

Title Flexibility and Adaptability as Architectural Approach in Designing Hospital

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ABSTRACT

This study aimed to establish a hospital architectural design criteria that focuses on the need for handling the changes that occur in it. Study method began with collecting various type of hospital design that have concern in handling the problem of changing. Further stage is to formulate criteria for the design of the hospital according to the research topic. The main result of this study was flexibility and adaptability in architecture criteria that can be implemented on selected hospital.

Keywords: adaptability architecture, flexibility architecture, hospital

INTRODUCTION

Hospital as an architecture has a variety of design approaches. This is associated with diverse functions that are inside. Nowadays green buildings and sustainable architecture concept becomes a key issue. A wide strategies was carried out to obtain a result in order to achieve the goal. but along with that hospital architecture should give attention to any changes that occur in it

The hospital is one of the architectural building typology that has a high tendency towards the change. Change in question is an increase in services that cause increase in the number and extent of existing space based on the needs of service. thus the symptoms that appear when the hospital was in operation is the presence of a patchy form solution in the building. The symptoms are often directly impact on the performance efficiency of medical personnel in the handling of patients. On the other hand the patient as a user of the architecture have to get the comfort situation in undergoing the treatment process. A decrease in quality is due to a discrepancy architectural design with the previous configuration. One example is the circulation that cross each other when the increase occurred in the building.

The emergence of the new needs, whether it's a vital need or internal strategic policy of the hospital, basically have to get a proper response in accordance with the objectives to be achieved. Targets must be referring to the vision and mission of the hospital. Thus the needs can be directed

Generally in some cases, the impact of these changes can begin on the building configuration which less attention in solving one of design issue. One of the four main issues in the goals in architecture is the issue of change [3]. This issue has emphasis that architecture can meet the changing point of physical and non physical building. Physical changes can be seen with the addition of building elements in both the exterior and interior. Non-physical changes occur in the form of changes to existing functionality in it.

For an overview of several hospitals in Surabaya that built with the arrangement pattern of low-rise multy-courtyard, increasing the mass of the building in order to meet the needs. The pattern of mass arrangement in question is the pattern of mass arrangement with a total floor under the classification of high buildings. In hospitals with the arrangement of this kind of mass for mass built in the context of land area that can still be used. In fact "scrapping" activities can be carried out in connection with these changing demands. If drawn in more detail at one at a mass of buildings, in which also there was a movement of change. In this case the problem is not only done at the level of the master plan to plan the phasing of development only. But the design on each unit mass of the building itself should be able to adapt to such changes.

Architectural design that has a high durability of the changes that occur in it will have a long lifetime. A hospital that basically have to have a long useful life of more than 30 years [1]. Along with the rapid technological developments and advances in medical science, science and governance innovations in the realm of engineering, the current hospital will quickly become "obsolete" in a short time, therefore it must needs be an intelligent design of the hospital in response to and anticipate changes in the future[2].

The second element is research formulation that formulates new and meaningful problem solving. It has to show a significant novelty of a study. The research formulation is therefore the author's capability in

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fulfillment the gap theory, the gap method, product gaps, and others. Thus, research formulation has no references cited in the text.

The third element is research objectives that correspond to the research formulation. Again, there is no source of references in this element. It is important to note, avoid to set many objectives but the benefits are less. Benefits must be at least equal to, preferably more than, objectives.

MATERIALS AND METHODS

Architecture and The Issue of Change

Architecture has a goal in its development where it's one of the goals is to complete one of the issues or problems relating to changes in it, "designing for change" [3] . This issue is a form of responsiveness of the building will change that can occur during use of the building. The choice of strategy in a building need to be considered and determined, of course this is related to what the function that run by the building

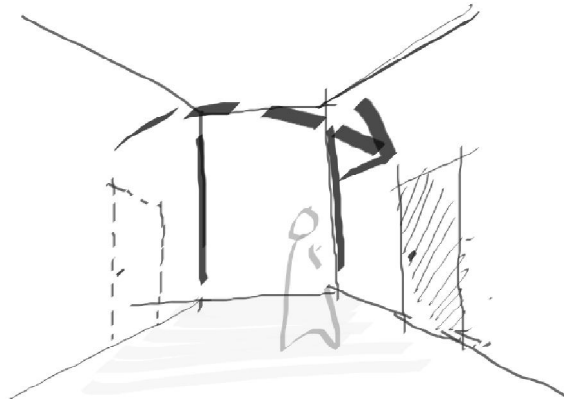


Figure 1: Illustration of improvization

Improvization is a modification made to the minor scale. Changes that do not require great effort and expense. As an example is the change in the location of doors in a corridor circulation

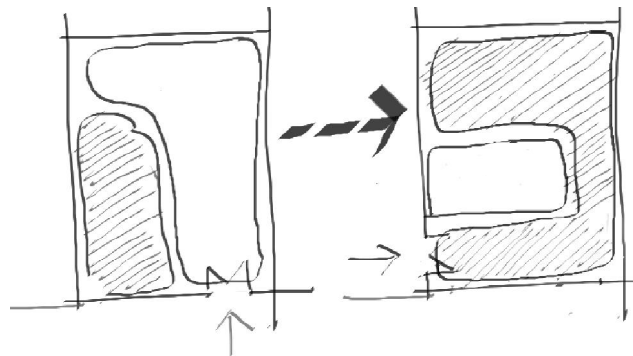


Figure 2: Illustration of building change

Building change is a change in building function due to changes in policy. So that it affects the needs of activity inside and directly impact on the use of existing space.

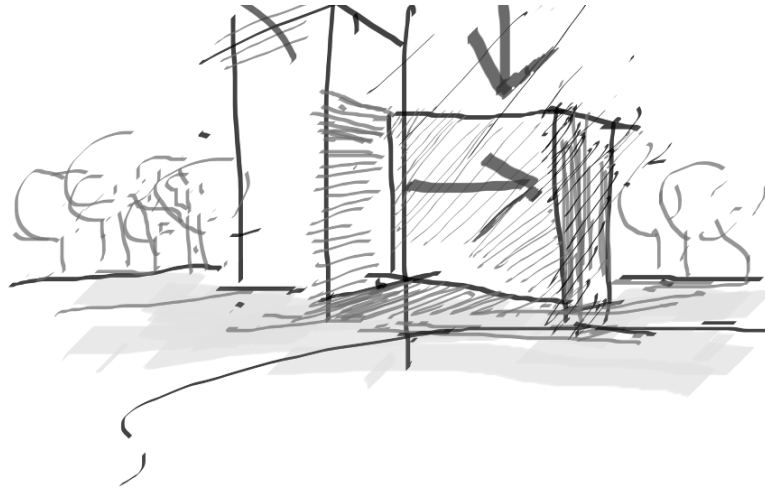


Figure 3: Illustration of building extension

Building extensions is the mass of the building due to the addition of the needs that are not accommodated in the existing building. Form these changes tend to require effort and expense of relatively large.

Flexibility and Adaptability in Architecture

Understanding of the flexibility proposed by Hill [4] that flexibility is based on the principle that a building can absorb or adapt to reflect changes in use. In this case the adaptation is the condition to be achieved when the change is completed with the principle of flexibility. Forty [5] identified three types of flexibility in the architecture are: flexibility by technical means; flexibility by spatial redundancy and flexibility as political strategy. Thirdly it is a strategy in which architecture can be applied to deal with the demands of changing requirements. In his book, Hill [4] review two forms of flexibility, Forty [5] and was added by him with open plan flexibility. Flexibility by technical means is a strategy that comes with the completion of the technical aspects of building elements. As his case of an application system that can be assembled wall, making it easier to make changes to the interior furnishings are made in such a way as to blend with the wall with a special system. Flexibility by spatial redundancy is building flexibility by providing a large space for mengakomidir use different. Flexibility by open plan is a form of flexibility that has similarities with the shape flexibility by spatial redundancy but this form emphasizes the existence of a condition that is loosening between space and usability.

In major and minor Flexibility and adaptability is achieved through building elements. Major in this level is over the main concepts implemented in general while the minor is the completion of detailed forms for each element based on the previous major decisions.

Healthcare Architecture

There are principles to consider in hospital's planning and design ,Hatmoko[6]

- Plan according to the hospital's strategic plan
- Plan a hospital in an organic, evolving and gradually
- Plan hospital that compact
- Plan hospital that provides life expectancy
- Plan the hospital with the appropriate grouping
- Plan the hospital with proper circulation and accessible
- plan hospitals that are energy efficient and thermally comfortable
- Plan a secure hospital and emergency response
- Plan a green hospital
- Plan hospital that is easy and inexpensive maintenance
- Plan hospital that targeted consumers and facilitating

The overall principle is built to cope with the problems that occur in hospitals. In accordance with the topic of this research, the planning of the hospital should be carried out in an organic and gradual. Problems faced is that there is increased demand shocks that may occur in the hospital. In this case the hospital should be able to estimate the trend of increased demand through a feasibility study and master the hospital in connection with it. Architecture and then respond to the input from these studies into an organic design.

Challenges of "change" in Hospital Architecture

A new era has changed the face of hospital architecture in which the current paradigm that the hospital only as a place to care for the sick, has undergone a shift. Diverse needs, the current programming has developed a fabric that is therein. Just as what is delivered Kunders [2] that the current hospital is considered as an office and even a hotel. This indicates that the expectations of society has evolved and of course this brings about changes in the arrangement.

How to deliver a plan that can adapt to the changes movement be a very important factor in the development of the hospital. A design with the flexibility and adaptability's approach is how to plan and implement an organized system where health facilities can meet the long-term potential by being able to respond to the need for future change of use purposes[7]

Flexibility is divided into four characteristics [8]: *usage flexibility, disposal flexibility, internal flexibility and external flexibility*, which can be selected and sorted in accordance with the objectives to be achieved. This is very helpful in analyzing the position of flexibility degree.

RESULTS AND DISCUSSION

Case study

Precedent is a form of withdrawal from the completion of architectural ideas are applied to similar objects. By examining the extent to which contextuality faced by each case study.

Table 1. Strategy of flexibility

no	Case study	Flexibility	Information
1	Nieuwegein st. Antonius Hospital	External	arrangement of buildings on the site allow for a future building addition
2	Insel Hospital	External & Internal	building's configuration adopting flexibility mainly through standardised spaces, same-handed rooms, pod design, and shell spaces
3	Martini Teaching Hsopital	Internal	buildings configuration made thin with dimensions of 16 x 60 m where the order of the diagram makes it possible to place a variety of configurations according to the needs of existing space

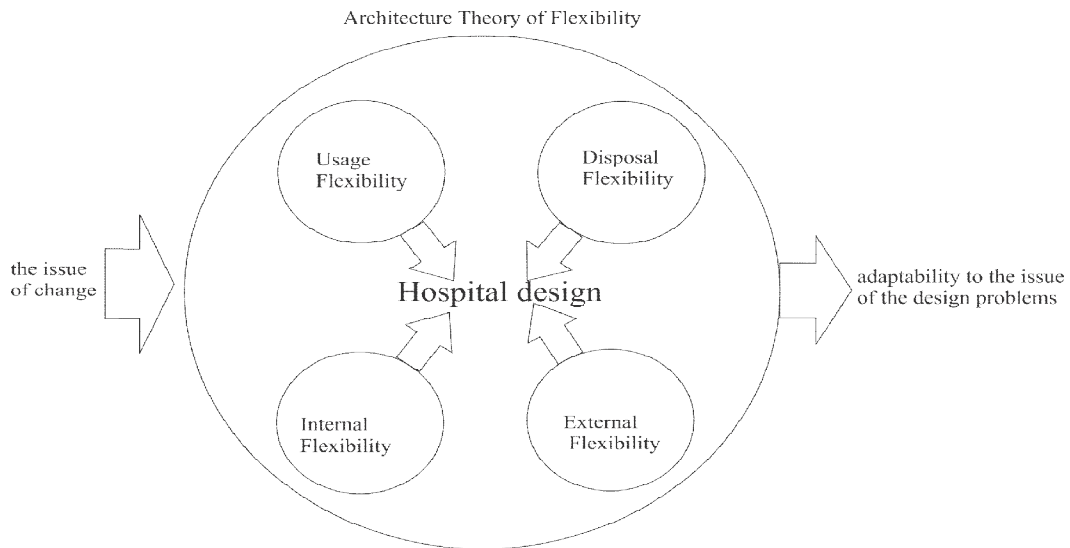


Figure 4: Synthesis of literature review of flexibility in hospital

Based on the description that was analyzed on the composition of the above literature it can be drawn a conclusion that a hospital is dynamic building. Change can occur therein. The diversity of organizations that exist in it has the potential to be the existence of a development or even shrinking.

Settlement of the problem changes both internally and externally in the physical hospital buildings need to be done. As was explained above that there is a change in the hospital and have several levels of classification that allows us to determine the extent to which the application flexibility and adaptability to stress.

A wide range of building typologies have changing demands of each hospital as well as working with keanekaragaman functions therein. By looking at the characteristics of the changes proposed in the literature review, we conclude that the flexibility and adaptability are needed in a particular hospital's design. Flexibility is one of the phase in the adaptability and a first foothold in achieving it.

CONCLUSION

Hospital as an architecture that has special characteristics should have an ability to adapt with the development patterns of needs that occur in it. Various case studies have shown the existence of responsiveness to these problems by implementing the strategy in its design. Proposed design criteria related to the approach of flexibility and adaptability are the things that need to be taken into consideration for future development in addition to reference material in planning a hospital architecture

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