A triangulation for passive design strategies in public hospital

J Muhamad¹, H Ahmad¹ and A Abd Aziz¹
¹Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA, Seri Iskandar Campus, Perak Branch, 32610 Perak, Malaysia.

Email: 53a.jmaarchitects@gmail.com

Abstract: This study touches on passive design elements used at the preparatory design stage of public hospital in Malaysia. Passive design is an aspect of sustainable architecture that needs to be understood and adopted in an environmentally sensitive architectural design. The most common problem is that the designers do not have proper guidelines for passive design to help them in designing a public hospital. Currently there is no comprehensive guidelines on passive design or sustainable architecture that may help designers. This consequently affects the increase of energy usage in hospitals. The intent of this study is to furnish evidence that the initial process of systematic design and guidance is essential in planning for a sustainable public hospital environment. In this study, the researcher uses a mixed method to obtain outcome for guideline. Through this method, a combination of qualitative and quantitative metadata to foster effective interventions to improve the quality of environmental friendly hospital design. The conclusions obtained from this study are to assist in the process of more efficient public hospital design. In addition to making these passive design guidelines as helpful in providing explanations and working to ensure that the guideline produced has credibility and meet the criteria.

1. Introduction
In social science research, there are several ways to collect and analyze data onward formalization guideline. It is included simulation methods, expert interviews, case studies and triangulation or mixed methods. Greene [5] states this data is often referred to as dialectal hearing bridging post positivist and social constructivist worldview, pragmatic perspective, and transformative perspective [4]. The production of guidelines using this mixed method has been successfully developed by the World Health Organization and National Institute For Health & Care Excellence. Therefore, it is a guide to the researcher to use the method as it has proven successful.

The combination between the questionnaire (quantitative) and the interview (qualitative) session was aimed to gain the impact value of the implementation of building designs, especially hospitals to consumers. The use of this method also has three sequences to follow: a) convergence, (b) sequential explanation, and also (c) sequence of exploration [1]. It encompasses the characteristics of data collection, analysis, interpretation and verification of research. Therefore, the combination will provide a more in-depth understanding of the research’s problems.

2. Methodology
In research design, the use of mixed methods as an implication to the impact investigated by researchers. The findings that will be conducted in select hospitals in Malaysia are dependent on the limited area of the patient’s ward area. Qualitative interpretation study with exploration of users using the hospital environment. The start of the study is based on the topic selection as well as the paradigm that comes from the theoretical framework and methodology which then understand the impact of the factors investigated and the structure of variables [6].
In data collection, interviews with expert panels are one of the methods in qualitative. The Interview is an active interaction between two or more people leading to negotiation decisions and based on the context and topic chosen. According to Yin [15], bridging is a must-do for researchers to prove case studies. In this context, the use of partial structural propagation adapted to which the question has been determined, but the order and the sentence can be changed to match the atmosphere of the conversation or to be added during the interview.

Through a field survey (observation) of the hospital environment, it is a very challenging psychological or physical task [11]. The purpose of this study is to help researchers understand the function and routine of medical care routine. Researchers also need to understand the privacy of patients as well as do not interfere with nursing duties to carry out their daily routines as it is a requirement to be complied with by the authorities without any compromise [12]. To achieve the goal, researchers need more creativity in information gathering in hospitals. During the field survey, a questionnaire was also conducted on hospital users i.e. staff and patients. The study conducted by Kothari [8] found that this method is often used by researchers in the built environment and is an effective tool in research for architecture. This is because it involves socio-cultural, environmental and management interactions as an inquiry tool known as Post Occupancy Evaluation (POE) to assess the performance of buildings. This method is one of the examples of questionnaires on the most effective building design and population response to their environment [10].

2.1 Nested Methodology Approach

The nested research methodology proposed by Robson [16] through his study aims to test the theory and reflect research questions. In addition, it also serves as a guide to researchers to understand the complexities and also to provide an overview of the current research. The combination found in this nested research encompasses: the overall philosophy of research, research approaches and research techniques.

This method is also referred to as an integrated research as it creates a framework for guiding the researcher's approach and consequently leads to a more appropriate selection of techniques [13]. Therefore, through this study mapping the methodology of passive design and its effect to the public hospital in Malaysia. The implication is that the use of active energy increases from time to time. Preparation of the pre-design of the physical environment of the public hospital, especially in the ward should be taken into account in order to contain this energy use from continuing to increase.

![Figure 1. Nested Methodology Approach Model and Its Application in the Main Study](image)

**Figure 1.** Nested Methodology Approach Model and Its Application in the Main Study

2.1.1 Research Philosophy: Phenomenological. Philosophy of phenomenology is a philosophy associated with empirical communities and human cultures. Through this philosophy reflection on passive designs based on cultural anthropology and space studies based on social construction needs and comforts (interpretism) [9]. The emphasis on research and exploration is the principle of knowledge assessment that supports the theoretical and practical developments in the design process.
The use of philosophy in this study is to see the implications of the active energy use and its effect on hospital design. In addition, wastage and increased use of active energy for health care. The selection of philosophy is a reflection of the objective and adapted evaluation framework during the design process. Catalytic studies and case studies with relevant information and guides for designers in producing more efficient and practical design.

2.1.2 Research Approach: Multiple Case Studies
According to Yin [15] and J. W. Creswell [3], the philosophy associated with social constructs and paradigm constraints, environmental preservation of users and managing organizations can advance the theoretical perspective in a more complex and practical form. The problem statement through cross-analyzes arising from research questions will provide the corresponding pattern of equality as well as the differences in case studies [9]. This statement is supported by Yin [15], which states that the relatively used sample affects the establishment of parameters that are case studies aimed at guiding the building designers. Creswell [2], in his study noted that the case study research approaches were carried out covering a comprehensive method of data collection during exploration of each case. Hence, the findings from this diverse case study are challenging in implementation to researchers [15] and strategies involving the analysis need to be deepened so that issues raised can be achieved and resolved more efficiently.

2.1.3 Research Technique: Mixed Method with the Qualitative-Dominant
The topic selection and paradigm associated with the design are the first step in building the theoretical framework and methodology that need to be understood as it is a guide to the investigation of the construction of the design process [2]. Thus, this qualitative methodology is a priority for the entire research design and is further supported by quantitative method [1] [2] to get results implications of design impacts to users and their experience. The two methods carried out in this research are an approach called 'dominant and less dominant'. This less dominant approach was during the collection of data through a questionnaire (quantitative) and validated by expert panels (dominant) through interviews (qualitative) on research conducted through participants' beliefs, views, understanding and experience [3] [9]. Therefore, qualitative research is an inductive procedure that is relevant to interviews, expert panel about the production of hospital designs produced in a sustainable environment. Subsequently the data is supported through quantitative data verified through surveys obtained and questionnaires distributed to consumers (staff and patients) aimed at strengthening qualitative data. Therefore, the mixed method approach has many advantages related to the exploration to complement the development and development of the triangulated research.

3. Result And Discussion Of Triangulation Of Data
Researchers need to understand the quality requirements for data validation obtained as stated by Kothari [8], and Lucas [9]. Verification of key finding data must be transparent as well as to ensure the credibility of this qualitative study and the development of knowledge gained is true and accurate [6] [1]. Questionnaire data obtained from the respondents will be analyzed to support the findings of qualitative research results that respond from the start of both data [2]. Therefore, the re-authentication of the data obtained after the discovery by users of this public hospital is known as cross-validation [1]. For the validation of the data, it aims to establish the final interpretation of the data obtained from the study as well as to minimize any biased findings.
Therefore, this triangulation method will benefit, the researchers in producing guidelines later. This method is closely related to one another and can also cross check the data obtained. This framework relates to the assessment of passive design criteria as dimensions. This conceptual and practical assessment framework supports the clarity of the conclusions discussed.
4. Conclusion

Through the findings of the study, it is clear that the cross-checking of data through triangulation is important so that the continuation of the design of the public hospital is more efficient. The main case study is the continuation of pioneering hospital studies with some issues that need to be expanded in relation to the limitations and scope of the study on the issue of sustainable environmental hospital. Therefore, in making guidelines, it is necessary to study the aspects from the initial design process and implications to end users based on their experience.

5. References

[1] Creswell J, Klassen A C, Plano V and Smith K C 2011 Best Practices for Mixed Methods Research in the Health Sciences Methods 29 1–39
[2] Creswell J W 2012 Educational research: Planning, conducting, and evaluating quantitative and qualitative research Educational Research 4
[3] Creswell J W 2014 Research Design: Qualitative, Quantitative and Mixed Methods Approaches. (V. Knight, Ed.).
[4] Creswell J W 2014 Research Design [Fourth Editon]: Qualitative, Quantitative and mixed Methods Approaches Animal Genetics 39
[5] Greene J C 2006 Toward a Methodology of Mixed Methods Social Inquiry Research in the Schools: Mid-South Educational Research Association 13 93–98
[6] Ivankova N V, Creswell J W and Stick S L 2006 Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice Field Methods 18 3–20
[7] Kagioglou M, Cooper R, Aouad G and Sexton M 2006 Rethinking construction: the Generic Design and Construction Process Protocol.
[8] Kothari C R 2004 Research Methodology: Methods and Techniques (Second Rev). New Age International.
[9] Lucas R 2016 Research Methods for Architecture. United Kingdom: Laurence King Publishing.
[10] Mohammad I S 2011 Post Occupancy Evaluation of Building Performance In Malaysia.
[11] Rina S and Zakaria R 2014 Green Assessment Criteria for Public Hospital Building Development in Malaysia Procedia Environmental Sciences 20 106–115
[12] Smith F 2014 Sustainable Healthcare & ebola, (June).
[13] Turner S F, Cardinal L B and Burton R M 2017 Research Design for Mixed Methods: A Triangulation-based Framework and Roadmap Organizational Research Methods 20 243–267
[14] Yin R K 2006 Case Study Reserach - Design and Methods Clinical Research 2 8–13
[15] Yin R K 2009 Case Study Research Design and Methods. Applied social research methods (Fourth Edi).
[16] Zhao Y and Moursshed M 2012 Design indicators for better accommodation environments in hospitals: Inpatients’ perceptions Intelligent Buildings International 4 199–215