may include the list of all those within a population who can be sampled, which include the individuals, households or institutions. The researcher selected office workers in Malaysian government sector as the respondents of the study in order to collect the data needed. The sample size is 152 out of 250 office workers randomly drawn from Dungun District and Land Office, Dungun District Education Office, and Dungun Municipal Council. The data for this study were mainly obtained from the Administrative Department. In order to gather all the information and data, the researchers called and visit the government sector selected.

Research Instrument

To gather the data in this study, a set of questionnaires were used. Then, the researchers distributed the questionnaires only to focus respondents or office workers at Malaysian government sector. The questionnaire used Likert-type scale. Likert-type scale was the sum of responses to several Likert items. Usually these items displayed with a visual aid such as a series of radio buttons or a horizontal bar representing a simple scale. To process the information the SPSS version 2.0 was used. The questions in the questionnaire were divided by four sections. This questionnaire was adapted from past research done by [10, 2]. The sections involved in this questionnaire included the section A, B, C, D and E. Firstly, in the section A the questions regarding respondents' personal demographic data such as gender, age, highest education, division and length of service. Secondly, questions in the section B discussed office environment and employees' productivity. Thirdly, questions in section C asked more about office lighting related with employees' productivity. Section D focused on office furniture and last but not least, questions included in section E are more focused on office temperature and employees' productivity.

RESULTS AND DISCUSSION

The research objectives were to examine the ergonomics factors and employees' productivity in Malaysian government sector. There are two areas that will be tested which were office lighting and office furniture.

Research Objective 1: Relationship between office lighting and employees' productivity in Malaysian government sector.

Table 1: Office lighting and employees' productivity

Ergonomic	Employees' Productivity	
	Office Lighting	Pearson Correlation
	Sig. (2-tailed)	0.000

*Correlation is significant at the 0.05 level (2-tailed)

Table 1 shows the correlation between ergonomic: office lighting and employees' productivity. The study indicates that there are relationships between office lighting and employees' productivity at Malaysian government sector. The correlation analysis between office lighting and employees' productivity had been tested using the Pearson Product Moment Correlation Coefficient (PPMC). In [22] stated that the PPMC shows the linear relationship between the two variables. In [22] also stated that the results of PPMC was between -1 or 1 and if the value of r is closer to zero, then the variation of data points will be greater. The researcher had analysed the assumptions of normality, linearity, and homoscedasticity. From the findings, it was found that there was a significant positive and moderate relationship between office lighting and employees' productivity

($r = 0.513$, $p < 0.05$). Therefore, the good office lighting, the better employees' productivity. The findings show that the lighting factor in this organization does not highly give a huge impact towards employees' productivity because the relationship between office lighting and employees' productivity was moderate. Thus, the employees in this organization do not care enough with the lighting condition. This finding was contradicted with past research where the employees need better lighting condition at the workplace to avoid accidents, improve their performance and prevent from fatigue and eyestrain [10]. In [10] also mentioned that when the employees work in dim light it will causes the headaches, irritability and will affect the employee's morale.

Research Objective 2: Relationship between office furniture and employees' productivity in Malaysian government sector.

Table 2: Office furniture and employees' productivity

Ergonomic	Employees' Productivity	
	Office Furniture	Pearson Correlation
	Sig. (2-tailed)	0.000

*Correlation is significant at the 0.05 level (2-tailed)

Table 2 shows the correlation between ergonomic: office furniture and employees' productivity. The study indicates that there are relationships between office furniture and employees' productivity at Malaysian government sector. The study indicates that there are relationships between office furniture and employees' productivity at Malaysian government sector. From the findings, it was found that there was a significant positive and moderate relationship between office furniture and employees' productivity ($r = 0.549$, $p < 0.05$). Therefore, the good office furniture, the better employees' productivity. In this organization, the employees do not fully aware about their office furniture whether it was comfortable enough or not. Thus, office furniture has significant impact on employee's productivity. In [2] supported that the poorly designed furniture has its own effect on spatial arrangement that can increase employees stress and fatigue level that will lead to back pain and eyestrain and also lead to lack of morale. In [2] also stated that different employees have different impact towards office furniture.

Research Objective 3: Relationship between office temperature and employees' productivity in Malaysian government sector.

Table 3: Office temperature and employees' productivity

Ergonomic	Employees' Productivity	
	Office Temperature	Pearson Correlation
	Sig. (2-tailed)	0.000

*Correlation is significant at the 0.05 level (2-tailed)

Table 3 shows the correlation between ergonomic: office temperature and employees' productivity. The study indicates that there are relationships between office temperature and employees' productivity at Malaysian government sector. The study indicates that there are relationships between temperature and employees performance at Malaysian government sector. Findings showed that that there was a significant positive and moderate relationship between office temperature and employees' productivity ($r = 0.521$, $p < 0.05$). Therefore, the good temperature, the better employees' performance. Hence, this result shown that this organization does not really practice the appropriate level of office temperature level. This organization, do not care much on the temperature because their temperature used at their office was in moderate way and does not affect a lot to employees performance. In [23] stated that a comfortable office environment was when the use of temperature in a proper range so that employees can generate their work properly and improve performance. In [23] also done an investigation in two temperature levels which were cool and warm conditions. The results found that when the temperature was too cool the employees feel uncomfortable to work and when the temperature was too warm they also feel slightly uncomfortable. Thus, this shown that the result has a moderate relationship because the employees' feels uncomfortable to work in condition that was too cool or too warm.

RECOMMENDATIONS

There are a few recommendations proposed for each of office environments factor and employees performance that has at Malaysian government sector selected as a way to improving their office environment that can provide satisfaction and motivate employees in enhance good performance: The organization needs

improves their own office environment to become more comfortable that can enhance the employees' productivity. The organization also must equip their office environments with ergonomic material including office lighting and office furniture. During the distribution of the questionnaire, the organization still use an old lighting system at their organization because they prefer more to indoor lighting such as fluorescent. The quality and comfort levels of lighting can impact the employees' productivity. Therefore, the organization should be replaced the old lighting system with the new lighting system which was using the light emitting diodes (LEDs) bulbs. If the organization used this bulbs they can experienced an extremely energy efficiency because this light bulbs has its own significant features which were the light is in directional, the light spread with more spherically. Moreover, the benefits of using this lighting system were it was long lasting, durable, mercury free, cost efficiency and give a comfort to employees to improve their performance.

Next, as for the office furniture, the organization should replace the old furniture with ergonomic furniture. The organization must use the ergonomics chairs that can easily able to rotate and can have an adjustable height which 38-54 cm. The adjustable chairs that can allow sufficient leg space and can easily flex the knees by 90 degrees. Therefore, with these ergonomic adjustable chairs the employees can sit with comfortably and has a sustainably good condition that can improve more on their performance.

Recommendation for Future Research

For the future research, the researchers suggest that the sample size is tested in different population because the research only focuses on the sample size at the government sector. The future researchers can develop more innovative and creative idea in order to make their research study more acceptable and useful. Instead, the future researcher also can improve the data analysis process with simple but in appropriate ways. Thus, this will provide more general knowledge to the future researcher who was interesting in investigate regarding the ergonomic and employees' productivity.

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