POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

Factor that Affects Sick Building Syndrome in The Building

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ABSTRAK

Sindrom Bangunan Sakit (SBS) terdiri daripada pelbagai gejala tidak spesifik yang berlaku pada penghuni bangunan. Penghuni boleh merasakan kesan gejala Sindrom Bangunan Sakit melalui persekitaran dalaman dari pengudaraan yang tidak mencukupi, prestasi penyelenggaraan, pencahayaan, dan pencemaran di dalam bangunan. Selain itu, kebanyakan kajian terkini telah menumpukan pada pengenalpastian faktor risiko kesihatan di bangunan dan mengembangkan strategi pendekatan baru dan sistem inovatif untuk mengawal dan pencegahan namun, Sindrom Bangunan Sakit masih berlaku di pada sesetengah bangunan di Malaysia. Objektif utama kajian ini adalah untuk mengetahui tahap Sindrom Bangunan Sakit di dalam bangunan. Kajian penyelidikan ini menggunakan kaedah kuantitatif iaitu tinjauan soal selidik untuk mengenal pasti faktor yang mempengaruhi Sindrom Bangunan Sakit (SBS) di bangunan dan menganalisis tahap Sindrom Bangunan Sakit (SBS) dalam keadaan semasa. Soal selidik berstruktur diedarkan kepada responden dan tinjauan keadaan dilakukan di bangunan terpilih. Soal selidik dianalisis secara statistik menggunakan perisian SPSS. Tinjauan menunjukkan bahawa pengudaraan yang tidak mencukupi adalah salah satu faktor yang boleh mempengaruhi Sindrom Bangunan Sakit (SBS) di bangunan tersebut.

Kata kunci: Pengudaraan yang tidak mencukupi, Prestasi penyelenggaraan, pencahayaan, pencemaran, Gejala Sindrom Bangunan Sakit (SBS)

ABSTRACT

The sick building syndrome (SBS) consists of various nonspecific symptoms that occur in the occupants of a building. Occupants may affect to sick building syndrome symptom through indoor environmentally from inadequate ventilation, maintenance performance, lighting, and contaminant in the building. Besides, more recent studies have focused on the identification of health risk factors in the building and developed new approach strategies and innovative systems to control and prevention however, sick building syndrome still occur among the building in Malaysia. The main objective of this study is to determine the level of Sick Building Syndrome in the building. This research study used quantitative method which is questionnaire survey to identify the factor that affects Sick Building Syndrome (SBS) in the building and analyzes the level of Sick Building Syndrome (SBS) in current condition. The structured questionnaire was distributed to respondents and condition survey was carried out on selected building. The questionnaires were analyzed statically using SPSS software. The survey shows that inadequate ventilation is one of the factors that can affect Sick Building Syndrome (SBS) in the building.

Keywords: Inadequate ventilation, Maintenance performance, lighting, contaminants, Symptoms of Sick Building syndrome (SBS)

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Indoor air quality is recognized as a major public health concern at home, school, institution, or offices in developed and developing countries. It is an important issue since individuals spend up to 80% of their time indoors, especially in the home and office environment. The community on industrialized countries entails spending an average of 8.5 hour in indoor environments. According to World Health Organization (WHO) the concept of sick building syndrome (SBS) in 1983 as certain medical symptoms experienced by occupants in buildings with indoor environment problems. The building occupants experienced acute health or comfort effects that tend to be correlated with time spent in a particular building but cannot be identified as a specific disease or cause. Complaints may be placed in a specific room or area or may be spread all over the building. Building occupants often encounter symptoms that do not match the pattern of any specific disease and are difficult to trace to any specific source.

Sick building syndrome has been labeled as this phenomenon. Symptoms that have occurred in sick building residents have ranged from inflammation of the eyes and nose, fatigue, cough, rhinitis, nausea, headache, sore throat, or a combination of these. Besides, building-related illness is the other problem which include Legionnaires' disease, asthma, hypersensitivity pneumonitis, and humidifier fever, have been directly traced to specific building problems. Most of these diseases are treatable however, others face severe risks.

The Industrial Code of Practice on Indoor Air Quality (ICOP) (2010) declared by Department of Occupational Safety and Health Malaysia introduce the selected indoor air quality parameters and their acceptable limits. The appropriate limit of each IAQ parameter must be respected prior to maintaining a

good IAQ. Healthy indoor air quality characteristics include the introduction and distribution of adequate ventilation air, airborne contaminant regulation, maintenance of appropriate temperatures and relative humidity. The acceptable range for the air temperature is between 23 °c to 26 °c, while the relative humidity is between 40% to 70% and the air movement is between 0.15 m/s to 0.50 m/s.

The failure to act instantly and efficiently on the issues of poor IAQ could have the devastating result on human health. SBS affect the health and comfort of the occupant where the occupant suffered acute health and comfort (Hossein, et. al, 2018). Sick building syndrome: Hidden danger found in Kuala Lumpur. *The Sun online*. Next, inadequate ventilation may lead to SBS (Zuraihana, et. al, 2019). Ventilate offices to curb SBS. *The Star online*. Furthermore, SBS may potentially affect job satisfaction, work stress, and productivity (Surahman, et. al, 2019).

Therefore, a study on sick building syndrome is important to determine the affect Sick Building Syndrome in the building to increase the productivity of building occupants.

1.2   Determination of Study Concepts

1.2.1 Research issues

Sick building syndrome affect the health and comfort of the occupant where from some of the investigated, occupant suffered symptoms such as dry eyes, eye strain, watering eyes, blocked or stuffy nose, runny nose, dry or irritated throat, flu-like symptoms, and difficulty in breathing, headache, tiredness as well as dry skin, sensitivity to odors and difficulty in concentration. (Hossein, et. al, 2018). Sick building syndrome: Hidden danger found in Kuala Lumpur. *The Sun online.*

Moreover, inadequate ventilation may lead to sick building syndrome due to too high relative humidity is associated with the growth and spreading of bacteria, virus, house dust mite (small insect that can bite and case irrigation to human) and fungi especially in air-conditioned rooms with poor ventilation system (Zuraihana, et. al, 2019). Ventilate offices to curb SBS. *The Star online.*

Next, chemical contaminants from outdoor and indoor sources may leads to sick building syndrome where contaminants from outside like pollutants from motor vehicle exhaust, plumbing vents and building exhausts (bathrooms and kitchens) can enter the building through poorly located air intake vents, windows and other openings. The most common contaminant of indoor air includes the volatile organic compounds (VOC) such as cleaning agents, etc. (Lim, 2016). Poor ventilation and the sick building syndrome. *Edge prop online.*

Besides, sick building syndrome may potentially affect job satisfaction, work stress, and productivity (Surahman, et. al, 2019). The occupant may face some stress due to unhealth and discomfort so, that will lead to insufficient work progress.

Based on the discussion of this study, evidently shows that the occupants still lack knowledge about sick building syndrome and the affect toward the occupant itself.

1.2.2 Problem Statement

Health risk factors in an academic building setting have previously been investigated by many authors. Individuals spend up their lifetime about 80% inside workplace or in their own homes compared to outdoor. According to study conducted by WHO (2005), more than 2 million premature deaths each year are attributed to the effects of urban outdoor air pollution and indoor air pollution. (Lim, 2016) also explained that people in industrialized countries spend about 80% of their lifetime in a room. A high percentage of people spend time indoors, has a high risk of experiencing SBS. Sick Building Syndrome is also defined as a health problem caused by chemical and biological pollution in the room, temperature, and humidity, or other factors, which have been recognized as a problem in Western countries since 1970 (Vesitara, 2019). Conversely, more recent studies have focused not only on the identification of health risk factors in the building, but also on developing new approach strategies and innovative systems for their control and prevention (Dovjak, et. al 2019) however, sick building syndrome still occur among the building in Malaysia.

1.2.3 Aim of Research

The aim of conducting this research is to determine the level of sick building syndrome the building.

1.2.4 Secondary Research Question

This research has the following question which to be answered at the end of it which are:

i.   what is the symptom of Sick Building Syndrome (SBS) that occupant experienced?

ii.   How to evaluate the level of symptom that contribute to Sick Building Syndrome (SBS)?

iii.   What is the possible solution that able to reduce the Sick Building Syndrome (SBS)?

1.2.5 Objectives of Research

To achieve the aim of this research and answered the problem statement, there are specific objectives have been identified which are:

i.   To identify the factors that affect Sick Building Syndrome (SBS).
ii.   To analyze the level of Sick Building Syndrome (SBS) in the current condition.
iii.   To propose the possible solution that able to reduce the Sick Building Syndrome (SBS).

1.3   Scope of Research

Scope of research concentrates on the sick building syndrome (SBS) symptom that be found in the Kuantan Court Complex building by going through the method of questionnaires for maintenance staff of *Lembaian Fajar* and condition survey in the selected place in the building. The study will be conducted at Kuantan Court Complex.

1.4   Significant of Research

From this research, by recognize the symptom and factor of Sick Building Syndrome, the parties involved in maintaining the building could minimize the condition of the building and make occupant feel more comfortable toward the room environment. Furthermore, it can increase the occupant performance in conducting task or activities due to a good condition of health and low in stress.

CHAPTER TWO

LITERATURE REVIEW

2.0   Introduction

To understand the structure of the study, it is important to recognize the resources that can be extracted to strengthen the study on the level of Sick Building Syndrome (SBS) in the building. This involves recognizing some of the issues that have arisen that can be highlighted in support of the study to be carried out. In this literature review, there are various sources and information acquired and divided into a group of title to understand the context of the word before the detail information is carried out.

Sick building syndrome is a term used to describe a situation in which occupants of a building have a health symptoms and discomfort. Sick Building Syndrome is also defined as a health problem caused by chemical and biological pollution in the room, temperature, and humidity, or other factors, which have been recognized as a problem in Western countries since 1970 (Surahman, et. al, 2019). Surahman also said that sick building syndrome may potentially affect job satisfaction, work stress, and productivity. The occupant will be affected due to the environment of the area. This research was conducted to determine the health status of the campus building according to the sick building syndrome (SBS) so that, we could recognize whether the building is safe to be occupied.

In conclusion, this research will include the approaches that able to reduce the Sick Building Syndrome (SBS) to ensure the building is safe to be occupied and keep the occupant in healthy and comfortable whenever they enter and stay at the building. This will lead to an increasing productivity and sufficient worked progress among the occupants.

2.1. Definition of Factor That Affects Sick Building Syndrome Symptom in the building

2.1.1. Factor

Factor is one of the elements contributing to a particular result or situation. The other word, it should only be used to refer to something which contributes to a result. It should not be used to refer to a part of something such as a plan or arrangement; instead, a word such as *component* or *element* should be used (Cambridge dictionary 6th edition 1995).

2.1.2. Affect

Affect and effect, each both noun and verb, share the sense of "influence," and because of their similarity in pronunciation are sometimes confused in writing. As a verb Affect[1] means to act on or to move. It is also means to pretend or to assume. The verb effect means to bring about, accomplish. The noun effect means result or consequence. Moreover, affect is not used as a noun. (Cambridge dictionary 6th edition 1995)

2.1.3. Sick Building Syndrome (SBS)

An illness that people who work in certain buildings can get, caused by poor air quality inside the building (Cambridge dictionary 6th edition 1995). From British dictionary define a group of symptoms, such as headaches, eye irritation, and lethargy, that may be experienced by workers in offices with limited ventilation. While in medical terms it defines an illness affecting workers in office buildings, characterized by skin irritations, headache, and respiratory problems, and thought to be caused by indoor pollutants, microorganisms, or inadequate ventilation (Cambridge dictionary 6th edition 1995)

2.1.4. Building

Building is a relatively permanent enclosed construction over a plot of land, having a roof and usually windows and often more than one level, used for any of a wide variety of activities, as living, entertaining, or manufacturing. It is also known as anything built or constructed such for the act, business, or practice of constructing houses, office buildings, etc. (Cambridge dictionary 6th edition 1995)

2.1.5. Kuantan Court Complex

Kuantan court Complex is built on 94,000-square-foot land at Bandar Indera Mahkota. The construction of this new court on the concern of YAA Chief Justice, the YAA. Tun Dato 'Sri Ahmad Fairuz bin Dato' Sheikh Abdul Halim to give a spacious and comfortable to the occupants. The purchase was completed on 10 October 2005 and the construction of the Court Complex was fully completed in April 2012.

His Majesty the Sultan of Pahang Sultan Haji Ahmad Shah Al-Musta'in Billah Ibni Al-Marhum Sultan Abu Bakar Ri'ayatuddin Al-Mu'adzam Shah has consented to desecrate the duke officiating the Kuantan Court Complex, Bandar Indera Mahkota Kuantan on 27 May 2013. The new Kuantan Court Complex was handed over by the Legal Affairs Division (BHEUU) to the Office of the Registrar General of the Federal Court of Malaysia on 20 July 2012 and became fully operational on 23 July 2012.

The complex has 23 courtrooms, namely 3 High Court courtrooms, 10 Sessions Court courtrooms and 10 Magistrate Court courtrooms. The complex is also equipped with various facilities for the use of Court staff and customers. Such facilities are such as Special Court for Vulnerable Witness, Mediation Center, Lawyer Room, Multipurpose Hall, Meeting Room, Public Discussion Room, Training Room, Library and Public Surau.

2.3 Conceptual Framework of Research

A conceptual framework is a structure which the researcher considers the natural progression of the phenomenon to be studied. It is linked to concepts, empiric research and important theories used to encourage and systemize the knowledge of the researcher (Peshkin, 1993). It is the researcher's interpretation of how the study issue will be tackled. The conceptual framework presents an integrated way to solve an issue under study (Liehr & Smith, 1999; Akintoye, 2015).

The conceptual framework of this research is based on the factor affects sick building syndrome (SBS) in current building. The concept of this investigation is a description on analyze the critical factor that occupant experiences towards sick building syndrome (SBS) by recognize the factor that influences sick building syndrome (SBS) towards the occupant and the building which are an inadequate ventilation, maintenance performance, indoor contaminants, and lighting.

Next, evaluate the level of the health status of the Kuantan Court Complex based on sick building syndrome (SBS). In this study, researchers recognize the factors affects Sick Building Syndrome (SBS). In addition, researchers also aim to investigate the crucial factor in the Sick Building Syndrome (SBS) experience of occupants and able to reduce the Sick Building Syndrome (SBS).

Inadequate ventilation (Chirico, et. al, 2017), (Jiya, et. al, 2019)

Maintenance

(Zarith, et. al, 2019)

Indoor contaminant (Zuraihana, et. al, 2019), (Ali, 2019)

Lighting

(Zuraihana, et. al, 2019

Factor that affects sick building syndrome (SBS) in the building.
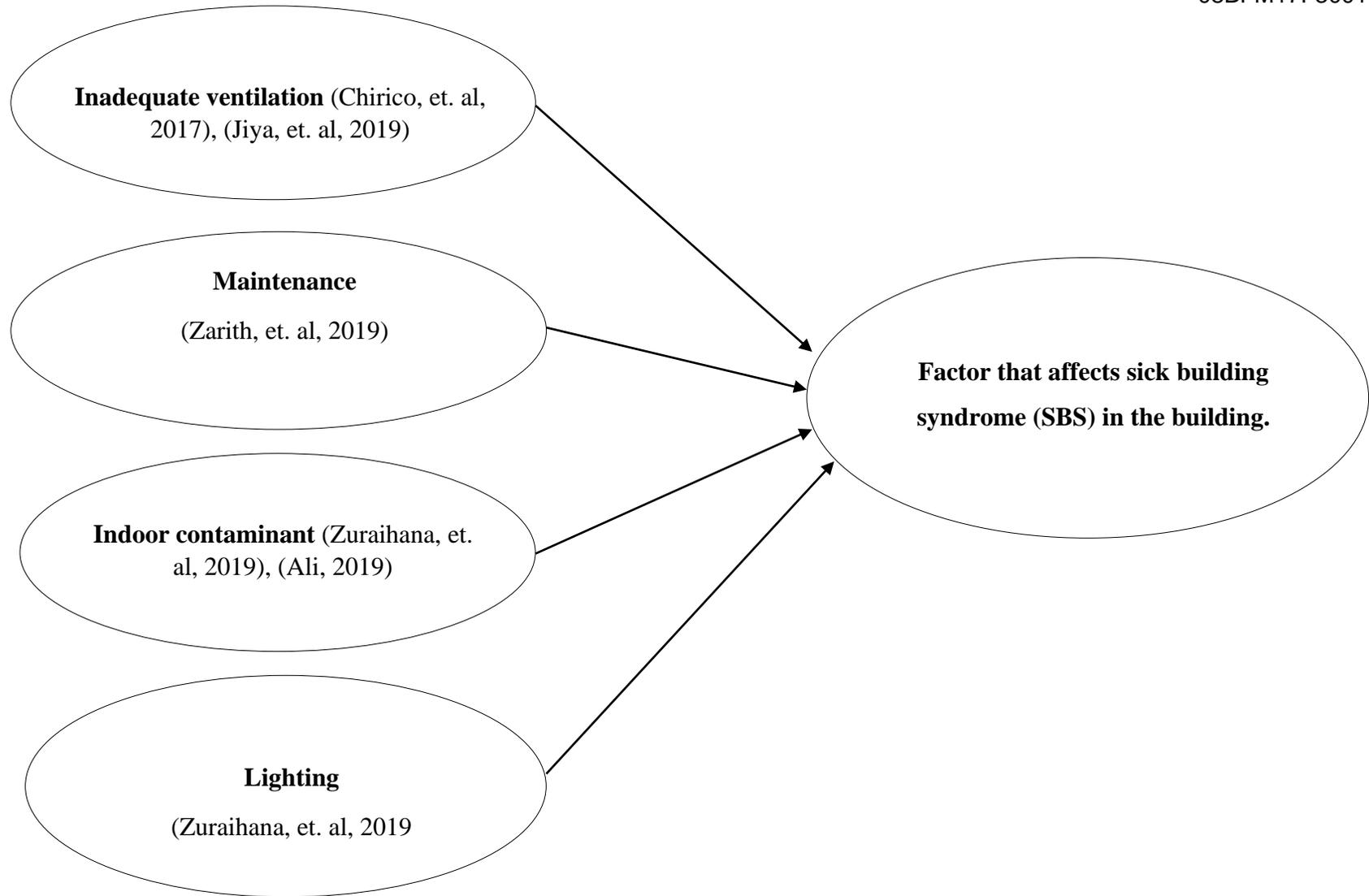
Figure 2.3: Conceptual Framework of Research

2.3.1 Inadequate Ventilation

This finding is in accordance with a thorough research showing that air-conditioned buildings are associated with an increased prevalence of SBS (Chirico, et. al, 2017). Studies have demonstrated that SBS was influenced by the type of ventilation system, with the prevalence of SBS being higher in buildings with mechanical ventilation systems compared to normal ventilation system (Burge et al., 1995).

Iyagba (2005) defines that the ventilation system is often considered to be the most important aspect affecting buildings that seem to be airtight and have an active ventilation system. In other cases, ventilation is required to remove deteriorated or stale air and replace it with fresh air, thereby creating a kind of movement or flow that gives the occupant a feeling of freshness (David, et. al, 2018)

This could therefore be harmful if the essential opening for cross ventilation is not provided to disperse the pollutants from the building. However, advancements in technology have resulted in the tight sealing of buildings. This causes the air to be re-circulated within the building and filled with a variety of particles and chemical-emitting materials that make those living or working in the space exhibit sick building syndrome. Sick building syndrome arises in any building with inadequate ventilation, poor and ineffective layout and poor or passive maintenance (Jiya, et. al, 2019).

2.3.2 Maintenance

A study by (Sullivan et al., 2012) highlights issues with maintenance access, low standards of installation, lack of competently trained individuals, insufficient operation, and poor commissioning. Maintenance is important in handling the mechanical ventilation and air conditioning (MVAC). A scheduled maintenance will be able to reduce and control a good ventilation.

Usually, indoor air quality (IAQ) problems are closely related to mechanical ventilation and air conditioning (MVAC) systems with poor or improper maintenance, which, in turn, leads to inadequate ventilation and the inability to remove the contaminants from the room or building (Zarith, et. al, 2019).

Shaw (1997) also said that the level of indoor air quality in any building is influenced by the air handling unit (AHU), maintenance, cleaning procedures and the duration of inspection. In adequacies occur because systems are field assembled (usually without design specifications), there is no consistent process for identifying and fixing problems, and the value of such activities in terms of reducing energy use and improving IAQ is unknown (Turner et al., 2013).

2.3.3 Indoor Contaminant

Indoor air pollution is a combination of contributions from outdoor sources and indoor sources. In some cases, air pollution can contribute to high-rise buildings located near highways or industrial estates (Hakim et. al, 2013). Indeed, the health risks from exposure to indoor air pollution may be greater than those related to outdoor pollution (Cincinelli and Martellini 2017). Individuals exhibiting environmentally and occupationally associated symptoms have been exposed to the elements of airborne materials coming not from outdoors but within a building (Aziah, et. al, 2019)

From the study that being carried out showed that air filters in HVAC systems have a very high retention capability for airborne microorganisms. Only under continuous long-term, high relative humidity decreases due to growth and subsequent release of microorganisms into the flowing air. Due to their small sizes, the microorganisms released by the air filters are breathable. They can be carried on into the ventilated rooms by air and cause infections (e. g. bronchitis, asthma) or allergies (e. g. bronchial asthma) in persons who stay in these inner rooms for a longer period (Ali, 2019)

2.3.4 Lighting

Inadequate illumination, glare, flicker, and lack of contrast can also cause tiredness, dry and gritty eyes, and headache (Vince, 1987). According to Wilkins (1990) a conventional white – fluorescent lighting is likely to cause eyestrain and headaches. Potter (1989) said, several reports, including Wilkins et al., have claimed that the ultraviolet light emission from fluorescent lamps can react with various pollutants in the air creating a photochemical smog which acts as a toxic irritant (Anne, et. al, 2005).

Passarelli (2015) identified flickering daylight and mechanical lighting as a matter of concern in the emission of the right type of light in the working environment. Molina et. al (1990) found that the use of a solid high-frequency ballast resulting in reduced variability in illumination reduced the incidence of eye

strain and headache by more than 50% in workers. In addition, the report suggests that insufficiency of contrast, excessive brightness and glare contribute to the advancement of eye irritation and headache in visual stress. There is a standard guideline for illumination level of lights by Illumination engineering terms standard (IEL), MS1525 recommendation and *Jabatan Kerja Raya* (JKR) technique guideline.

2.4 Summary of The Chapter

From the literature review, the researcher has emphasized several basic knowledges of the study to be conducted such as definition, study-related background and concepts of the topic that being carried out. At the starting point of this study, the researcher provided several basic knowledges related to the topic of the study conducted based on the source data collection on the health status of the Kuantan Court Complex according to the sick building syndrome (SBS).

In this study, we will analyze the critical factor that occupant experiences towards Sick Building Syndrome (SBS) by recognize the factor that affects sick building syndrome (SBS) towards the occupant and the building which are;

  i.   Inadequate Ventilation
  ii.   Maintenance
  iii.   Indoor Contaminants
  iv.   Lighting.

All these factors will be used as a guide to conduct a study to achieve the objective of the study. All the factors that contributed to Sick Building Syndrome (SBS) will be evaluated to recognize the critical factor that occupant experiences towards Sick Building Syndrome (SBS).

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. Abraham Kaplan defines research methodology in this way. Research methodology is "the description, explanation and justification of various methods of conducting research". The scope of Research Methodology is wider than that of research methods. "Thus, when we talk of research methodology, we not only talk of the research methods but also considered the logic behind the methods we use in the context of our method or technique & why we are not using others (Varghese, 2017). The methodology that researchers will use in conducting this study will be discussed in this chapter. It seeks to explain how the study was conducted, obtaining, and analyzing the data to obtain accurate information.

3.2 Philosophy and Approaches of Research

The choice of which method to employ is dependent upon the nature of the research problem, Morgan and Smircich (1980) argue that the actual suitability of a research method, derives from the nature of the social phenomena to be explored (Khairul, 2008). There are some stages of research and methods used for data collection and conduct analysis of the data. It consists of six layers of research methods which are philosophy, approach, preferred methodology, strategy, time horizon and techniques and procedures.

3.2.1   Philosophy of Research

Pragmatism research philosophy accepts concepts to be relevant only if they support action. Pragmatics "recognize that there are many different ways of interpreting the world and undertaking research, that no single point of view can ever give the entire picture and that there may be multiple realities" (Saunders, et. al, 2012)

Positivism and interpretivism are two extreme mutually exclusive paradigms about the nature and sources of knowledge. While many dissertation topics fall broadly within one of these two main paradigms, there is an occasional need for seasoned researchers to "modify their philosophical assumptions over time and move to a new position on the continuum" (Collis, et. al, 2014). The modified philosophical assumptions are adapted by pragmatic researchers, who usually happen to be experienced researchers.

The research question, according to pragmatism research philosophy, is the most important determinant of the research philosophy. Pragmatics can combine both, positivist and interpretivism positions within the scope of a single research according to the nature of the research question. It can integrate more than one research approaches and research strategies within the same study.

3.2.2   Deductive Approaches

Deductive analysis refers to data analyses that set out to test whether data are consistent with prior assumptions, theories, or hypotheses identified or constructed by an investigator. In deductive analyses, such as those used in experimental and hypothesis testing research, key themes are often obscured, reframed, or left invisible because of the preconceptions in the data collection and data analysis procedures imposed by investigators (David, et. al, 2006). A deductive research using a quantitative approach where it allows research to develop hypothesis based existing theories that conduct research to test hypothesis so, it is the best suited for design form of quantitative study.

3.2.3   Inductive Approaches

The inductive approach is a systematic procedure for analyzing qualitative data in which the analysis is likely to be guided by specific evaluation objectives. According to Strauss and Corbin's (1998) description: "The researcher begins with an area of study and allows the theory to emerge from the data" (p. 12). The primary purpose of the inductive approach is to allow research findings to emerge from the frequent, dominant, or significant themes inherent in raw data, without the restraints imposed by structured methodologies (David, et. al, 2006). An inductive research using a qualitative approach where it needs an approach to evaluate the results based on the quantity selected to test the research requirements. The results will be observed with the number of results collected and rely only on qualitative data.

3.2.4   Abductive Approaches

The collection, thorough reading and preliminary analysis of relevant documentary material thus formed a key part of the information used. An abductive research approach seemed most suitable given the nature of the research objective. Unlike inductive and deductive reasoning, abductive research can explain, develop, or change the theoretical framework before, during or after the research process (Dubois, et. al, 2002). Accordingly, abductive reasoning consists of a pragmatic approach to advancing the social sciences through a process of "systematic combining" in academic research as depicted in Dubois and Gadde's model (Friedrichs, et. al, 2009). Modell (2010) defines mixed methods research "in terms of its propensity to enable research to combine breadth and depth in empirical enquiries to enhance the validity of research findings through triangulation and to facilitate the mobilization of multiple theories". Furthermore, an abductive approach would be used to fulfill the aim and objectives of the research study. This abductive approach will be used by researcher to be carried out a study of Factor That Affects Sick Building Syndrome in The Building.

3.3   Research Design

A research design is the 'procedures for collecting, analyzing, interpreting and reporting According to Creswell (2007), a research design is the 'procedures for collecting, analyzing, interpreting, and reporting data in research studies. It is the plan for connecting the conceptual research problems with the pertinent (and achievable) empirical research. In other words, Grey (2014) said, the research design sets the procedure on the required data, the methods to be applied to collect and analyze this data, and how all of this is going to answer the research question. (Boru, 2018). According to Maxwell (2011) theory, there are five components to the design of the study, which include goals, conceptual framework, research questions, methods, and validity.

COMPONENT 1

Determine the level of SBS in campus building.

COMPONENT 2

i.   Inadequate ventilation

ii.   Maintenance

iii.   Indoor contaminants

iv.   Lighting

COMPONENT 3

Does campus building is affected by Sick Building Syndrome (SBS)?

COMPONENT 4

i.   Questionnaires

ii.   Observation

COMPONENT 5

i.   Lembaian Fajar (Maintenance)
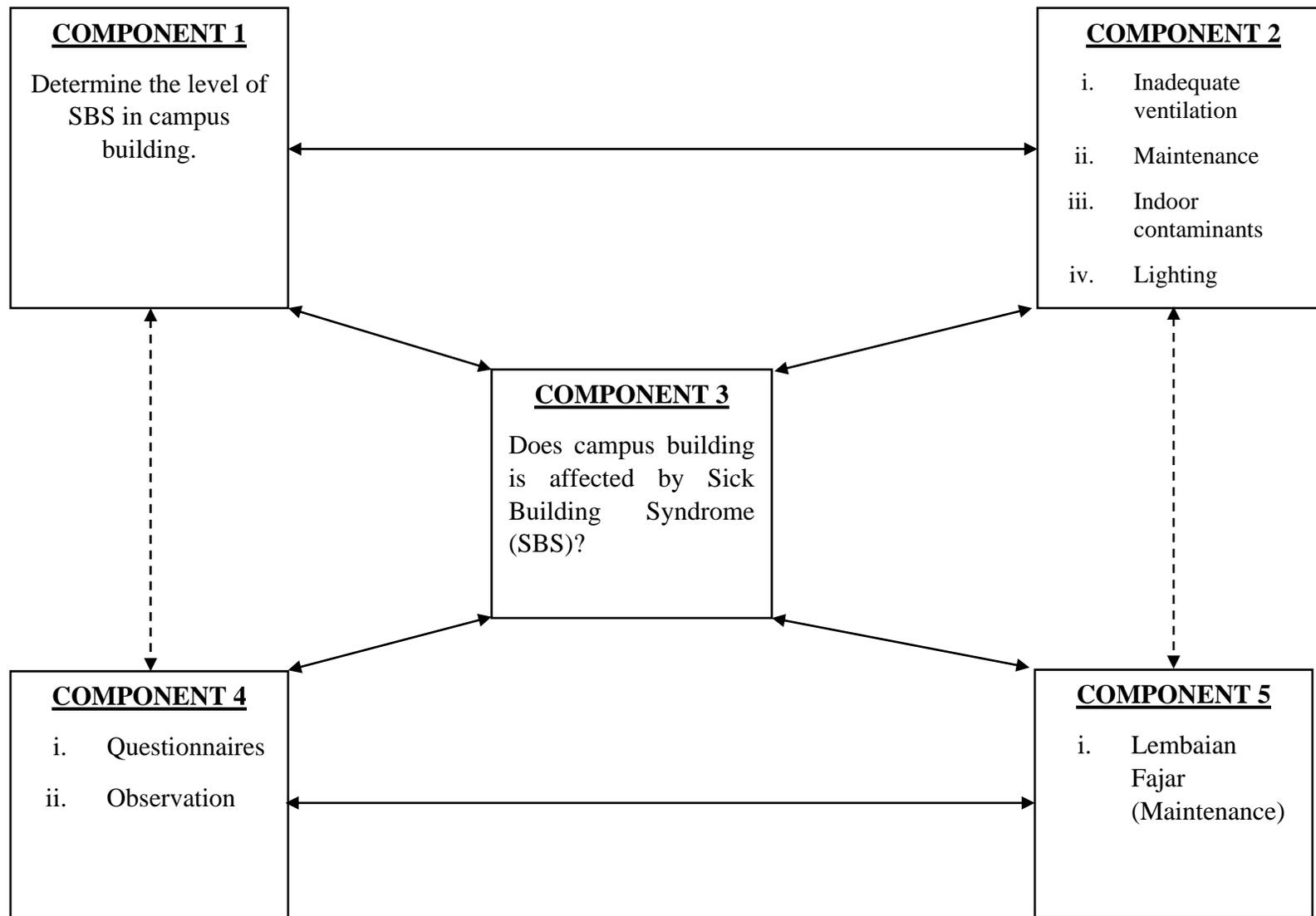
Figure 3.3: Research Design

3.3.1 Goal

The goal of conducting this research is to determine the level of sick building syndrome the building. The goal of this review is a combination of the purpose, the objectives and the whole thing that was discussed in chapter one. Goals are the first component and are interlinked with the second component of the conceptual framework, research questions and methods.

3.3.2 Conceptual Framework

The conceptual framework is a system comprised of Objectives and basic concepts that are interrelated. Referring to the conceptual framework of the study as set out in Chapter 2, the conceptual framework consists of four constructs representing factors that affects sick building syndrome (SBS) towards the occupant and the building which are an inadequate ventilation (1), maintenance (2), indoor contaminants (3) and lighting (4). All variables within the conceptual framework will be a component that will be distributed to the respondents in the questionnaire form.

3.3.3 Research Question

Based on this study, research questions have been identified to achieve the goals set in the study design. There are several research questions that are issues to implement this study and need to be seen and refined. Research questions are also an important guide to conducting a study. This study aims to discover a solution of questions related to the elements in the design of the study.

iv.   what is the symptom of Sick Building Syndrome (SBS) that occupant experienced?

v.   How to evaluate the level of symptom that contribute to Sick Building Syndrome (SBS)?

vi.   What is the possible solution that able to reduce the Sick Building Syndrome (SBS)?

3.3.4 Method

The methods of this study are qualitative (condition survey) and quantitative (questionnaire). This research method will involve the maintenance department on Kuantan Court Complex.

3.3.4.1   Questionnaire

Questionnaires are instruments used in research to gather valid and reliable information from respondents. It is an indispensable tool in behavior change studies as it helps in data collection for measurement of the constructs in various behavior models.

To develop a good questionnaire, it is important that one not only understands the behavior change model and its constructs but also the specific behavior (in question) to which they will be applied (Shoufa, et. al, 2014).

The data collection tool or questionnaire should be described in the research proposal and provided in full as an appendix. How the tool was obtained, adapted, or developed should be described. The validity and reliability of the questionnaire should also be addressed in the proposal (Bob, et. al, 2014).

3.3.4.2 **Condition survey**

Condition survey is the collection of data about the condition of a building, estate, or portfolio; assessing how that condition compares to a pre-determined standard, to identify any actions necessary to achieve that standard now; and maintain it there over a specified time horizon; the purpose being to support management decision making (RICS, 1997). As for the researcher, the condition survey is caried out to identify the factors that affects Sick Building Syndrome in the building.

The survey is included the air ventilation, lighting, and source of contaminants. The measurement of air temperature, relative humidity and the light level were carried out. The air temperature, and relative humidity were measured to find the thermal comfort and the light level was measured to find the lighting quality.

There were two instruments used for the measurements of environmental parameters of indoor environment. These instruments are bellow.

i. Air temperature and relative humidity

The Air Temperature and relative humidity were measured by using the digital instrument of fluke 971 temperature humidity meter. With backlit dual display of humidity and temperature, it Measures dew point and wet bulb temperatures. The range of measurements are between -20 °C to 60 °C (-4 °F to 140 °F) and the Relative humidity from 5% to 95%. It is used for the measurement of the Air flow from HVAC system induction ducts, diffusers and grilles and it is powered by battery.

Figure 3.3.4.2 (i): Fluke 971 temperature humidity meter

ii. Lux meter

Light level was measured with Testo 540 Lux Meter. The sensor of the testo 540 is adapted to the spectral sensitivity of the eye. This makes testo ideal for the measurement of light intensity. The Hold function allows an easy readout of the measurement values. Max. and min. values are displayed at the press of a button. testo 540 is very handy, small, and easy to operate.

Figure 1.3.4.2(ii): Testo 540 Lux Meter

3.3.5 Validity

Validity means the degree to which findings are commonly accessible in the system used by the researcher and can be obtained in response to analysis questions to make the results more specific. The validity of this study is first, by obtaining confirmation from Facility Manager of *Lembaian Fajar Sdn Bhd* in the building of Kuantan Court Complex, whether it is appropriate for respondents who wanted to be questioned whether it meets the requirements of the study.

3.3.6 Sampling

Sampling is selecting a group from a much larger population (study population) that is similar in its trait distribution such as gender, ethnicity, age, income, etc. to the larger population. Findings made from studying the group can then be generalized to the larger population. The required size of the sample has been calculated above, but sampling deals with the actual selection of the group. sampling selection depends on the type of research that been carried out. there are two type of sampling method which include Probability of sampling and non-probability sampling. A good sample selection is a sample that can represent such variables in the target population (Bob, et. al, 2014). Figure 3.2 shows the sampling flow chart (Chua Yan, 2006).

Define the target population
Identify the sampling framework
Identify sample size
Choosing a sampling method
Select a sample on purpose
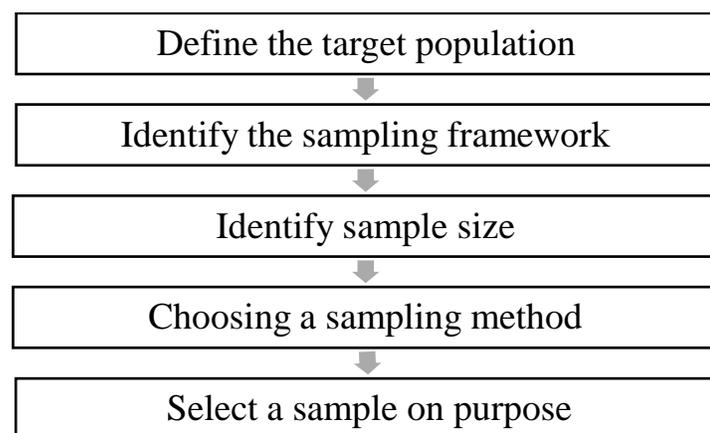
Table 3.3.5: flowchart of sampling

3.4 Summary

In summary, there is an extensive discussion of methodologies that will be included in this review. Choosing methodology, study design, data collection methods used, research tools, sampling, and data analysis methods. Researchers have also explained how to conduct research. Each section of the title of this chapter has been prepared to provide more detailed and clear explanation of the methodology of the research arrangement. The steps taken for more detailed data collection to obtain more data are also described in this chapter.

CHAPTER FOUR

DATA COLLECTION

4.1. Introduction

Data collection is carried out to obtain the information necessary for the purpose of the research. In any study the data collection is the most critical element (Cresswell, 2008). In data collection, a suitable selection of data collection techniques and methods should be focused. A good tool or instrument for gathering data will determine the quality of study.

This chapter will explain the data collection methods used for this study. This explanation includes the types of sampling, sampling size and the justification of the data collection instruments used. Data collection is a process of obtaining data for the study conducted. The effective approach for this study is through two (2) methods selected to support the results and objectives of the study.

4.2.   Instrument of data collection

Data collecting tools is a method to use in collecting and measuring information and data in systematic method to achieve the study objectives. From the study, the data collected is from two different sources which are primary and secondary.

A primary source refers to a type of information that is obtained directly from the first-hand source through experiments, surveys, or observations. So, this source plays a significant role in determined the result of study. The primary source data is needed to answer the question and objective study which included in conducting analysis and draw conclusion for the study.

As for secondary source refer to a data collected by someone other than the actual user. It means that the information is already available, and someone analyses it. The secondary data includes magazines, newspapers, books, journals, etc. therefore, this source is important in determine the aims and goals of the study conducted.

In addition, Instrument is one of the tools or methods used to gather the data. Among the data collection instruments for the study cases used in this research are questionnaire and condition survey with respondent as per required for the data collection process. Data collection techniques are very important steps in the analysis process since the main objective of the study is to analyses the obtained data as per stated by Burhanuddin (2003).

The sample size for this study is through purposive method which is a technique widely used in qualitative research in identify and select the information-rich cases for the most effective use of limited resources (Patton, 2002). This involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest (Cresswell & Plano Clark, 2011).

Table 4.2: the numbers of workers involve in the survey

Maintenance department	Total workers	No of Involvement
Civil	20	18
Mechanical	19	19
Electrical	19	18

4.2.1. Questionnaire

Questionnaire is used in this research in to get respondent opinions towards the factor that affects Sick Building Syndrome in the building. The questions list is followed and constructed according to the conceptual framework and literature review by the researcher. All the responds recorded through the questionnaire survey are strictly confidential and will be used only for the research purposes. The questionnaire is distributed by using Google Form link to maintenance teams that is selected by the researcher.

In this questionnaire, the researcher will focus on the research objectives which is

i.   To identify the factor that affects Sick Building Syndrome in the building.
ii.   To analyses the level of Sick Building Syndrome in the current condition.
iii. To propose the possible solution in reducing Sick Building Syndrome in the building.

For this research, the questionnaire involving fifty – five (55) respondents in Kuantan Court Complex from a different department in maintenance field. The department divided into three (3) which is Civil, Mechanical and Electrical. The items in this questionnaire are based on four (4) constructs that are part of conceptual framework of study. This questionnaire form is also applied to answer the second objective. This is the list of the question asked in the survey.

Table 4.2.1 (a) Questionnaire's Section

Section	Title
A	Respondent's Demographic
B	The factors that affect Sick Building Syndrome in the building
C	The symptoms that occupants face when they are in the building

4.2.1.1   Respondents' demographic

In this section, the researcher has listed some background data of respondents to relate with the question that been asked in section B and C. the question in section A, focuses on respondent's demographic that surveys respondent's gender, age, department in the company and working hours per week.

4.2.1.2   The factors that affect Sick Building Syndrome in the building

In Section B, questions related to factors that affect Sick Building Syndrome in the building. In this section, there are four (4) factors that involved in this research which are maintenance performance, inadequate ventilation, indoor contaminants, and lighting.

4.2.1.3   The symptoms that occupants face when they are in the building

Section C is to query the respondent regarding the symptoms that occupants face when they are in the building. Questions that included in the survey are the general symptom, mucosal symptom, and skin symptom.

Table 4.2.1 (b) List of Question in the Questionnaire

Section	List of Questions
A. Respondents' Demographic	1. Gender 2. Age 3. Department 4. Working time per week

B. The factors that affect Sick Building Syndrome in the building	i. Maintenance performance
	  1. The maintenance team ensures that the room is cleaned after maintenance work done.
	  2. The maintenance team ensures all dirt and dust are removed during the maintenance process.
	  3. The maintenance team does not ensure the air condition meets the standard of decibel level (dB).
	
	ii. Inadequate ventilation
	  4. Ventilation ducts is inspected and maintained by following Plan Preventive Maintenance (PPM).
	  5. Room temperature is automatically controlled by regulator.
	  6. Room temperature changes according to user's request
	  7. Relative humidity is not maintained between 40% and 60%
	
	iii. Indoor contaminants
	  8. No odor nuisance in the room.
	  9. Regular refurbishment is not part of maintenance.
	  10. Placement of photocopiers and printers is not in sealed rooms with their own extract system.

	iv. Lighting 11. The maintenance team ensures that all lighting in the room function well. 12. The room does not have enough natural lighting.
C. The symptoms that occupants face when they are in the building	i. General symptom 1. Headache 2. Tiredness 3. Feel like having flu ii. Mucosal symptom 4. Irritating eyes 5. Runny nose 6. Nose block 7. Sore throat iii. Skin symptom 8. Rashes on skin 9. Itchy on skin

Table 4.2.1 (c) Likert Scale

Statement	Scale
Strongly Agree	5
Agree	4
Neither agree nor disagree	3
Disagree	2
Strongly Disagree	1

Table 4.2.1 (d) Questionnaire Link on Google Form Platform

Questionnaire Title in Google Form	Google Form Online Link
A factor that affects Sick Building Syndrome in the building	**Short Link**
	https://forms.gle/zZYFyEyiqfM49LWx5
	Full Link
	https://docs.google.com/forms/d/e/1FAIpQLSfmqKI 60n_kE9kcqt8hNBaxkZixK_U8j24vbpe_uHlZxWza pA/viewform?usp=sf_link

4.2.2   Pilot Test

In this study, the researcher conducts a pilot test with ten (10) respondents who work in maintenance at other government building. The target of this pilot test is to see if the items used in the survey questions are accurate. This test is necessary to ensure the respondent understand the question well and will give an accurate data finding.

Figure 4.2.2: Table of Cronbach's alpha score

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Cronbach's alpha is a metric for determining the internal consistency, or reliability, of a set of scale or test items. Pilot survey will be distributed to random technicians to ensure every tool used in the questionnaire are reliable and understandable by the respondent. This process is important before the actual questionnaire is distributed to the respondent. The pilot survey for questionnaire has been done by technician in the selected government building. For this research the Cronbach's Alpha score was 0.837 for section B and 0.943 for section C. Based on the Cronbach's Alpha score the questionnaire are in good and excellent range and acceptable for this research.

Table 4.2.2: The Cronbach's alpha score

OBJECTIVES	C.A	N OF ITEM
Factor that affect Sick Building Syndrome (SBS) in the building	.837	12
The level of Sick Building Syndrome (SBS) in the building	.943	10

4.2.3   Condition Survey

The condition survey is conducted adopted from *A. Ahmad Romaizi* thesis. The sampling points were considered the general conditions, source of contaminants, air intake and lighting of the building.

For lighting consideration, the reading of lux is conducted two times in a day, morning, and evening. The instrument used to read the data is portable lux meter (to measure the lux). Next, for the air intake consideration, the measurement of temperature and humidity was conducted two times in a day, morning, and evening. The instruments used to assess the measurement is portable temperature/humidity meter

(to measure temperature and relative humidity). The samples were conducted for 2 days due to limitation of time due to Covid – 19.

Each sampling point in the condition survey is to obtain and support the required data for the researcher to the research's objectives. The research objectives are:

i.   To identify factor that affects Sick Building Syndrome in the building.
ii. To analyses the level of Sick Building Syndrome in the current condition.
iii. To propose possible solution in reducing Sick Building Syndrome in the building.

Table 4.2.3: the condition survey sampling point

Sampling point	Inspection
General condition	1. Check sign of mold 2. Check sign of crack
Air ventilation	1. Check the temperature and relative humidity 2. Check if there is a dust around the air vents 3. Check the indoor temperature regulated by thermostat or not
Indoor contaminants	1. Check the location of photocopying machines 2. check if there have a smoking area 3. check the odors
Lighting	1. check the natural lighting of the space 2. check the light level of the lamp

4.3   Summary

This chapter has fully explained the instruments used for the data collection process. In this research, the data collection instrument used by the researchers are mixed-method data collection. There are two method approaches which each of it will interpret different outlook of the topic. There are two methods of data collection used in the research which is questionnaire and condition survey.

Overall, this chapter describes the comprehensively of data collection starting from identify the question need to be asked, instrument method used, and analyses the questionnaire before distributing to the respondents by using the pilot test. By followed the steps, it can ensure that the survey question is the best and appropriate to obtain the objectives and goals of the study.

Finally, based on the whole of this chapter, researcher has outlined the purpose of data collection to ensure it is achieving the objective and goals of study.

CHAPTER FIVE

DATA ANALYSIS

5.0   Introduction

Data analysis is an easy way to understand the turning data into information and solving research-related problems (Sora N., 2015). Syamer (2017) claimed that data analysis is also an operation that gathers and processes data to address the question and goals od study. Descriptive data will enable the researcher to present the data in more simple interpretation of the data.

In this chapter, research focusses on describe and discuss the results of finding through analysing the data to measure the objectives that set in the study. Therefore, a quantitative analysis will be focused on the questionnaire session result and qualitative analysis will extracted information gained from the condition survey session from selected part of the building. The analysing process is done by using Statistical Package for Social Sciences (SPSS) software. Acquired by IBM in 2009, this software use for interactive or batched, statistical analysis which help the researcher able to extract data in much simpler ways.

5.1   Questionnaire

According to Rani Menta (2012) A questionnaire is a collection of question asked to individuals to collect statistically valuable information on a specific subject. When properly designed and implemented, Questionnaires are a critical instrument when it is properly designed and implemented due to the assumptions been made by a groups or individuals or entire populations call as respondents. A questionnaire related to the study of factors that affects Sick Building Syndrome in the building is conducted at Kuantan Court Complex. The analysis of this data is to answer the objective one (1) and two (2). The questionnaire is distributed to maintenance workers at the site using an online method which is

via google form. There are 55 responds were returned to the researcher for analyses purpose.

5.1.1 Respondent Demographic

According to Gavrilova N.S., Gavrilov LA. (2011), demographic is a statistical study of the population, especially human and it can analyse any type of dynamic population of life that change over time and space. Demographic section describes background of the respondents who answered the questionnaire.

Table 5.1.1 Background of Respondent

No	Item	Category	Sample Size (n= 55)
1	Gender	Male	49
		Female	6
2	Age	20 – 25 years	26
		26 – 30 years	23
		31 – 35 years	5
		36 years and above	1
3	Department	Civil	18
		Mechanical	20
		Electrical	17
4	Working time per week	40 – 43 hours	7
		44 – 47 hours	27
		48 hours and above	21

Sample Size = Number of respondents for the questionnaire

Table 5.1.1 shows the total number of respondents which are 55 respondents who answered to the questionnaire distributed for the study. The demographics asked in this research are:

i.   Gender

ii.   Age

iii.   Department

iv.   Working time per week

GENDER

(6) 11%

(49) 89%

▪ Male   ▪ Female
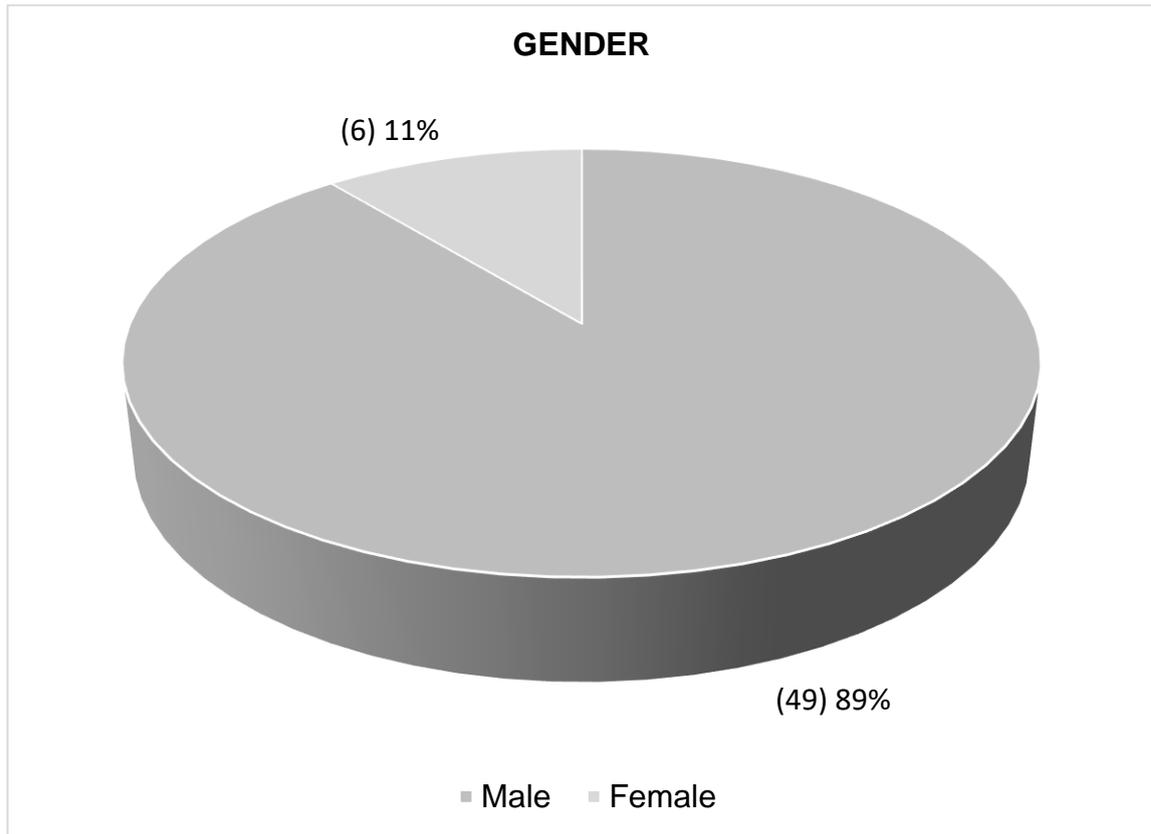
Figure 5.1.1 (a) Percentage of Gender of Respondent

Figure 5.1.1 (a) describes the percentage of gender that was answered by 55 respondents who participated in the survey questionnaire at Kuantan Court Complex. Respondents consisted of males and females randomly selected online. Based on the percentage obtained, a total of 89% of respondents are male which 49 respondent and 11% of respondents are female which is 6. Therefore, the researcher found that men are more involved in this study because the building is usually maintained by male employees who are most employees in the building.
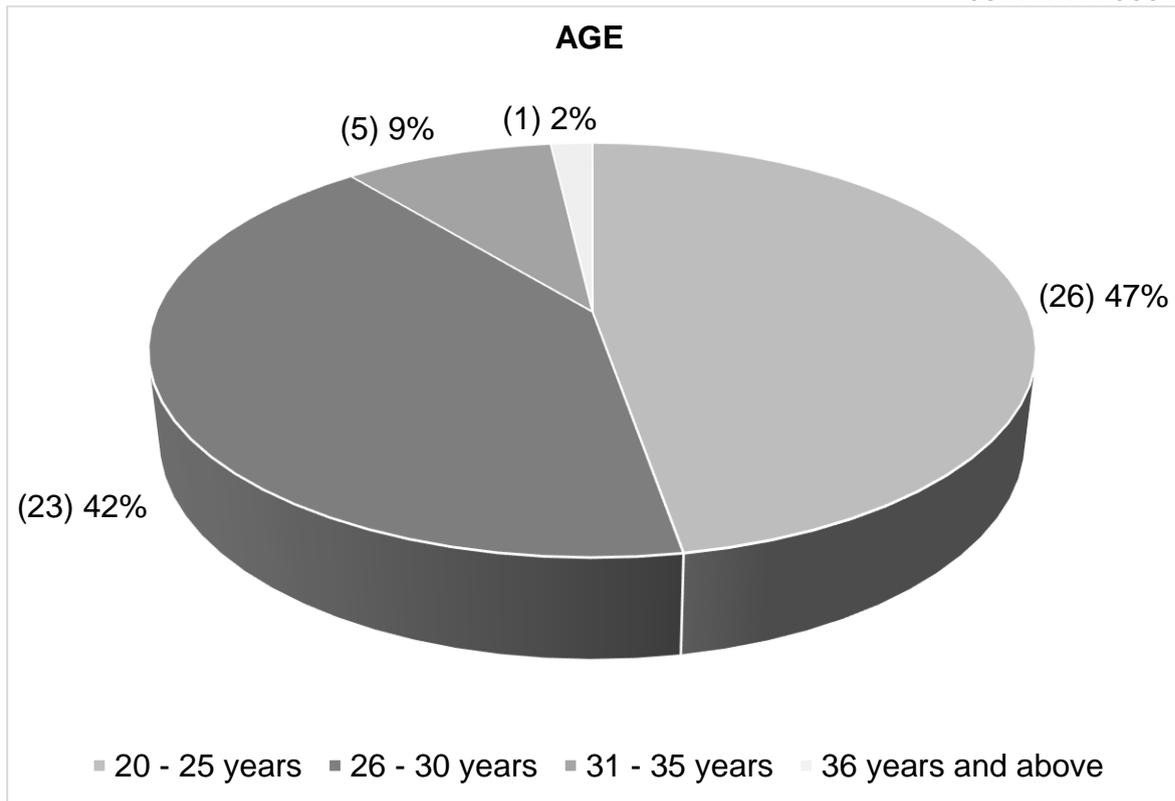
Figure 5.1.1 (b) Percentage of Age of Respondent

Based on the chart above shows the respondent based on age. The number of respondents that answer this questionnaire mostly from 20 to 25 years. The percentage of respondent from 20 to 25 years are 47% consist of 26 respondents. For the age 26 to 30 years, the respondent percentage are 42% consist of 23 respondents. Meanwhile, the respondents from the age 31 to 35 years percentage are 9% consist of 5 respondents. The lowest number of age 36 years and above which percentage recorded are 2% consist of 1 respondent. Researcher can conclude that respondents are majority from respondent who age is around 20 to 25 years that involve with this questionnaire.
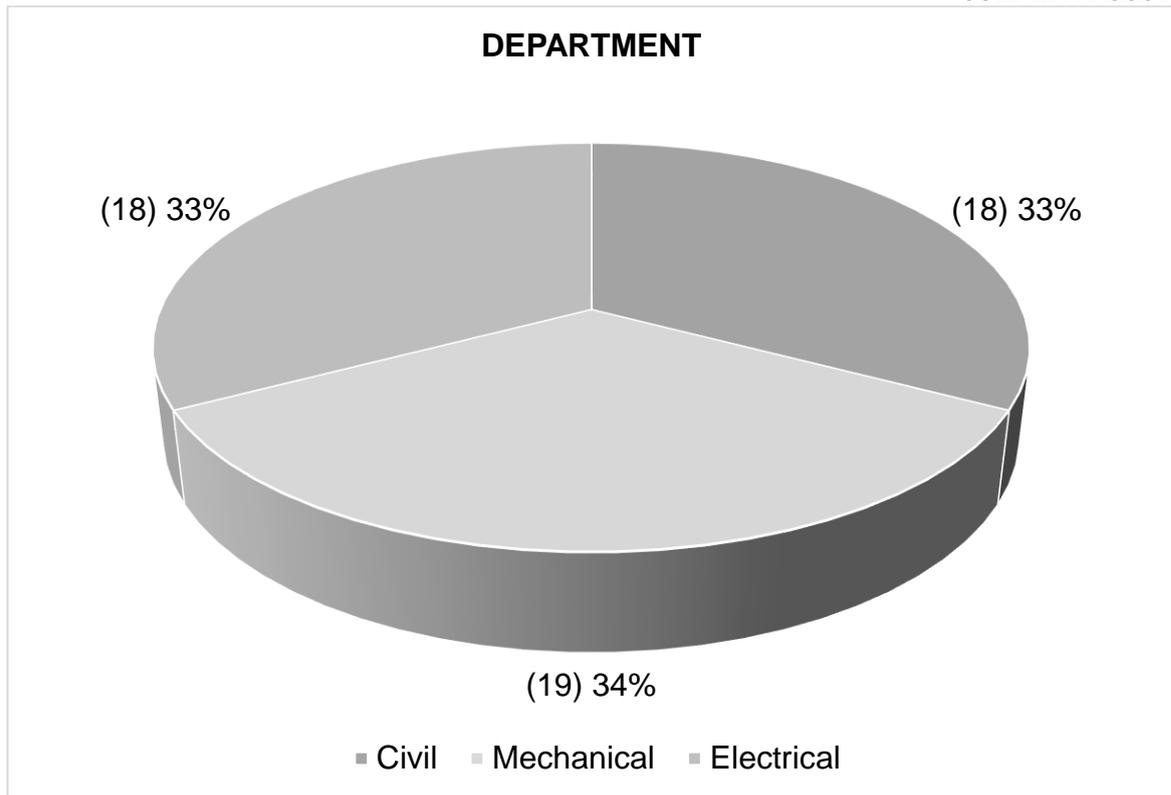
DEPARTMENT

Figure 5.1.1 (c) Percentage of Department of Respondent

Based on the chart above shows the respondent based on department. The number of respondents that answer this questionnaire mostly from Mechanical department. The percentage of respondent are 34% consist of 19 respondents. For Civil and Electrical departments, the respondent shares the same percentage which is 33% consist of 18 respondents. Researcher can conclude that respondents are majority from Mechanical department that involve with this questionnaire.

WORKING TIME PER WEEK

(7) 12.7%

(21) 38.2%

(27) 49.7%

▪ 40 - 43 hours　　▪ 44 - 47 hours　　▪ 48 hours and above
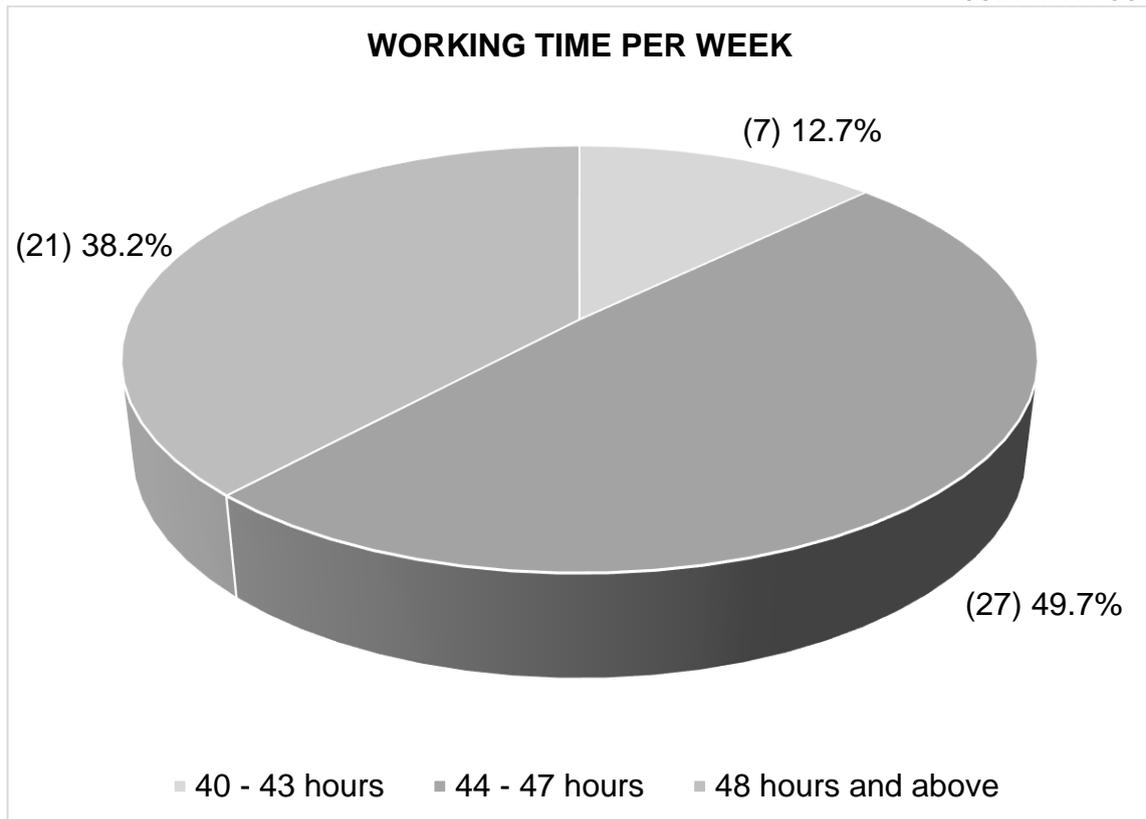
Figure 5.1.1 (d) Percentage of working time per week of Respondent

Based on the chart above shows the respondent based on working time per week. The number of respondents that answer this questionnaire mostly they work 44 to 47 hours per week. The percentage of respondent are 49.1% consist of 27 respondents. Meanwhile, the other respondents work 48 hours and above with the percentage are 38.2% consist of 21 respondents. The lowest working time per week of respondents are 40 to 43 hours which percentage recorded are 12.7% consist of 7 respondents. Researcher can conclude that respondents are majority worked for 44 to 47 hours per week that involve with this questionnaire.

5.1.2 Data Analysis for Objective 1

Section B in the questionnaire is to identify the affects Sick Building Syndrome in the building. The reading of past studies was the solution proposed to reach this intended objective. The researcher was able to identify the constructs that were produced based on past study readings. Based on the reading material that researcher study, researcher sum up that the factor that affects Sick building Syndrome in the building are:

i.   Maintenance performance
ii.   Inadequate ventilation
iii.   Indoor contaminants
iv.   Lighting

Researcher already come out the factors as the conceptual framework for the questionnaire made.

Table 5.1.2 (a) Score Mean for the Factor That Affects Sick Building Syndrome in The Building

Factors	Item	Question	Mean	Total Average Mean
Maintenance performance	**B1**	The maintenance team ensures that the room is cleaned after maintenance work done.	4.29	4.20
	B2	The maintenance team ensures all dirt and dust are removed during the maintenance process.	4.09	
	B3	The maintenance team does not ensure the air condition meets the standard of decibel level (dB).	4.22	
Inadequate Ventilation	**B4**	Ventilation ducts is inspected and maintained by following Plan Preventive Maintenance (PPM).	4.09	4.22
	B5	Room temperature is automatically controlled by regulator.	4.47	
	B6	Room temperature changes according to the user's request	4.05	
	B7	Relative humidity is not maintained between 40% and 60%	4.25	
Indoor Contaminants	**B8**	No odor nuisance in the room.	4.13	4.20
	B9	Regular refurbishment is not part of maintenance.	4.20	
	B10	Placement of photocopiers and printers is not in sealed rooms with their own extract	4.27	

		system.		
Lighting	**B11**	The maintenance team ensures that all lighting in the room function well.	4.13	4.19
	B12	The room does not have enough natural lighting.	4.25	

Table above shows the factors that affects Sick Building Syndrome in the building. This section is to see whether the factors affect Sick building Syndrome is around the building and starting to build in the building. From the question, researcher will recognize the symptoms level. The results obtained as pictured in the table above are based on what the respondents face in the building.

MAINTENANCE PERFORMANCE

4.22

4.29

4.09

- B1 The maintenance team ensures that the room is cleaned after maintenance work done.

  B2 The maintenance team ensures all dirt and dust are removed during the maintenance process.

- B3 The maintenance team does not ensure the air condition meets the standard of decibel level (dB).
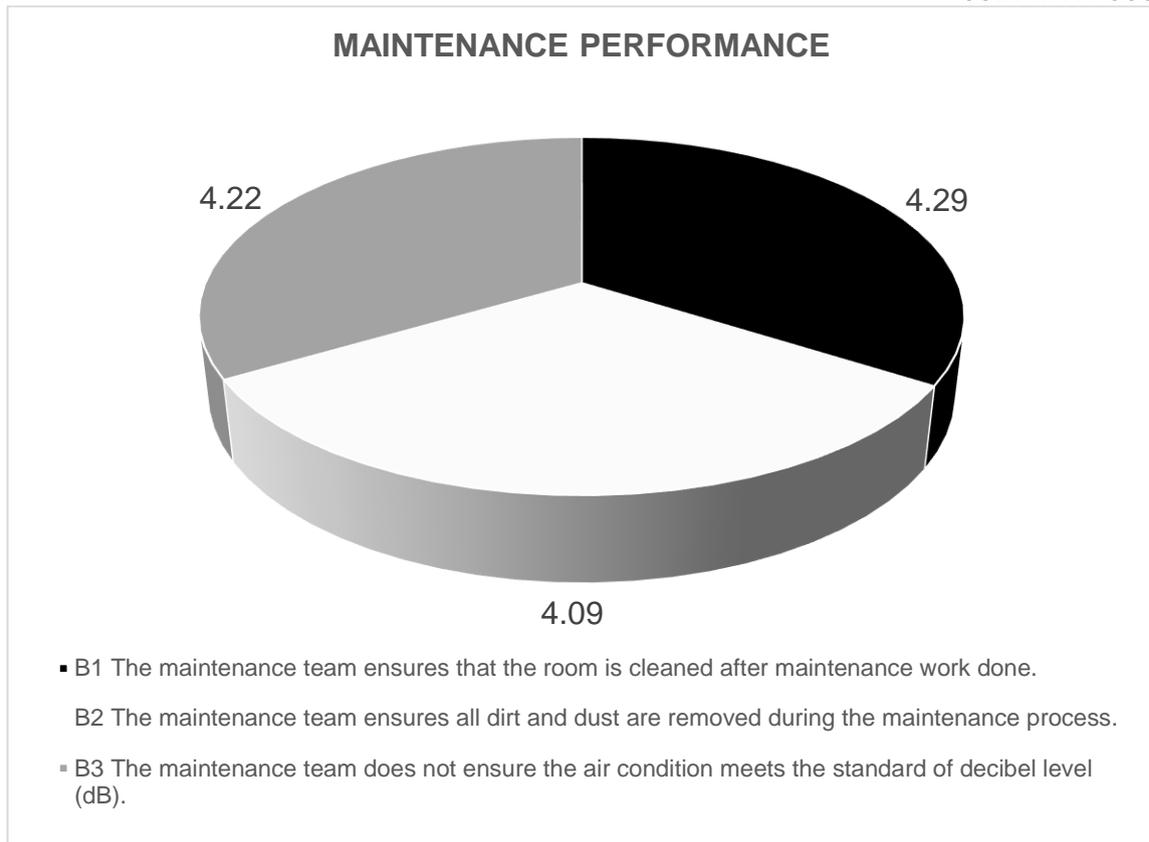
Figure 5.1.2 (a) Mean score of Maintenance performance

Based on the table, the mean score is 4.20. The highest score is 4.29 which is the maintenance team ensure that the room is cleaned after maintenance work done. The higher score is 4. 22 which is the maintenance team does not ensure the air condition meets the standard of decibel level (dB) The lowest score is 4.09 which is the maintenance team ensures all dirt and dust are removed during the maintenance process.

INADEQUATE VENTILATION

4.25

4.09

4.05

4.47

- B4 Ventilation ducts is inspected and maintained by following Plan Preventive Maintenance (PPM).

  B5 Room temperature is automatically controlled by regulator.

- B6 Room temperature changes according to the user's request

- B7 Relative humidity is not maintained between 40% and 60%
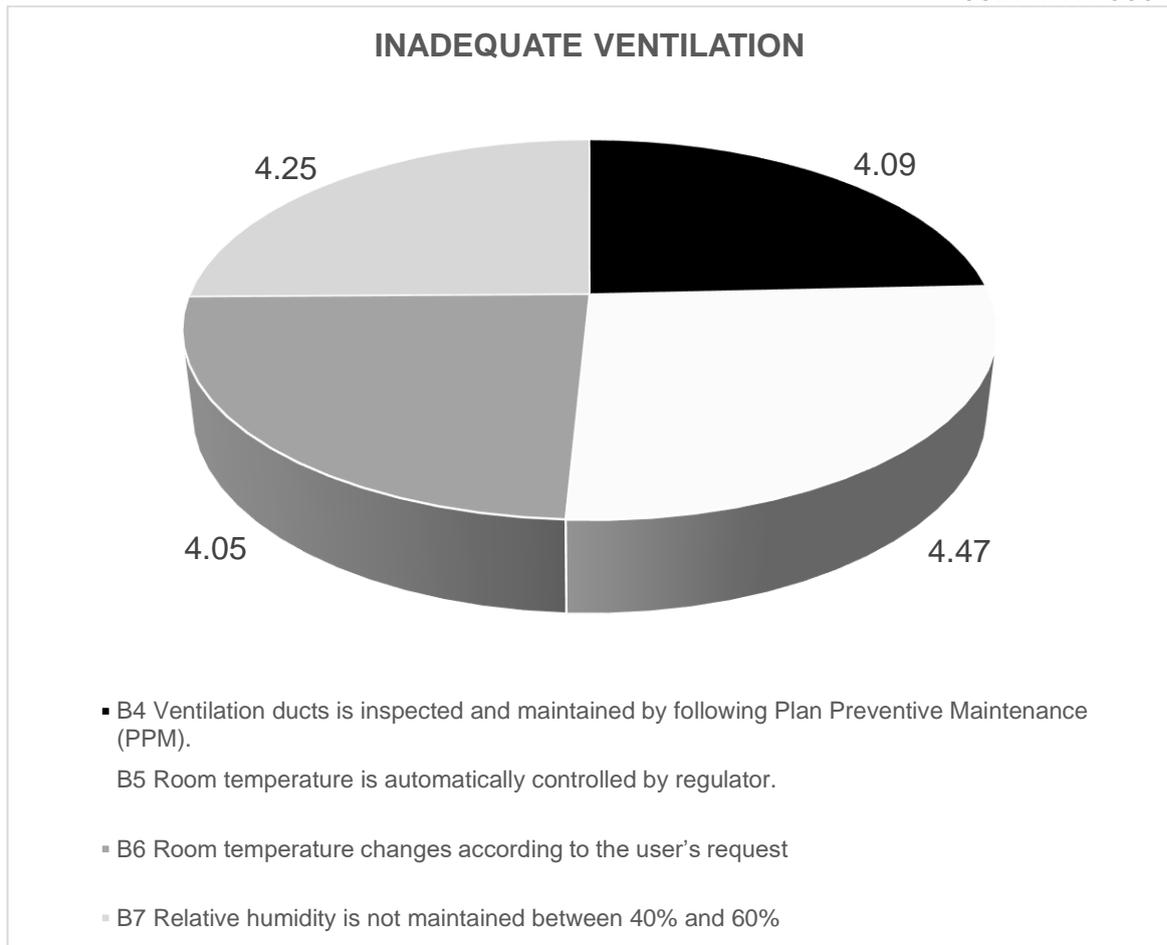
Figure 5.1.2 (b) Mean score of Inadequate Ventilation

Based on the table, the mean score is 4. 22. The highest score is 4.47 which is room temperature is automatically controlled by regulator. The higher score is 4.25 and 4.09 which are relative humidity is not maintained between 40% and 60% and ventilation ducts is inspected and maintained by following Plan Preventive Maintenance (PPM). The lowest score is 4.05 which is Room temperature changes according to the user's request.

INDOOR CONTAMINANTS
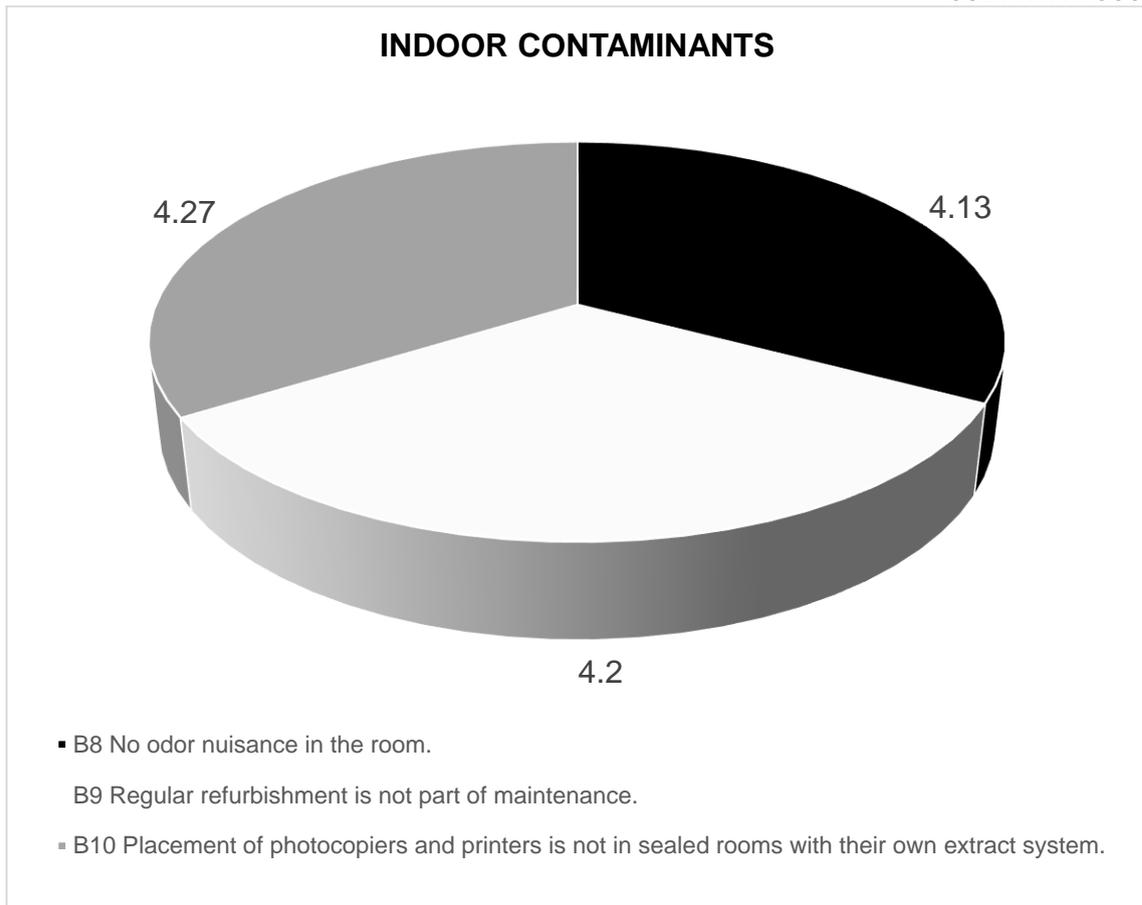
Figure 5.1.2 (c) Mean score of Indoor Contaminant

Based on the table, the mean score is 4.20. The highest score is 4.27 which is placement of photocopiers and printers is not in sealed rooms with their own extract system. The higher score is 4.2 which is Regular refurbishment is not part of maintenance. The lowest score is 4.13 which is no odor nuisance in the room.

LIGHTING

4.13

4.25

▪ B11 The maintenance team ensures that all lighting in the room function well.

▪ B12 The room does not have enough natural lighting.
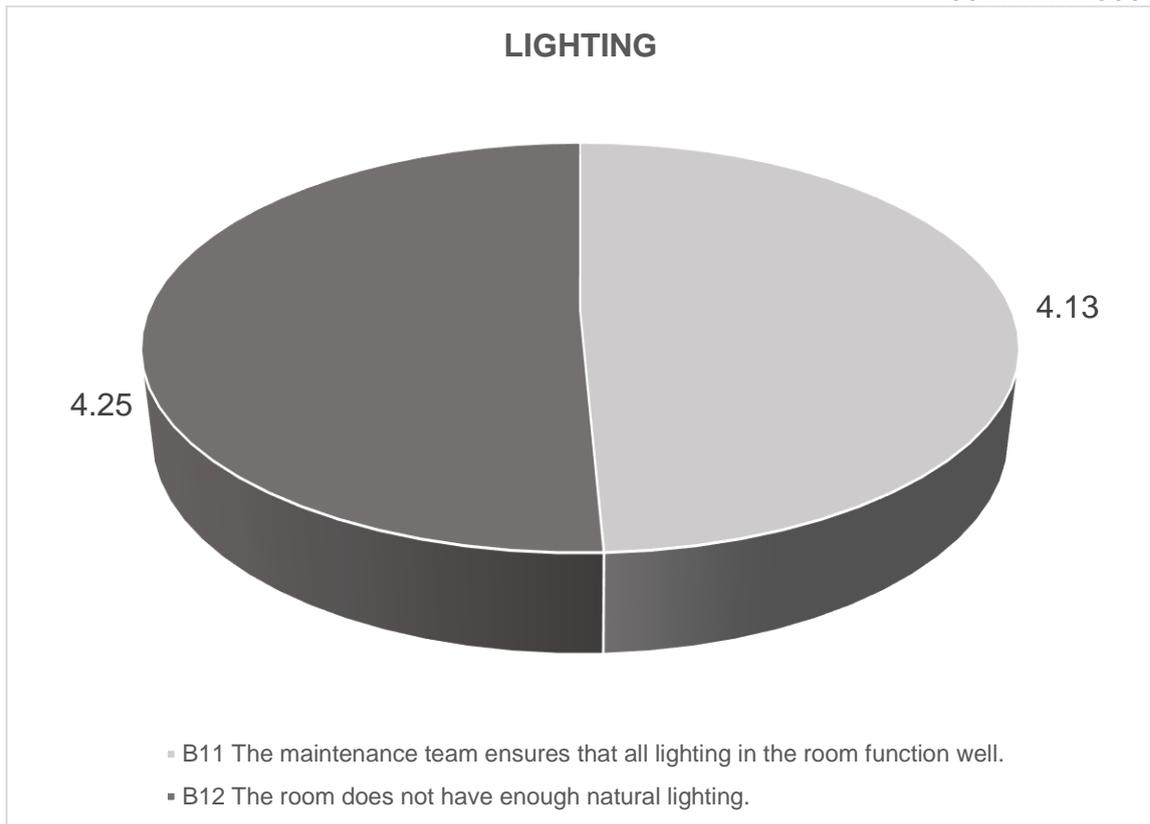
Figure 5.1.2 (d) Mean score of Lighting

Based on the table, the mean score is 4.19. The highest score is 4.25 which is the room does not have enough natural lighting. The lowest score is 4.13 which is the maintenance team ensures that all lighting in the room function well.

Table 5.1.2 (b) Percentage Score for Factor That Affects Sick Building Syndrome in The Building

Factors affects SBS	Item	Question	LIKERT SCALE SCORE PERCENTAGE (%)				
			Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Maintenance performance	B1	The maintenance team ensures that the room is cleaned after maintenance work done.	9.1	3.6	1.8	43.6	41.8
	B2	The maintenance team ensures all dirt and dust are removed during the maintenance process.	10.9	14.5	1.8	30.9	41.8
	B3	The maintenance team does not ensure the air condition meets the standard of decibel level (dB).	7.3	3.6	5.5	40.0	43.6
Inadequate ventilation	B4	Ventilation ducts is inspected and maintained by following Plan Preventive Maintenance (PPM).	7.3	12.7	3.6	29.1	47.3
	B5	Room temperature is automatically controlled by regulator.	5.5	1.8	1.8	45.5	45.5
	B6	Room temperature changes according to the user's request	7.3	12.7	7.3	38.2	34.5

	B7	Relative humidity is not maintained between 40% and 60%	3.6	0.0	20.0	25.5	50.9
Indoor contaminant	**B8**	No odor nuisance in the room.	7.3	3.6	3.6	40.0	45.5
	B9	Regular refurbishment is not part of maintenance.	7.3	1.8	3.6	38.2	49.1
	B10	Placement of photocopiers and printers is not in sealed rooms with their own extract system.	5.5	0.0	3.6	43.6	47.3
Lighting	**B11**	The maintenance team ensures that all lighting in the room function well.	3.6	5.5	1.8	52.7	36.4
	B12	The room does not have enough natural lighting.	1.8	1.8	1.8	58.2	36.4

B1: The maintenance team ensures that the room is cleaned after maintenance work done.
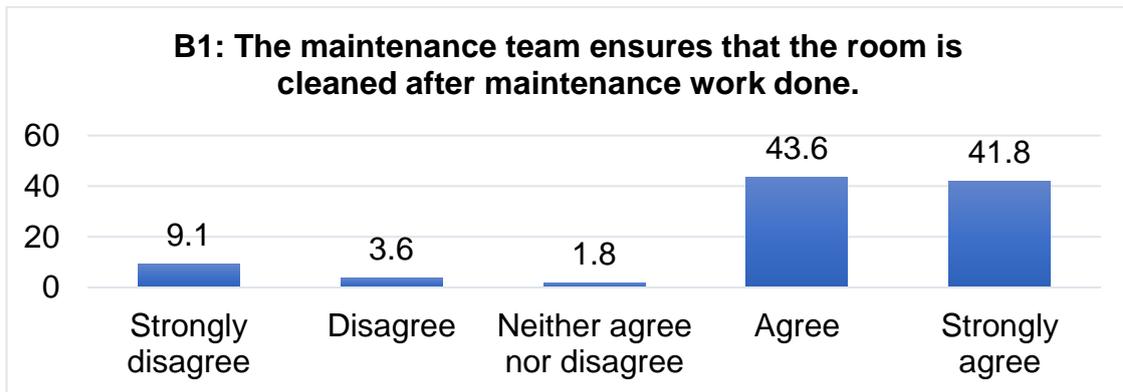
Figure 5.1.2 (e) Percentage of maintenance performance B1

From the figure above, the respondents were asked if the maintenance team ensures that the room is cleaned after maintenance work done. As many as 43.6% gave an agreeable response and 41.8% respondents strongly agreed that the room is cleaned after maintenance work done. However, 9.1% of respondents are strongly disagreeable response and 3.6% of respondents disagreed with the statement given. Besides, 1.8% of respondent are neither agree nor disagree with the statement.

B2: The maintenance team ensures all dirt and dust are removed during the maintenance process.
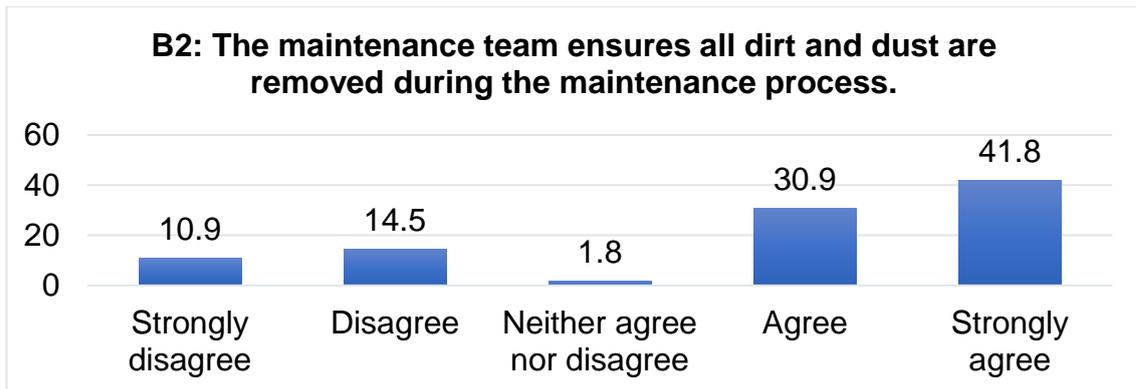
Figure 5.1.2 (f) Percentage of maintenance performance B2

From the figure above, the respondents were asked if the maintenance team ensures all dirt and dust are removed during the maintenance process. As many as 41.8% gave a strongly agreeable response and 30.9% respondents agreed that all dirt and dust are removed during maintenance process. However, 14.5% of respondents are disagreeable response and 10.9% of respondents strongly disagreed with the statement given. Besides, 1.8% of respondent are neither agree nor disagree with the statement.

**B3: The maintenance team does not ensure the air condition meets the standard of decibel level (dB).**
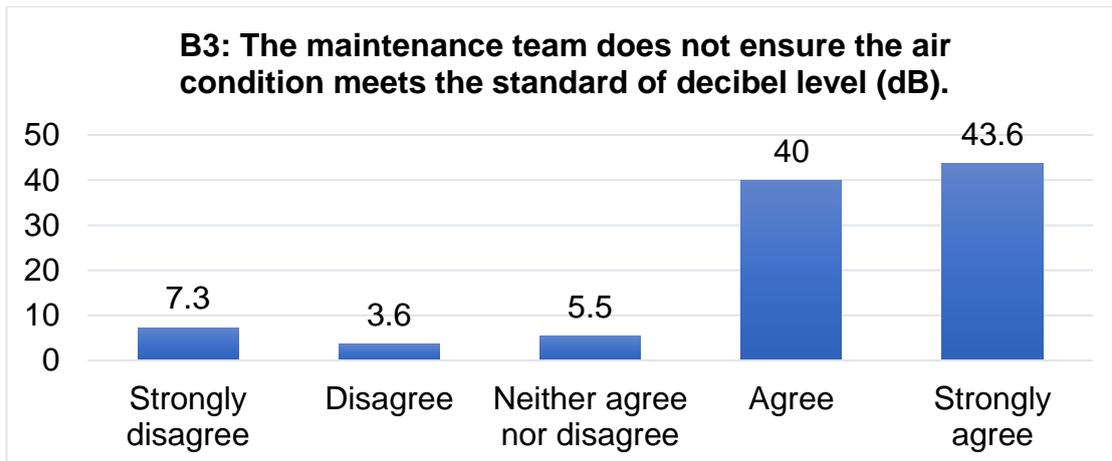
Figure 5.1.2 (g) Percentage of maintenance performance B3

From the figure above, the respondents were asked if the maintenance team does not ensure the air condition meets the standard of decibel level (dB). As many as 43.6% gave a strongly agreeable response and 40% respondents agreed that the team did not check for the noise. However, 7.3% of respondents are strongly disagreeable response and 3.6% of respondents disagreed with the statement given. Besides, 5.5% of respondent are neither agree nor disagree with the statement.

B4: Ventilation ducts is inspected and maintained by following Plan Preventive Maintenance (PPM).

Figure 5.1.2 (h) Percentage of inadequate ventilation B4

From the figure above, the respondents were asked if ventilation ducts are inspected and maintained by following Plan Preventive Maintenance (PPM). As many as 47.3% gave a strongly agreeable response and 29.1% respondents agreed that the ventilation ducts are inspected and maintained following the PPM. However, 12.7% of respondents are disagreeable response and 7.3% of respondents strongly disagreed with the statement given. Besides, 3.6% of respondent are neither agree nor disagree with the statement.

B5: Room temperature is automatically controlled by regulator.
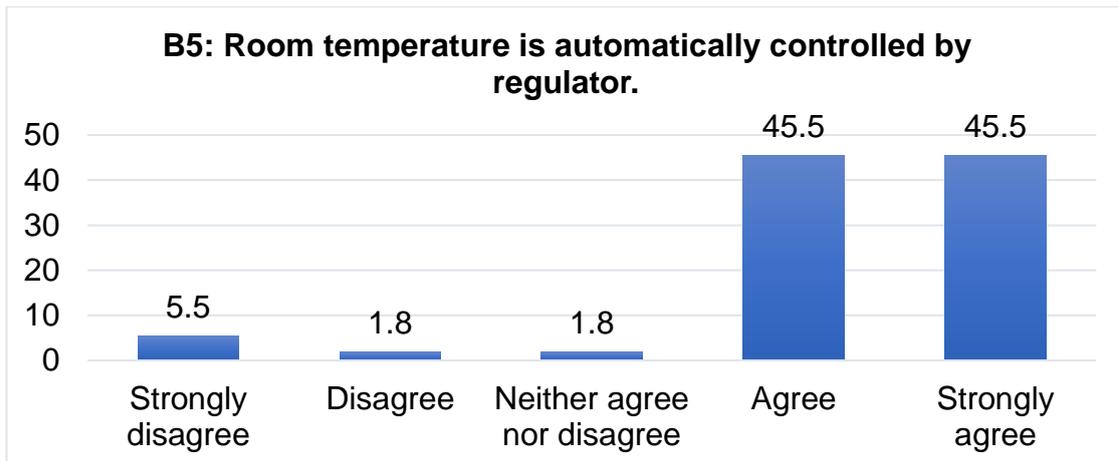
Figure 5.1.2 (i) Percentage of inadequate ventilation B5

From the figure above, the respondents were asked if the room temperature is automatically controlled by regulator. As many as 45.5% gave a strongly agreeable and agreeable response that the room temperature is automatically controlled by regulator. However, 5.5% of respondents are strongly disagreeable response and 1.8% of respondents disagreed with the statement given. Besides, 1.8% of respondent are neither agree nor disagree with the statement.
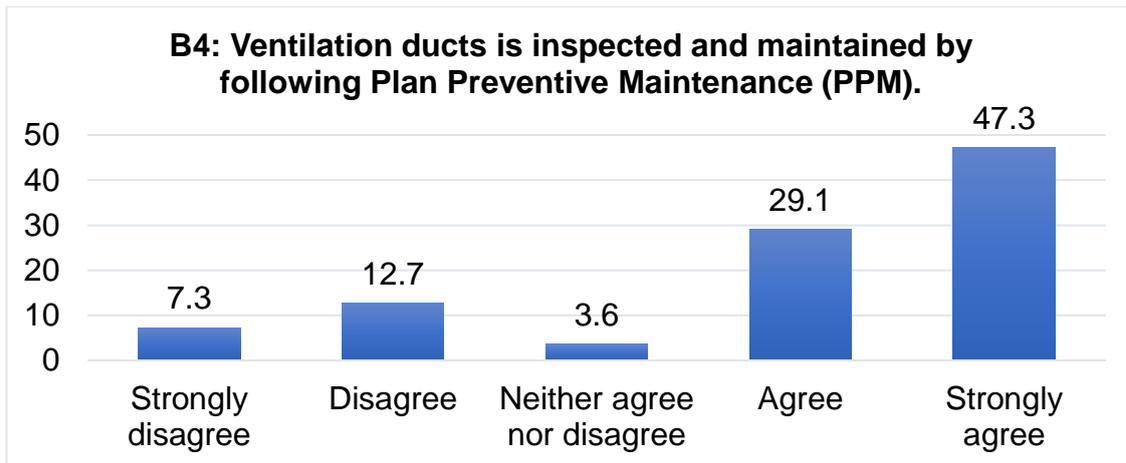
B6: Room temperature changes according to the user's request
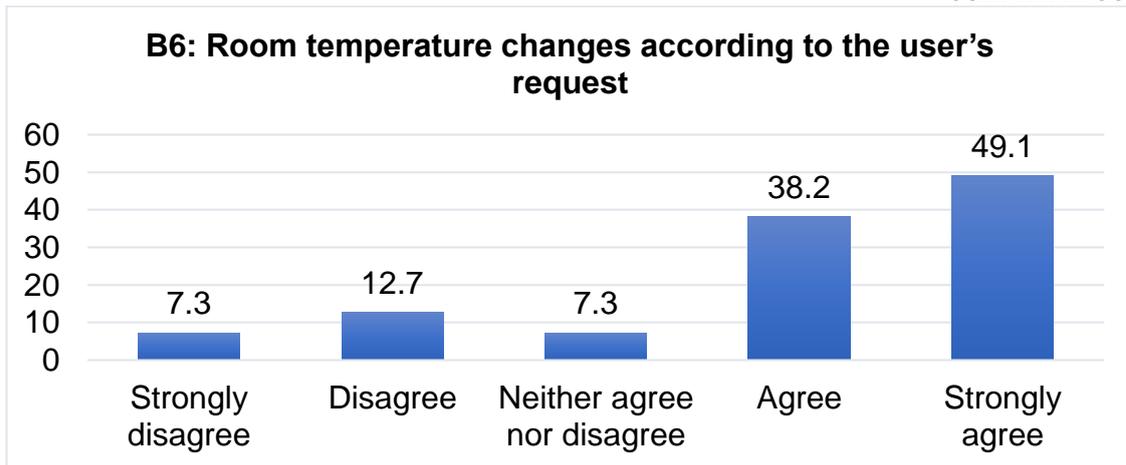
Figure 5.1.2 (j) Percentage of inadequate ventilation B6

From the figure above, the respondents were asked if room temperature changes according to the user's request. As many as 49.1% gave a strongly agreeable response and 38.2% respondents agreed that room temperature is changed due to the request of user. However, 12.7% of respondents are disagreeable response and 7.3% of respondents strongly disagreed with the statement given. Besides, 7.3% of respondent are neither agree nor disagree with the statement.

B7: Relative humidity is not maintained between 40% and 60%
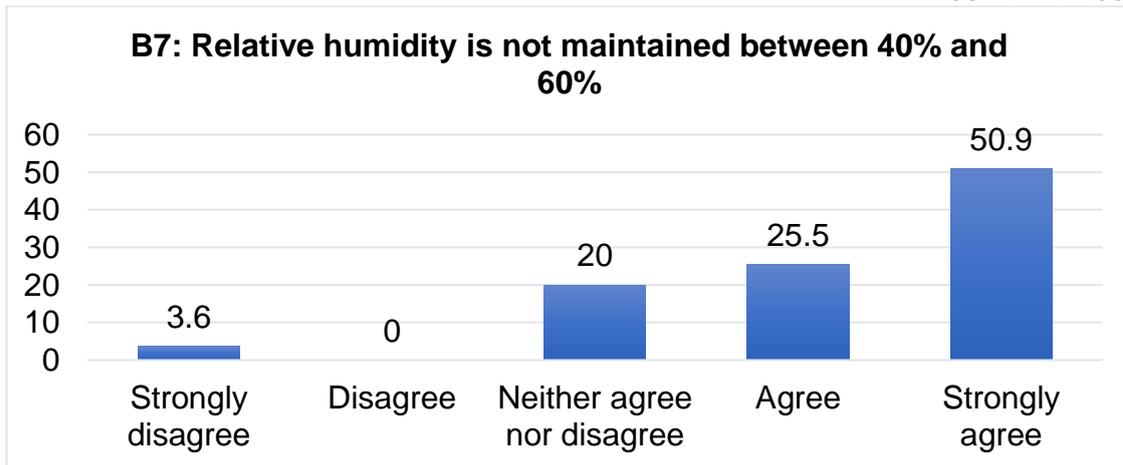
Figure 5.1.2 (k) Percentage of inadequate ventilation B7

From the figure above, the respondents were asked if relative humidity is not maintained between 40% and 60%. As many as 50.9% gave a strongly agreeable response and 25.5% respondents agreed that the relative humidity is not maintained between 40% to 60%. Besides, 20% of respondent are neither agree nor disagree with the statement. However, 3.6% of respondents are strongly disagreeable response with the statement given.

Figure 5.1.2 (l) Percentage of indoor contaminants B8

From the figure above, the respondents were asked if no odor nuisance in the room. As many as 45.5% gave a strongly agreeable response and 40% respondents agreed that there is no odor nuisance in the room. However, 7.3% of respondents are strongly disagreeable response and 3.6% of respondents disagreed with the statement given. Besides, 3.6% of respondent are neither agree nor disagree with the statement.

B9: Regular refurbishment is not part of maintenance.
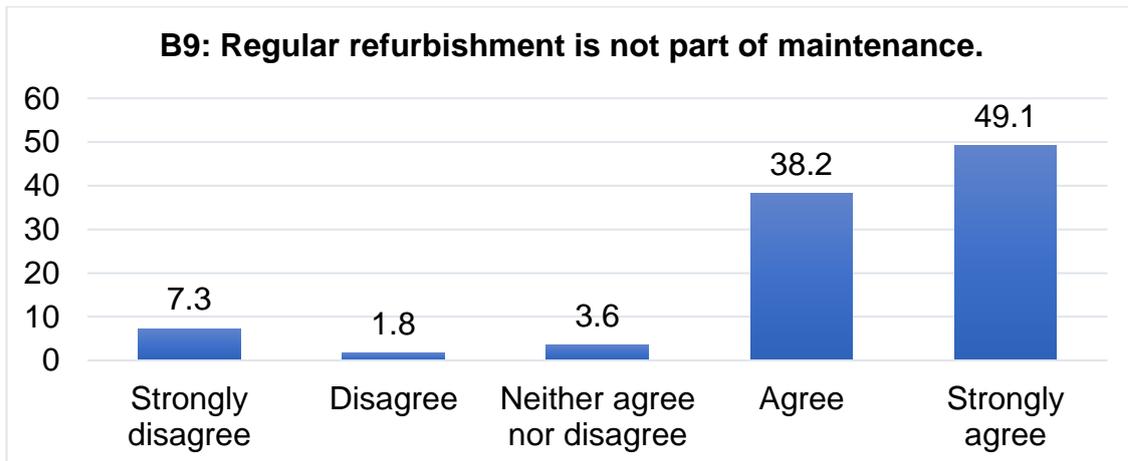
Figure 5.1.2 (m) Percentage of indoor contaminants B9

From the figure above, the respondents were asked if regular refurbishment is not part of maintenance. As many as 49.1% gave a strongly agreeable response and 38.2% respondents agreed that regular refurbishment is not part of maintenance. However, 7.3% of respondents are strongly disagreeable response and 1.8% of respondents disagreed with the statement given. Besides, 3.6% of respondent are neither agree nor disagree with the statement.
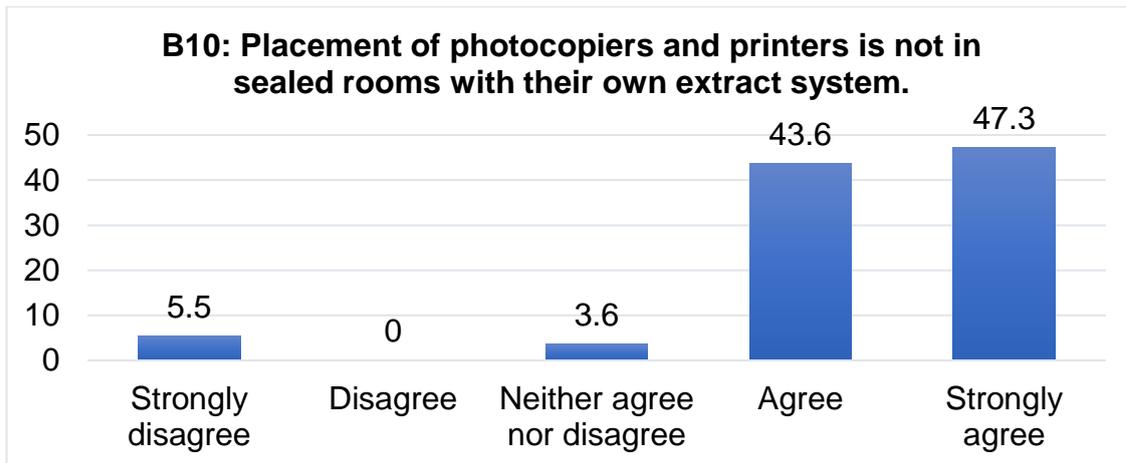
Figure 5.1.2 (n) Percentage of indoor contaminants B10

From the figure above, the respondents were asked if placement of photocopiers and printers is not in sealed rooms with their own extract system. As many as 47.3% gave a strongly agreeable response and 43.6% respondents agreed that there is no specific room for photocopier machines. However, 5.5% of respondents are strongly disagreed with the statement given. Besides, 3.6% of respondent are neither agree nor disagree with the statement.

B11: The maintenance team ensures that all lighting in the room function well.
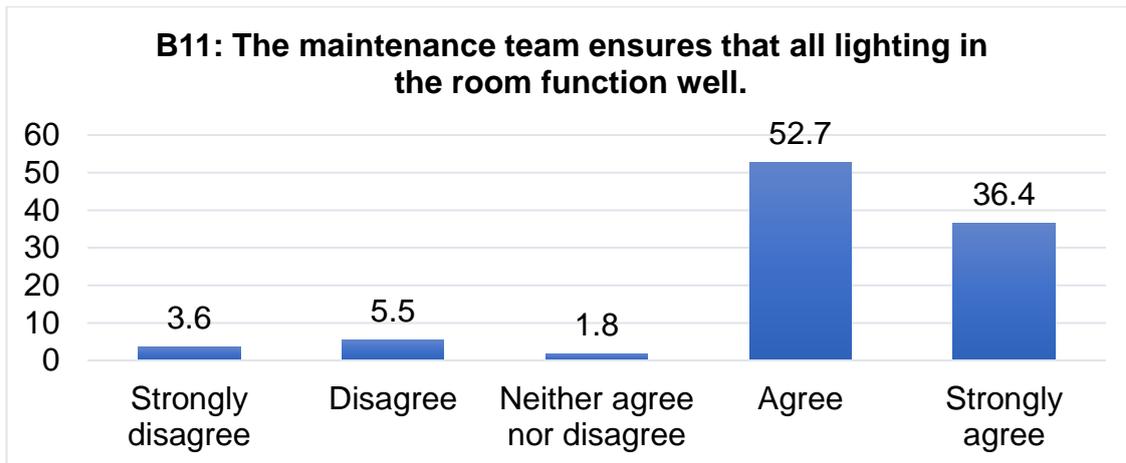
Figure 5.1.2 (o) Percentage of lighting B11

From the figure above, the respondents were asked if the maintenance team ensures that all lighting in the room function well. As many as 52.7% gave an agreeable response and 36.4% respondents strongly agreed that the maintenance teams ensures that all lighting in the room function well. However, 5.5% of respondents are strongly disagreeable response and 3.6% of respondents strongly disagreed with the statement given. Besides, 1.8% of respondent are neither agree nor disagree with the statement.

B12: The room does not have enough natural lighting.
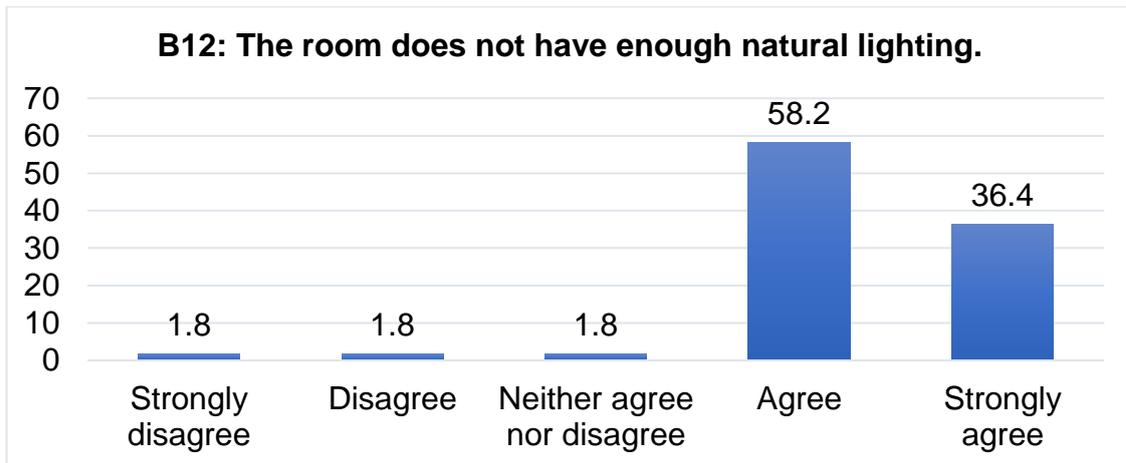
Figure 5.1.2 (p) Percentage of lighting B12

From the figure above, the respondents were asked if the room does not have enough natural lighting. As many as 58.2% gave an agreeable response and 40% respondents strongly agreed that there is not enough natural light in the room. However, 1.8% of respondents are strongly disagreed and disagreed with the statement given. Besides, 1.8% of respondent are neither agree nor disagree with the statement.

5.1.3 Data Analysis for Objective 2

This section aims to analyze the level of Sick Building Syndrome in the current condition. The data obtained were quantitative and the data were analyzed using SPSS software. The instrument used to obtain the data was to disseminate survey forms to selected respondents. The findings obtained from this first objective are also used as a support tool to get more specific answers for the second objective.

Symptoms	Item	Symptoms	Civil		Mechanical		Electrical	
			N = 18		N = 19		N = 18	
			n	%	n	%	n	%
General symptom	C1	Headache	0	0	0	0	0	0
	C2	Tiredness	1	6	1	5	0	0
	C3	Feel like having flu	8	44	2	11	3	17
Mucosal symptom	C4	Irritating eyes	0	0	0	0	0	0
	C5	Runny nose	0	0	0	0	0	9
	C6	Nose block	1	6	0	0	0	0
	C7	Sore throat	4	22	5	26	2	11
Skin symptom	C8	Rashes on skin	0	0	0	0	0	0
	C9	Itchy on skin	0	0	0	0	0	0

Table 5.1.3 (a) Score Mean for The Level of Sick Building Syndrome in Current Condition

For the second objective, the researcher analyses the level of Sick Building Syndrome through the symptoms that user face when they are in the building. In the assessment of the SBS, the respondent may have a general, mucosal, or skin symptom. The person is considered as having SBS when they reported the onset of two or more SBS symptoms at least once or twice weekly in the last for week. Person with SBS also demonstrated the improvement of the symptoms after left the buildings.

The prevalence of SBS symptoms were shown in Table 5.1.3. Respondents from Civil department faces feel like having flu, followed with sore throat, tiredness, and nose block with percentage, 44%, 22% and both 6% respectively. Meanwhile respondents from Mechanical department faces sore throat, followed by feel like having flu and tiredness with percentage 26%, 11% and 5% respectively. Therefore, from Electrical department faces feel like having flu, sore throat, and runny nose with percentage 17%, 11% and 9% respectively.

There are similar symptoms that respondent faced. The highest symptoms that respondents from three departments faced is general symptoms which is feel like having flu with the percentage 23.6% and followed by sore throat with percentage 20%. Therefore, respondents face tiredness and nose block with percentage 3.6% and 1.8% respectively.

Table 5.1.3 (b) Percentage Score for The Level of Sick Building Syndrome in The Building

Type of Symptoms	Item	Symptoms	LIKERT SCALE SCORE PERCENTAGE (%)				
			Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
General symptom	C1	Headache	63.6	29.1	4.0	0.0	0.0
	C2	Tiredness	60.0	29.1	7.3	3.6	0.0
	C3	Feel like having flu	43.6	21.8	10.9	21.8	1.8
Mucosal symptom	C4	Irritating eyes	60.0	29.1	10.9	0.0	0.0
	C5	Runny nose	60.0	27.3	12.7	0.0	0.0
	C6	Nose block	56.4	30.9	10.9	0.0	0.0
	C7	Sore throat	36.4	25.5	16.4	21.8	0.0
Skin symptom	C8	Rashes on skin	67.3	23.6	9.1	0.0	0.0
	C9	Itchy on skin	67.3	23.6	9.1	0.0	0.0
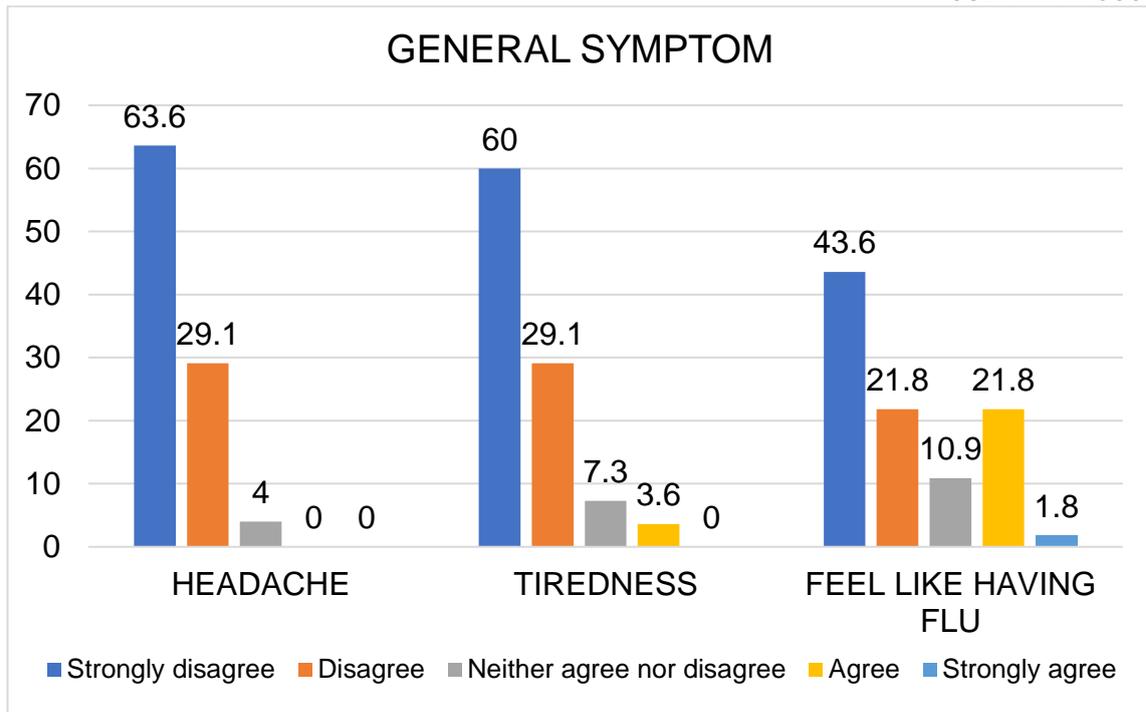
Figure 5.1.3 (a) Percentage of General symptoms

From the figure above, in general symptom there are three (3) symptoms which are headache, tiredness and feel like having flu symptom.

For the headache symptom, the mean score is 1.44. The highest Likert scale percentage of 63.6% indicates that respondents strongly disagree that they face headache when they at least once or twice weekly in the last for week and the improve the symptoms after left the buildings. While 29.1% of respondents disagreed that they face the symptom and 4% of respondents neither agree nor strongly agree with the symptom.

For the tiredness symptom, the mean score is 1.55. The highest Likert scale percentage of 60% indicates that respondents strongly disagree that they face tiredness when they at least once or twice weekly in the last for week and the improve the symptoms after left the buildings. While 29.1% of respondents disagreed that they face the symptom and 7.3% of respondents neither agree nor strongly agree with the symptom. However, there are 3.6% of respondents face the tiredness symptom when they are in the building.

For the feel like having a flu symptom, the mean score is 2.16. The highest Likert scale percentage of 43.6% indicates that respondents strongly disagree that they face feel like having flu when they at least once or twice weekly in the last for week and the improve the symptoms after left the buildings. While 21.8% of respondents disagreed and agreed that they face the feel like having flu symptom. Besides, 10.9% of respondents of neither agree nor strongly agree with the symptom. However, there are 1.8% of respondents strongly agree that they face the symptom when they are in the building.
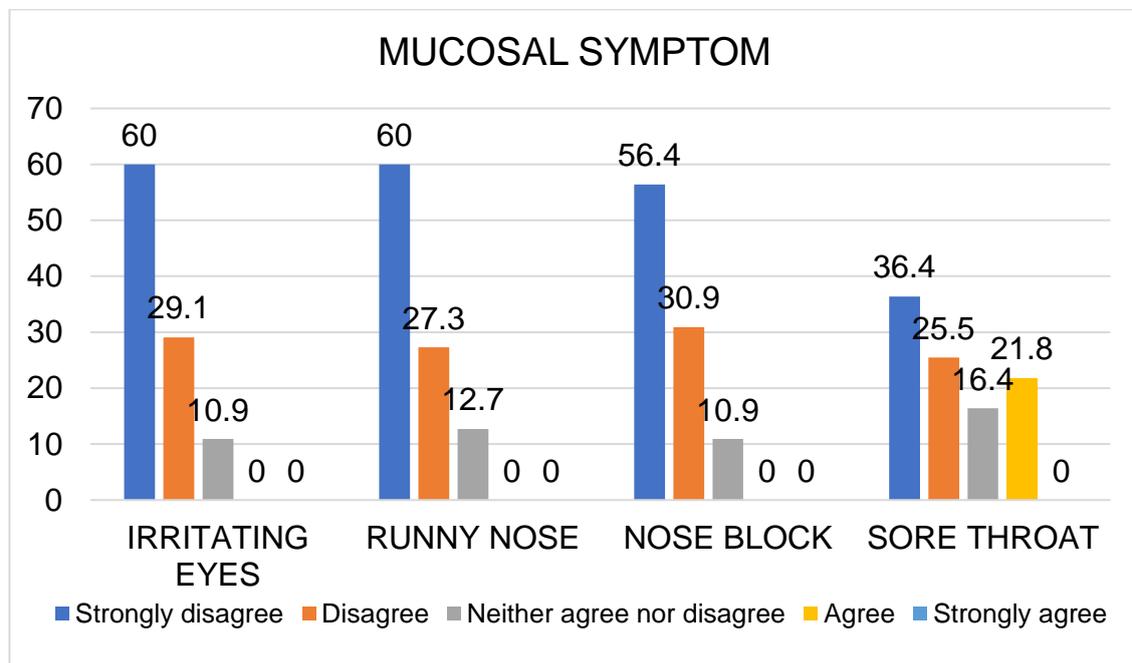
Figure 5.1.3 (b) Percentage of Mucosal symptoms

From the figure above, in mucosal symptom there are four (4) symptoms which are irritating eyes, runny nose, nose block and sore throat symptom.

For the irritating eyes symptom, the mean score is 1.51. The highest Likert scale percentage of 60% indicates that respondents strongly disagree that they face irritating eyes when they at least once or twice weekly in the last for week and the improve the symptoms after left the buildings. While 29.1% of respondents disagreed that they face the symptom and 10.9% of respondents neither agree nor strongly agree with the symptom.

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For the runny nose symptom, the mean score is 1.53. The highest Likert scale percentage of 60% indicates that respondents strongly disagree that they face runny nose when they at least once or twice weekly in the last for week and the improve the symptoms after left the buildings. While 27.3% of respondents disagreed that they face the symptom and 12.7% of respondents neither agree nor strongly agree with the symptom.

For the nose block symptom, the mean score is 1.58. The highest Likert scale percentage of 56.4% indicates that respondents strongly disagree that they face nose block when they at least once or twice weekly in the last for week and the improve the symptoms after left the buildings. While 30.9% of respondents disagreed that they face the symptom and 10.9% of respondents neither agree nor strongly agree with the symptom.

For the sore throat symptom, the mean score is 2.16. The highest Likert scale percentage of 36.4% indicates that respondents strongly disagree that they face feel sore throat when they at least once or twice weekly in the last for week and the improve the symptoms after left the buildings. While 25.5% of respondents disagreed that they face the feel like having flu symptom and the other 16.4% of respondents of neither agree nor strongly agree with the symptom. However, there are 21.8% of respondents agreed that they face the symptom when they are in the building.
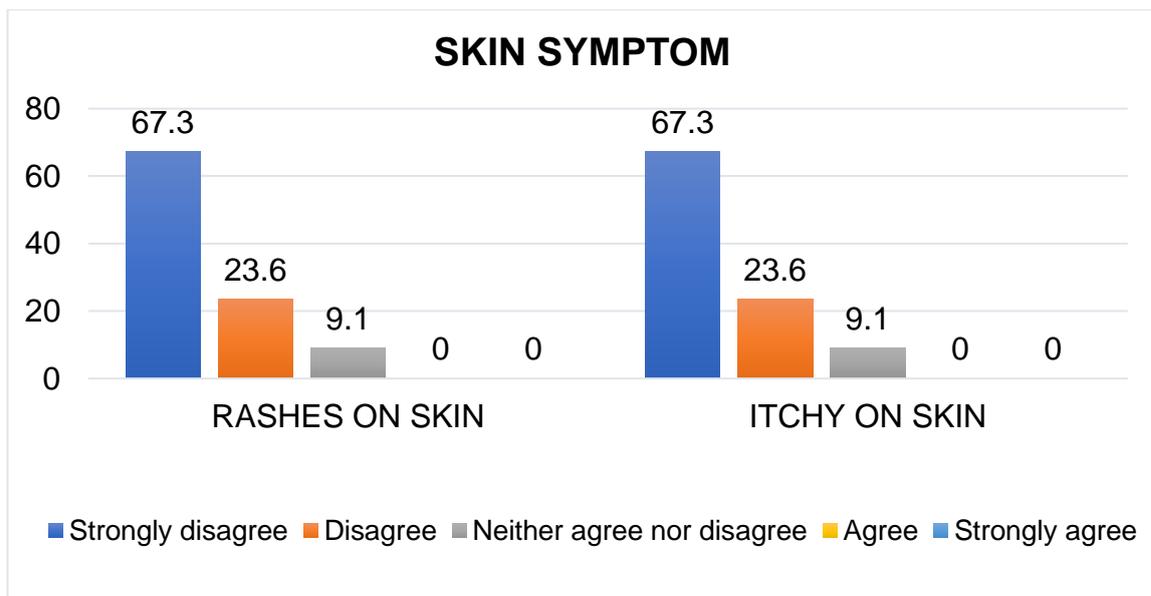
**SKIN SYMPTOM**

Figure 5.1.3 (c) Percentage of Skin symptoms

From the figure above, in skin symptom there are two (2) symptoms which are rashes on skin and itchy on skin symptom.

For the rashes on skin symptom, the mean score is 1.42. The highest Likert scale percentage of 67.3% indicates that respondents strongly disagree that they rashes on skin when they at least once or twice weekly in the last for week and the improve the symptoms after left the buildings. While 23.6% of respondents disagreed that they face the symptom and 9.1% of respondents neither agree nor strongly agree with the symptom.

For the itchy on skin symptom, the mean score is 1.42. The highest Likert scale percentage of 67.3% indicates that respondents strongly disagree that they face itchy on skin when they at least once or twice weekly in the last for week and the improve the symptoms after left the buildings. While 23.6% of respondents disagreed that they face the symptom and 9.1% of respondents neither agree nor strongly agree with the symptom.

5.2   Condition Survey

This section aims to propose possible solution in reducing Sick Building Syndrome in the building which achieving the third objective. The content analysis approach used to accomplish the third objective using the results of the analysis described in the conclusions of the first and second objective studies.

The data obtained were quantitative and the data were analyses using SPSS software. The instrument used to obtain the data was to disseminate survey forms to selected respondents.

The findings for this section are made to propose possible solution in reducing Sick Building Syndrome in the building. The data is gained from the survey condition in selected part of building.

5.2.1   Result of Indoor Environmental Parameter Measurement

This section presents the results obtained from the measurement of the indoor environment in the Kuantan Court Complex, at selected points for study.

5.2.1.1 General condition

The researcher inspected the selected point on the building to check the general condition of the point. The selected points are included hallway, basement car park, *Jabatan Alam Sekitar* offices and the magistrate court.

Selected point	Condition
Hallway	i. There is a hairline crack and mold on the wall

Figure 5.2.1.1 (a) The Hairline Crack

Figure 5.2.1.1 (b) The mold

Basement Car Park	i.	The basement is gloomy due to less occupants and lots of parking available
	ii.	The paint on the walls has faded and there is fungus

Figure 5.2.1.1 (c) The gloomy basement

Figure 5.2.1.1 (d) The mold and paint faded

Jabatan	i.	The air ventilation has dirt and dust
Alam	ii.	There is less natural lighting in the room due to there is no window around the space
Sekitar	iii.	The ceiling is missing
	iv.	The photocopier machines is placed on the corner of the room

Figure 5.2.1.1 (e) The condition of the space

Figure 5.2.1.1 (f) The ceiling has a hole

Figure 5.2.1.1 (g) The photocopier machines space

Magistrate Court	i.	The condition in this space is good
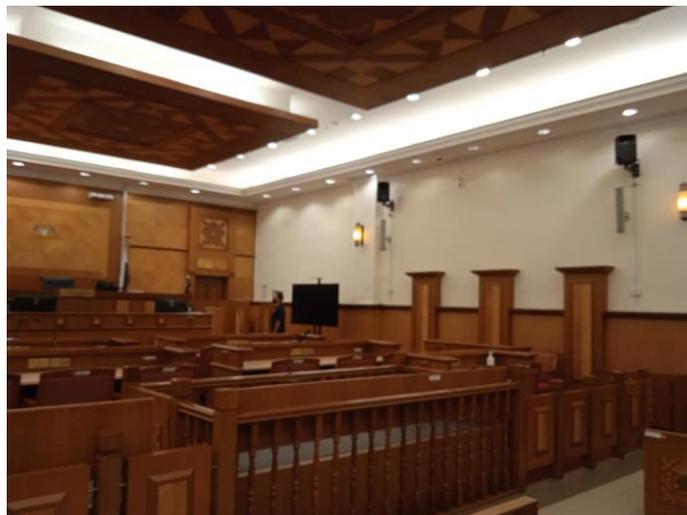
Figure 5.2.1.1 (h) The condition of the court

5.2.1.2   Thermal comfort

In this survey, the researcher is measuring the air temperature and the relative humidity of the selected room. This survey is conducted with a mechanical technician to ensure the survey is not disturbing the other user. This survey was conducted for two days to obtain data finding. From the table below, the average means of temperature is 24.1°c, the relative humidity is 67.7% for the first day while for the second day, the average mean of temperature is 23.8°c, the relative humidity is 67.5%.

Table 5.2.1.2 the measurement of air temperature and the relative humidity

Day	1		2	
Measure (mean)	Temperature (°c)	Relative Humidity (%RH)	Temperature (°c)	Relative Humidity (%RH)
First floor				
Jabatan Alam Sekitar (1)	24.4	80.7	23.8	80.5
Jabatan Alam Sekitar (2)	24.6	79.7	23.9	80.1
Second floor				
Mahkamah Majestret (1)	23.7	54.1	23.4	53.7
Mahkamah Majestret (2)	24.0	56.1	24.0	55.8

The survey is conducted to two (2) floors with selected point included *Jabatan Alam Sekitar* 1, *Jabatan Alam Sekitar* 2, *Mahkamah Majestret* 1 and *Mahkamah Majestret* 2 for two (2) days.

At the first day, the survey is conducted on the first floor first. From the table above, the temperature in *Jabatan Alam Sekitar* 1 is 24.4°c with the relative humidity 80.7%. While in *Jabatan Alam Sekitar* 2, the temperature is 24.6°c with the relative humidity 79.7%. Next, the survey is carried out to the second floor. The temperatue of *Mahkamah Majestret* 1 is 23.7°c with 54.1% of relative humidity. While in *Mahkamah Majestret* 2, the air temperature is 24°c with 56.1% of relative humidity.

For a second day, the survey is started with the first floor. From the table above, the temperature in *Jabatan Alam Sekitar* 1 is 23.8°c with the relative humidity 80.5%. While in *Jabatan Alam Sekitar* 2, the temperature is 23.9°c with the relative humidity 80.1%. Next, in the second floor, the temperatue of *Mahkamah Majestret* 1 is 23.4°c with 53.7% of relative humidity. While in *Mahkamah Majestret* 2, the air temperature is 24°c with 55.8% of relative humidity.

5.2.1.3 Lighting Quality

In this survey, the researcher is measuring the light level of the selected room. This survey is conducted with an electrical technician to ensure the survey is not disturbing the other user. This survey was conducted for two days to obtain data finding. From the table below, the average means of the light level is 267 lux for the first day while for the second day, the average mean of the light level is 257 lux.

Table 5.2.1.3 the measurement of air temperature and the relative humidity

Day	1	2
Measure (mean)	**Light level (lux)**	**Light level (lux)**
First floor		
Jabatan Alam Sekitar (1)	287	265
Jabatan Alam Sekitar (2)	279	268
Second floor		
Mahkamah Majestret (1)	250	244
Mahkamah Majestret (2)	253	250

The survey is conducted to two (2) floors with selected point included *Jabatan Alam Sekitar* 1, *Jabatan Alam Sekitar* 2, *Mahkamah Majestret* 1 and *Mahkamah Majestret* 2 for two (2) days.

At the first day, the survey is conducted on the first floor first. From the table above, the light level in *Jabatan Alam Sekitar* 1 is 287 lux while in *Jabatan Alam Sekitar* 2, the light level is 279 lux. Next, the survey is carried out

to the second floor. The light level of *Mahkamah Majestret* 1 is 250 lux while in *Mahkamah Majestret* 2, the light level is 253 lux.

For a second day, the survey is started with the first floor. From the table above, the light level in *Jabatan Alam Sekitar* 1 is 265 lux while in *Jabatan Alam Sekitar* 2, the light level is 268 lux. Next, in the second floor, the light level of *Mahkamah Majestret* 1 is 244 lux while in *Mahkamah Majestret* 2, the light level is 250 lux.

5.3   Summary

In conclusion, it was clearly explained and interpreted via the questionnaire method, based on the study findings obtained by the researcher. Using SPSS, all data is stored and analysed. Tables and diagrams made using Microsoft Word and Microsoft Excel are used to explain the findings of this analysis. Estimates, percentages and comparisons of mean scores were made as standard. From the findings, researcher able to find the answer for all three research questions and objectives of the study.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1   Introduction

Based on data analysis in the previous chapter, researcher will discuss the findings and draw conclusion related to the study that had been conducted. This chapter will focus on translating limitation, conclusions, implication, and recommendation. Furthermore, researcher also include some suggestion to reduce the Sick Building Syndrome in the building.

6.2   Summary Finding for Research Question

6.2.1   Research Question One

The first question for this study is to identify the factors that affect Sick Building Syndrome in the building. Researcher has listed causes that affect the building and asked respondents to mark in the section involved. Through the answers that have been received, the researcher can find out what causes are occur in the building. However, after reviewing the findings from the questionnaire, for the researcher, there are some possible solutions that can be done to increase the time from Sick Building Syndrome occur.

6.2.2   Research Question Two

To answer second research question, the level of Sick Building Syndrome in the current condition, the findings is gained from the questionnaire distributed to the respective respondents. The person is considered as having SBS when they reported the onset of two or more SBS symptoms at least once or twice weekly in the last for week. Person with SBS also demonstrated the improvement of the symptoms after left the buildings. Respondents agree that they face a few symptoms and when the left the building, the symptoms slowly released the symptoms. Thus, the Sick Building Syndrome is slightly occurred

in the building and need to be observed and take an action to reduce the Sick Building Syndrome.

6.2.3 Research Question Three

The findings for third research question for this study indicated ideas to propose the possible solution that able to reduce the Sick building Syndrome in the building and increase the time of Sick Building Syndrome to perfectly occur. Research question three is how to recommend the best solution in reducing Sick Building Syndrome, whereby researcher needs to find out is there any applicable method to improve the issues. Conduct the condition survey to analyze the factor that affect Sick Building Syndrome in the building.

6.3 Implication of Research

From the findings, researcher has come out with the analysis of factor affects Sick Building Syndrome in the building and the level of Sick Building Syndrome in the current condition. The Facility management team should be willing to implement the suitable solution as suggested in this study.

6.4 Limitation of Research

This study could not be conducted on time due to the change of place. Besides that, during the data collection process, researcher and worldwide citizen facing a global pandemic, Covid-19. The pandemic has cause global issues such as Movement Control Order (MCO) and lockdown as restricted the government. MCO has been causing difficulties for the researcher to gain data especially for condition survey session, whereby the respondents are reluctant to meet the researcher in person to avoid contact during the pandemic.

6.5 Recommendation And Scope for Further Study

From the results of the questionnaire and condition survey session, the researcher identified few possible solutions that is applicable to any organization in this field of Facilities Management.

6.5.1 Recommendation

i.   Organization needs to have a proper monitoring and assessment should not be left out to maintain the good shape of the building and keep occupants stay healthy and comfortable.

ii. Upgrading the air conditioning system to new technology that can improve the performance and reducing an energy consumption.

iii. Use anti-fungal paint to reduce fungus.

6.5.2 Scope for Further Study

It is recommended for the future study that the researcher can focus on Indoor Air Quality (IAQ) to draw the best result in determining the level of Sick Building Syndrome in the building and come out with the best solution in reducing Sick Building Syndrome in the building.

6.6 Summary

To be conclude, this chapter discussed the summary of the whole study from beginning to the end, discussions on the main findings, and discussions on the implications and as well recommendations that were suitable to implement in reducing Sick Building Syndrome in the building.

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APPENDICES

Appendix A: Sample of Suggested Questionnaire

A Factor That Affects Sick Building Syndrome Symptoms in the Building

I am Ayuni Ainaa a final year undergraduate from faculty of Bachelor in Facility Building Management in Politeknik Shah Alam, Selangor. I am undertaking a research for my Facilities Management Project 2. This questionnaire represents part of a research study that aims to determine the level of sick building syndrome (SBS) symptom in the IIUM Campus and to suggest the possible solution that able to reduce the Sick Building Syndrome (SBS) symptom in the Kuantan Court Complex building.

This questionnaire consists of section 1 and section 2. Please answer all the question given.

Thank you for your time.

SECTION A

Please tick (/) in the selected box

1. Gender

☐ Male

☐ Female

3. Department

☐ Civil

☐ Mechanical

☐ Electrical

☐ Others: _____

2. Age

☐ 20 – 25 years

☐ 26 – 30 years

☐ 31 – 35 years

☐ 35 Years and above

4. Working time per week

☐ 40 – 43 hours

☐ 44 – 47 hours

☐ 48 hours and above

SECTION B

Section B is the factors that affect Sick Building Syndrome (SBS) in Kuantan Court Complex building. Please tick (/) in the selected box.

EVALUATION STAGE	STRONGLY DISAGREE	DISAGREE	NOT SURE	AGREE	STRONGLY AGREE	
	1	2	3	4	5	

i.	MAINTENANCE	1	2	3	4	5
B1	The maintenance team ensures that the room is cleaned aftermaintenance work done. *Pihak penyelenggaraan memastikan bilik dalam keadaan bersihselepas kerja penyelenggaraan dilaksanakan.*					
B2	The maintenance team ensures all dirt and dust are removedduring the maintenance process. *Pihak penyelenggaraan memastikan semua kotoran dan habukdisingkirkan sewaktu proses penyelenggaraan.*					
B3	The maintenance team does not ensure the air condition meets thestandard of decibel level (dB). *Pihak penyelenggaraan tidak memastikan penyaman udara menepatistandard decibel level (dB).*					

ii.	VENTILATION IN THE BUILDING	1	2	3	4	5
B4	Ventilation ducts is inspected and maintained by following PlanPreventive Maintenance (PPM). *Saluran ventilasi diperiksa dan dipelihara dengan mengikuti PlanPreventive Maintenance (PPM).*					
B5	Room temperature is automatically controlled by regulator. *Suhu bilik dikawal secara automatik oleh pengatur*					
B6	Room temperature changes according to user request *Suhu bilik bertukar mengikut permintaan pengguna*					
B7	Relative humidity is maintained between 40% and 60% *Kelembapan relatif dikekalkan antara 40% dan 60%*					

iii.	CONTAMINANTS IN THE BUILDING	1	2	3	4	5
B8	No odor nuisance in the room. *Tiada gangguan bau di dalam ruangan tersebut.*					
B9	Regular refurbishment is not as part of maintenance. *Pengubahsuaian berkala bukan sebahagian daripada penyelenggaraan.*					
B10	Placement of photocopiers and printers is not placed in sealed rooms withtheirown extract system. *Penempatan mesin fotokopi dan pencetak tidak di tempatkan di bilik tertutup dengansistem ekstrak tersendiri.*					

iv.	LIGHTING	1	2	3	4	5
B11	The maintenance team ensures that all lighting in the roomfunction well. *Pihak penyelenggaraan memastikan keseluruhan lampu di dalamruangan berfungsi.*					
B12	The room does not have enough natural lighting. *Pencahayaan semulajdi tidak mencukupi di dalam bilik.*					

Section C

Section C is the Sick Building Syndrome (SBS) symptom that occupants face when they are in Kuantan Court Complex building.

Please tick (/) in the selected box.

i.	General Symptom	1	2	3	4	5
C1	Headache *Sakit kepala*					
C2	tiredness *Keletihan*					
C3	Feel like having flu *Seperti hendak selsama*					

ii.	Mucosal Symptom	1	2	3	4	5
C4	Irritating eyes *Iritasi pada mata*					
C5	Runny nose *Hidung meleleh*					
C6	Nose block *Hidung tersumbat*					
C7	Sore throat *Sakit tekak*					

iii.	Skin Symptom	1	2	3	4	5
C8	Rashes on skin *Ruam pada kulit*					
C9	Itchy on skin *Kegatalan pada kulit*					

iv.	Feeling	1	2	3	4	5
C10	I feel uneasy, uncomfortable and face any related symptom above in the building, but its relief soon when I am leaving the building. *Saya merasa tidak menyenangkan, tidak selesa dan menghadapi salah satu symptom berkenaan di atas sewaktu berada di dalam bangunan, tetapi ia akan hilang perlahan – lahan apabila saya keluar dari bangunan tersebut*					

Appendix B: Sample of Suggested Condition Survey form

Checklist of Building Inspection

Date of Inspection: _____

Inspected by: _____

Location: _____   Time: _____

1. General consideration

No.	General consideration	Yes	No	Remark
1.	Ensured that temperature and humidity are maintained within acceptable ranges			
2.	Ensured that no obstruction exist in supply and exhaust vents			
3.	Checked for odors			
4.	Checked for signs of mold and mildew growth			
5.	Checked for hazardous substances			
6.	Dirty or unsanitary condition			
7.	Overcrowding			

2. Ground level

No.	Consideration	Yes	No	Remark
1.	How many occupants in the work area?			
2.	How long are they in the work area?			
3.	Is the indoor temperature regulated by thermostats?			
4.	Is there discomfort due to radiant heat from warm window surfaces?			
5.	Are temperature, relative humidity and airflow rates checked regularly during working hours? Temp: RH:			
6.	Does air reach all parts of the office or there are no dead spaces?			
7.	Is the building is still being used for the purpose it was intended?			
8.	Have partitions/walls been added or removed?			

3. Potential sources of Contaminants

No.	Source of contaminants	Yes	No	Remark
1.	Are they any occupants smoking? If yes, indicate where and if no, is there any designated area?			
2.	Have detergents, pesticides or other chemicals been used in the building?			
3.	Is the building adequately clean?			
4.	Have photocopying machines, blueprint machines or other office machines			

4. Ventilation and air-conditioning

No.	General consideration	Yes	No	Remark
1.	Is there at least one supply air and exhaust air vents in every area?			
2.	Are supply air or exhaust air vents blocked in any way by partition, file or other structures that obstruct air flow			
3.	Has dust collected around the air vents			
4.	Is the air-conditioning system turned off? (During office hour / after office hour)			