

Design Strategies for Working Space to Reduce The Behavior of Stress and Preserve The Heritage Values of Banjarbaru City Hall Building

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Abstract—Designing government working space is proposed to solve the productivity issues among the workers inside the city hall office building of Banjarbaru city in South Borneo. This caused either by their work span inside the office and the style of working cubical or the interior element which has colonialism values. The design of the building case is using the colonial style which is this building's materials have color dominated with white colour and the architecture elements are containing a heritage value. Therefore, in this paper discuss the literature review to make a design strategies for working space inside the office with building heritage's values that suitable to maximizing the productivity of the workers by involving them in the process of design in advance, for instance, the design process will use a participatory design paradigm that will be reviewed before applicate it in the Banjarbaru government office design proposal. From those theories can be concluded that field area like shape, colors, and perception of space which related to an interior element can be controlled to maximizing the productivity and preserving the values of building heritage.

Keywords—City Hall Office, Productivity, Space Perception, Participatory Design, Literature review.

I. INTRODUCTION

BANJARBARU City Hall is one of the government important office that serve citizen of Banjarbaru city in any purposes. The City Hall building was built in 1950's by the Netherland Architect, D A W van der Pijl, therefore the style of this building is Colonialism. According to Soekiman, at the time of the Dutch presence in the archipelago, colonial civilization had dominated Indonesian culture and intermingled gradually. Therefore, many buildings with colonialism style are still being used as a government office. Imagine the people inside who work daily indise, it will be a boredom. Monotonous boredom in work is widely recognized as undesirable side effects due to boredom in doing repetitive work Boredom that occurs in a short time will not give effect, but the bad possibility that occurs is if it lasts for a long time. This can cause stress for employees and have an impact on decreasing performance. In a study at one of the government offices that there was an increase in absenteeism rates that were affected by stress due to the length of time the workers had done their work in that place. Boredom could occur a stress condition that affect the

health of the worker's body. Stress intensity can be measured by peak levels of stress hormones, neurotransmitters, and other physiological changes such as increased heart rate and blood pressure, and can affect the amount of time this change lasts during stress and after cessation of stress. The result of confusion is part of a semantic problem. While anxiety and depression are outcome terms, stress is more often used as a process term, which reflects the first possible cause, according to the Macquarie Dictionary.

The theoretical basis used as an approach is the theory of behavioral architecture because in this context, the strategy describes a comprehensive approach to behavior change, including dissemination, intervention, monitoring, and data collection, according to Fogg, ; Kelders, Kok, Ossebaard, & Van Gemert-Pijnen, [1]. Bring these elements together, providing the initial characteristics of Behavior Design as designing for a preliminary strategy for behavior change using implicit intervention to influence behavior. These are complementary, but different form, various approaches that are explained by persuasive design or technology. The theories that are used in this paper has consisted of behavioral architecture as the main theory and space & place perception, circulation, kinetic architecture as the supported theories which will be described below:

A. Behaviour Architecture

Human designing buildings based on needs, which shape human's behavior itself. After human's behavior is formed due to the architecture that has been made, humans re-establish architecture that has been built before on the basis of behavior that has been formed, and so on.

When viewed from the form of response to existing stimulus, the behavior can be divided into two forms which are:

- Closed behavior, is a person's response to a stimulus in the form of covert. The response or reaction to this stimulus is still limited to attention, perception, knowledge / awareness, and attitudes that occur have not been clearly observed by others.
- Open behavior is a person's response to a stimulus in the form of real or open action. The response to the stimulus is clear in the form of action or practice.

According to Setiawan [2]the variables that influence human behavior, which are:

- a) The most important thing about the influence of space on human behavior is the function and use of space. Physical design of space has variables that affect the wearer's behavior.
- b) The size and shape of the space must be adjusted to the function to be accommodated, the size that is too large or small will affect the wearer's psychological.
- c) The form of furniture arrangement must be adjusted to the nature of the activities in the space. Symmetrical arrangement gives the impression of being stiff, and official. While asymmetrical arrangement is more dynamic and less formal.
- d) Color has an important role in realizing the atmosphere of space and the realization of certain behaviors. In space, the influence of color not only creates a hot or cold atmosphere, but colors can also affect the quality of the space.
- e) Sound, Temperature and Lighting. Sound is measured by decibels, will adversely affect if it is too loud. Similarly, the temperature and lighting can affect a person's psychological condition.

1) Shape Definition

Ching [3] in his book: shape, space, and order, also mentions that the Basic Form, Outline characteristics or surface configuration of a particular shape. The form of architecture is the visual characteristic of a building that gives it a unique identity and distinguishes it from the others, or in shorts the form of architecture is a point of contact between mass and space [4] As a clear main feature, it is a major aspect of building aesthetic pleasure [4].

2) Space Definition

Our space of view consists of heterogeneous elements that differ in basic form, size, color, or orientation. To be able to understand the structure of a space of view, we tend to organize the elements into two opposing groups, positive elements, which are sensed as Figures, and negative elements, which provide a background for these Figures. Perception depends on the interpretation of the visual interactions between positive and negative elements in the environment [3].

B. Perception of space and place

Space is not something that has been determined and fixed; Actually, it is a private location that defines space [5]. In addition, the perception of space is only possible in the presence of a clear object because space is the relationship between objects [6]. Space, based on the lexical concept of English, can be classified into three types of geographical space, living space and architectural space (interior or central) [7]. Zevi considers space as the basis of architecture whose architecture gets its characteristics based on it. Therefore, it is full of meaning, physical reality and human experience and is considered a 'reasonable value center' [8]. Space, more than that, lies through organizing 'movements' in the 'tour' pattern, by making a series of pathways consisting of units that have static or cellular vectors [8]. Thus the 'space metaphor' such as a speech, narrates places that are linked together, more or less closely with the modalities that determine the types of parts that lead from one to the other [8].

C. Circulation

Ching explains that there are three types of circulation achieved, which are:

- a) Directly, the frontal achievement directly leads to the entrance of a building / space through a straight and axial path. The end of this visual end is clear: it can be in the form of a whole facade of a building or a detailed entrance in the field.
- b) Disguised, Emphasizing the perspective effect on the front facade and the shape of a building. The path can be redirected once or several times to delay and prioritize the sequence of achievements.
- c) Rotate, Equate the sequences of achievement and emphasize the three-dimensional shape of a building while we move along its perimeter. The final destination or an entry / exit point in this circulation can be presented clearly or it can also be hidden depending on the purpose.

PPS and Djailani[9] said street as place integrates various elements of the road corridor by creating a vitality where people feel safe, comfortable, feel possessed and socialize.

D. Adaptive and kinetic architecture

We enter the age of Adaptive Architecture where buildings will interact and respond to residents and their environment in a dynamic way [10]. Discusses this shift, especially the technical, interactional, and regulatory aspects. When the nature of architecture shifted, prototypes for new forms of human-building interaction emerged, ranging from pragmatic to therapeutic to provocative [11]. Adaptive architecture will recalibrate the nature of human-building interactions, mediating how we negotiate our relationships and daily life in these spaces [12]. Adaptive architecture focuses on buildings specifically designed to be adaptive to their environment and users [13].

The kinetic adjectives are from Ancient Greek, κίνησις (kinesis) which means motion. The rule in classical mechanics which states that $E \propto mv^2$ was first developed by Gottfried Leibniz and Johann Bernoulli, which states that kinetic energy is a living force, vis viva. Willem's Gravesande from the Netherlands conducted an experiment to prove this equation. By dropping objects from different heights into clay blocks, Gravesande states that the depth on clay is directly proportional to the square of the velocity. In Zinsse, Émilie du Châtelet was aware of the implications of this experiment and published an explanation.

In Barozzi1, the current architectural trend is more about a work that moves with an adaptive facade that can reconFigure itself to get climate and external changes internally or behavior [14]. Technological advances in the field of design have made it possible to reduce, or even eliminate the ecological impact of the built environment, and in some cases can even rehabilitate ecosystems [15].

E. Participatory design

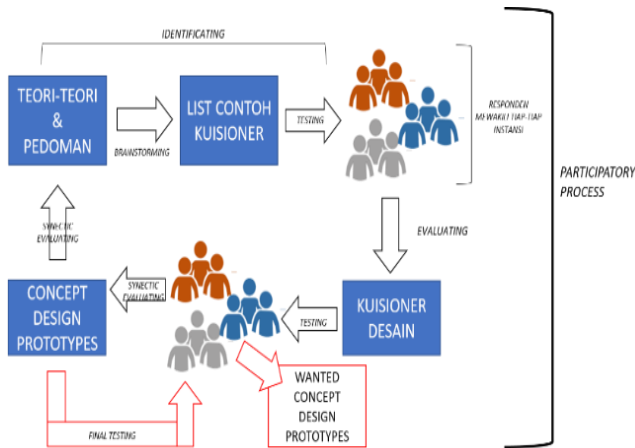


Figure 1. Cyclic process of participatory design process.

In many participatory research designs, core values and aspects of political empowerment, democracy and sound are supportive methods and techniques for pragmatic design solutions. Participatory design integrates two radical propositions about design. The first is a moral proposition that people whose activities and experiences will ultimately be most directly affected by the design results must have a substantive voice in the results. The second is a pragmatic proposition that people need to be adopted, and maybe to adapt to other artifacts or design results, must include in the design process, so that they can have more expert perspectives and preferences regarding activities that will support the design. A pragmatic proposition is that directly entering a user will increase the chances of a successful design result.

In line with participatory ergonomics proposals [16]; [17] ergonomists that focus on design activities often emphasize the need to involve potential users of objects that are being designed (whether it is software or work organization) in the design process. In this trend, users occupy very specific places and demand in the design process, as co-designers, that go beyond the way they are usually considered in design meetings [18]. But what exactly do they contribute to the design? What content is shared among users and designers in the process? Epistemic content from design interactions is thus a subject that is researched or designed [19].

Based on video observations, analysis of project documents, and survey questionnaires, this study shows that Participatory Design should have a positive influence on the place produced, although each part of the project may not be successful [20] [21] mentioning the application of the results of a research tends to be called a healing environment. Participatory design process has a cyclic process until the right design is achieved (Figure 1).

Therefore, in the design this time the forced based method was chosen from Plowright as a design method and process (Figure 2). In this thought comes a thought called emergent thinking, where this thinking style showed how to see design as a result of thinking process to solve a problem or urgency. In this thinking style, thinking about how academics and successful people can work together to overcome challenges through developing design quality sustainability strategies.



Figure 2. Force based framework that used in thesis design [6].

II. METHOD

Methodologies that will be used in this paper are literature and precedent review. The literature review will help for understanding the principle to make a design for maximizing productivity of the workers inside the Banjarbaru City Hall Building. The precedents that will be reviewed are Innovation Center UC and Quinta Monroy in Chile by Elemental Architecture Studio. With the result that knowing about what's part that will be focused.

A. Literature Review

Literature search is used as a design approach to help solve existing problems. In this case, the exploration of the theory needed is:

- 1) Behavioral architecture theory regarding which element that affecting the productivity.
- 2) Theory of space and place regarding the type working space that suitable for specific user.
- 3) Circulation theory related to creating the space and place perception and quality.
- 4) Adaptive, flexible and kinetic architecture theory related to possibility to move the space and place element to avoid boredom inside working space.

The way that the theoretical study is carried out is not too broad, there must be a specific specification to stay focused, namely by paying attention to the dust keyword. The literature study itself has been proven to help the design process in analytical activities [1].

B. Precedent Review

This technique is used to find the similarities of design strategy how to involve the people that will be the user of the building, from beginning to the end of the design process. And not just the people, but also the regulation where the building will be builds also being considered as well. This participatory design process will be more complicated but it will make the design be more suitable for the user.

III. RESULTS AND DISCUSSION

The human behavior inside the space and place, and also the perception of them is determined by architectural elements that applied. The more complicated of the shape or color of the space, will be more time for human to translate it to be more understood, therefore it will make a tendency to create a boredom inside a working space. But if it just one kind of color or shape it will cause a boredom as well. In addition, the need of controlling the room perception to maximizing the productivity of worker inside is needed. The Table 1 below is the detail from synthesis theories:

Table 1.
The Details from Synthesis Theories

No	Details	Synthesis	
		Description	Strategies
1	Behavioral Architecture	Architecture that not only capable to respond to human needs, but also capable to change human's behavior with architecture's elements based on needs or circumstances.	<p>Changing the elements that shaping the space, such as :</p> <ul style="list-style-type: none"> a.Room, hysical design of space b.Shape and shape, adjusted to the function to be accomodated c.Furniture, choosing the suitable one of needs and doing a right arrangement d.Colour, important role in creating an athmosphere or nuance e.Sound, temperature and lighting, creating or extending another dimension of nuance
2	Perception of space and place	Space is not secific area for human for doing an activity. Space has three classification which are geographical space, living psace, and architectural space. In another terms place is an identified area for human to their personal or group domain. Place not has specific classification but usually has a name for it based on humas needs.	<p>Making a series of pathways, created from organizing a sequence of spaces, consisiting of units that have static or cellular vector could make an aorganizing movement in the "tour" pattern.</p>
3	Circulation	Circulation is a moving-media activity that conects exterior or interior spaces.	<p>There are three types of circulation, which are directly, disguised and rotate.</p> <p>There are three main principles in regulating techniques, which are:</p> <ul style="list-style-type: none"> a.The road must be an element of open space b.The road and it's environment must be clear and able to give orientation c.The public sector and the road must be integrated to take common goals. <p>Adaptive and kinetic in architecture could be achieved by designing building to overcome or adjust with the inside or outside environment problems. It should be a prototypes of new forms building or space design that where the forms of human-building interaction emerged, raging from pragmatic to therapeutic to propocative.</p>
4	Adaptive and kinetic architecture	<p>Adaptive architecture is where buildings interact and respond to the resident and environment in a dynamic way.</p> <p>Kinetic architecture is more to how dynamic in architecture to be achieved.</p>	<p>Current architecture trend of adaptive facade could reconFigure a changes of an internal/external climate and a behavior.</p> <p>Technological advance in the filed of design could possible to reduce or even eliminate and rehabilitate the ecological impact of built environments and ecosystems.</p> <p>There are strategies to do a participatory design in the beginning untill the end of the processes, which are :</p> <ul style="list-style-type: none"> a.video oservation b.analysis of project documents c.survey d.questionnaires e.brainstorming f.collaboration research
5	Participatory design	Participatory design is where the designer and the people whose would be living inside the design, have the same role to solve the design problems and achieved the common goals. Designer is more to be their idea generator.	

Table 2.
The Detail from Precedents 1 Synthesis

Process	Analysis	Keyword/statement
Identification of design forces	In this design, there are 2 types of force used, the first is the context of space and activity needs Second is the context of energy efficiency.	<p>"to create a center where companies, businesses and more in general, demand, could converge with researchers and state of the art university knowledge creation."</p> <p>"this building had to respond to the client's expectation of having an innovation center with a "contemporary look", but the uncritical search for contemporariness has populated Santiago with glass towers that due to the desert climatic local condition have serious greenhouse effect in interiors."</p>
Propose form – Refine - Assemble	<p>Using a type of elevator as the main part of the building (core) but different from the elevator that usually uses massive thick walls, in this building it uses transparent boundaries.</p> <p>In response to the context of energy conservation but also maintaining aspects of its contemporary design, use the principle of cross ventilation which then forms a facade that looks contemporary but massive and save energy as well.</p>	<p>"... from the elevator's lobby with a bench where to sit if you happen to run into somebody that has interesting information to share, to a transparent atrium where you can sneak into what others are doing while circulating vertically, to elevated squares throughout the entire height of the building."</p> <p>"The way to avoid undesired heat gains is not rocket science; it is enough to place the mass of the building on the perimeter, have recessed glasses to prevent direct sun radiation and allow for cross ventilation. By doing so we went from 120 kW/m²/year (the consumption of a typical glass tower in Santiago) to 45kW/m²/year. Such an opaque facade was not only energetically efficient but also helped to dim the extremely strong light that normally forces to protect interior working spaces."</p>

Table 3.
The Detail from Precedents 2 Synthesis

Process	Analysis	Keyword/statement
Identification of design forces	This design utilizes force in the form of social and economic demands of the people who are illegal residents.	“to settle the 100 families of the Quinta Monroy, in the same 5,000 sqm site that they have illegally occupied for the last 30 years..” “We had to work within the framework of the current Housing Policy, using a US\$ 7,500 subsidy with which we had to pay for the land, the infrastructure and the architecture.”
Propose form – Refine - Assemble	It was also added with other changes regarding the Housing Policy in the area. Use incremental design on social housing. Put a collective space for several families with limited access (only 20 heads of families) These dwellings will later increase and solidify and then help collective and public space in accordance with the growth in housing needs.	“... we saw that a building blocks expansions; that is true, except on the ground and the top floor. So, we worked in a building that had just the ground and top floor.” “... In between the private and public space, we introduced the collective space, conformed by around 20 families. The collective space (a common property with restricted access) is an intermediate level of association that allows surviving fragile social conditions.” “... the provision a physical space for the "extensive family" to develop, has proved to be a key issue in the economical take off of a poor family. ... due to the fact that 50% of each unit's volume, will eventually be self-built, the building had to be porous enough to allow each unit to expand within its structure.”

Subsequent of theory analysis, the further step is to reviewing the precedents that correspond to participatory design paradigm to find out the way the well-known architect to designing their design that created by involving the people to generate the design idea to reach the mutually beneficial goals. And also the recedents correspond to the force-based framework. The Table 2 and 3 below are the detail from precedents synthesis.

Precedent’s design strategies analysis of Participatory Design:

- 1) Innovation Center UC - Anacleto Angelini / Alejandro Aravena, Elemental Studio

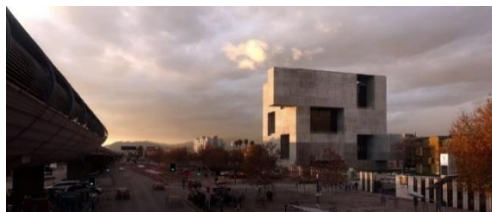


Figure 3. Perspective of Innovation Center UC.

Precedent 1 Conclusion:

The UC Innovation Center uses a force-based framework in the design process stage. Looking at the context of the building where the client’s wants and needs, will be the formation of activities that are integrated into one building to integrate one another. The formation of a contemporary massif facade that represents and becomes the icon of a contemporary, energy-efficient city as well.

- 2) Quinta Monroy, Elemental Studio



Figure 4. Perspective of Quinta Monroy, Incremental housing.

Precedent 2 Conclusion:

Quinta Monroy uses the force-based framework during the design process stage. Looking at the context of the building where the community wishes for legal housing and also looks at the economic context where the subsidy for occupancy for the community is only US \$ 7,500 (in

Chile the cost can only be for 30 heads of households). From these problems it makes an incremental social shelter design that impacts the economic and social growth of the residence very sustainably.

IV. CONCLUSION

The conclusion of analysis result are:

- 1) Design for increasing the working space quality to maximizing the productivity of work activity inside the City Hall of Banjarbaru (government office) should consider the basic elements that make the workers more relaxed while working but still could be change or move to avoiding boredom (new architecture elements). Architect has a important role not only just to generate the idea of people or client or user, but also preventing the idea out of the borders. Such as in the context of building heritage, the architect should make a parameters of building heritage so the idea of people will related to context.
- 2) Using participatory design process will involving the workers to cooperate for determining and analyzing the existing architectural elements that would be transforming into new architectural elements that suitable with workers comfort in the working space.
- 3) he process of Participatory Design is very repetitive and using many methods in perform, such as brainstorming as one of them, because there are involving many people in the design process until the design outcome is suitable with the workers not just better by looks but also by function and regulation.
- 4) The architectural elements need to be more adaptive, flexible, and moveable (kinetic) to be more suitable for the workers activity inside the working space, and still the adaptive and flexible movement need to be chosen by them and the architect make a guidance from the design parameters up to the design forms.

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