

## The Function of Creativity and Innovation in Architectural Design Management

Danfulani Babangida Idi <sup>1</sup>, Khairul Anwar Bin Mohamed Khaidzir <sup>2</sup> and Fahimeh Zeari <sup>1 +</sup>

<sup>1</sup> Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.

**Abstract.** Solution to a design problem can be achieved by understanding the holistic nature of the problem before adopting a problem solving process. As part of Architectural design problem solving Creativity and Innovation are among factors that incorporate new concepts and methods in designing. But, unfortunately these factors are affected by financial statues and designer level of experience. This study is about some of the factors that influence not affects creativity and innovation in architectural design management which is a process of observing design from inception to the concluding stage. The management process run from design brief, problem identification, search for solutions, design development, detail design, construction process together with pre and post occupancy evaluations. All these activities constitute architectural design management. This paper further identifies some of the functions of creativity and innovation in these managerial part of architectural design process. Among the functions identified are designer ideation processes, visual perception of aesthetics on physical elements use for façade design, together with choice and applicability of building materials. These entire factors represent function of creativity and innovation in architectural design considered for this study. Designer ideation process was explained as part of designer behavior/actions in generating and manipulating the concept of the design. Visual perception of aesthetics on physical elements use for façade design represents the perception of aesthetics attached to the building elements use for the façade design. Finally the choice of building material represents frequent choice and application of newly innovated building material in the design. Designer privilege to introduce and manage new design concepts such as shapes, texture, appearance, materials and technological advance in a given design was among other function of creativity and innovation acknowledged in this paper. The paper finally concludes that creativity and innovation are among factors that influence designer ideation, building appearance and choice of building material in architectural design.

**Keywords:** Architectural design, Designer Ideation, Building Appearance, Construction Materials

### 1. Introduction

Architectural design process is the scientific study of existing ideas, thought and thinking in getting detail solution of an architectural design. Simon (1969) differentiates between architectural design process and scientific methods such that design process is concerned with how things ought to be done while natural sciences are concerned with how things are. Goel (1994) generally considered that the difference between architectural, mechanical and industrial design processes is the aspect of the problem considered, the primary source of knowledge, the degree of commitment made to output statement, the level of detail, and finally the method of transformation. Design process is a method that reveals how things are created. Figure 1 illustrates the composition of four different activities in architectural design. Assimilation represents the process of gathering information related to the proposed design such as verbal communication with client and documentation of the design brief. The complete analysis of design problem and the identification of most suitable design solution constitute the components of general study. The growth and refinement of tentative solutions isolated during general study is what is referred to as development. Finally, communication is the act of representation design information to design teams, client, user and general public.

---

<sup>+</sup> Corresponding author. Tel.: + (60102639045);  
E-mail address: (babangida2010@gmail.com).

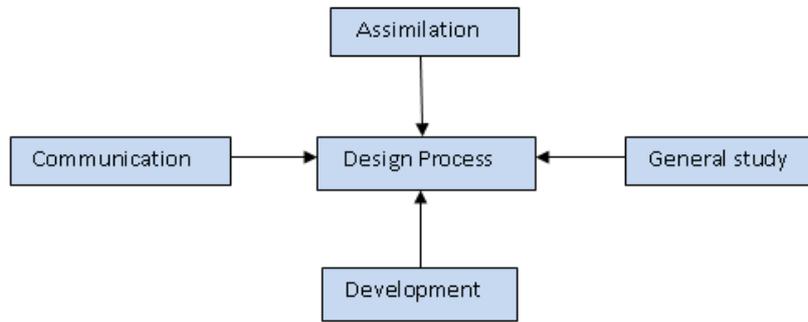


Fig. 1 Maps of Design Process (Lawson 2006)

Architectural design is a combination of graphical and theoretical solution to a problem, such as residential design, industrial design, institutional design, religious design, and commercial design. The solution take the forms of plans, elevations, sections, details, perspective, graph, analysis of proposed and existing features. Table 1.0 demonstrate the stages involve in architectural design process. In solving these problems designer use thinking and drawing to achieve the required creative result (Goldschmidt & Smolkov 2006). Creativity and Innovation is important throughout the life span of the project. Some of its functions include generation and improving the design idea together with improving perception of aesthetics on physical elements use for façade design. Other functions of creativity-innovation include choice and application of modern building materials (Gregory 1966; Goel 1995).

Table 1.0 Architectural design process

Architectural Design Process		
Task	Stages	Description
Assimilation	A	Meeting
	B	Design brief
General Study	C	Investigation
	D	Problem Identification
	E	Possible Solutions
Development	F	Growth of Solution
	G	Refinement of Solution
	H	Tentative Solution
Communication	J	Representation of Solutions to design and Construction Teams

## 2. Designer Ideation Process

Designers/Architects generate analysis of their design ideas through drawings, written word and verbal expressions. Idea generation is an activity that transforms conceptual idea to concrete idea. Technique like brainstorming is commonly applied by designers for idea generation purposes. It is obvious that such a critical part of human endeavor is an important part of the design process.

Ideation processes in Architectural design represents designer ability to think and generate new functional ideas that will become solutions to the architectural design problem. Designer ability is considered as designer fluency in sketching as a cognitive tool to the creation of design (Lawson 2004). These sketches are normally significant in achieving a good design (Dorst & Cross 2001). Figure 2 illustrates ideation process in designer sketching activity. Figure 2a illustrates the initial idea of the design while Figure 2b illustrates the final outcome of the ideation process.

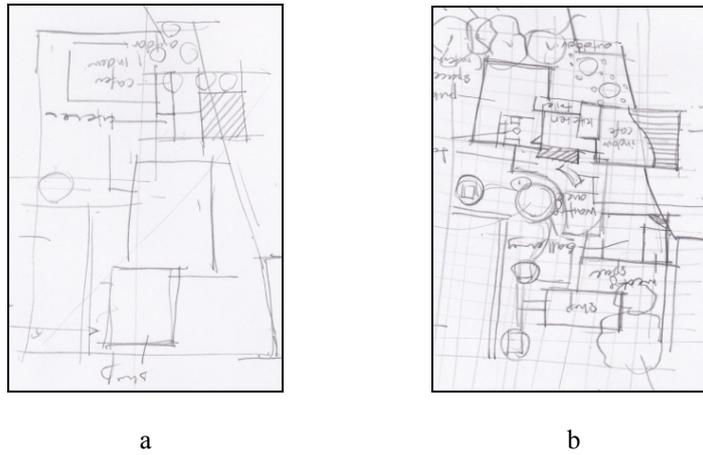


Fig. 2 Designer ideation process

Ideation is among activities in the stages of preliminary design, design development and embodiment stages of Architectural design. According to Cross (2001) designers use their creative potential to contribute to the creation and maintenance of the world. They (designers') use ideation process as the basic concept of harmonizing and maintained their design with the existing environmental features successfully (Cross 2001). These processes of transformation include the analysis of topography, vegetation, climate and infrastructure.

### 3. Appearance

Designer together with client, user, and the environment are all concern with the visual appearance of the design. As architecture is dynamic, new ideas and methods are always welcome in design education and practice. Experienced designer use inert abilities to generate and adopt a facade design that satisfies the aesthetic requirement of client, user and the environment at large. According to Scruton (1979) designers use imaginative thinking to perceive innovative ideas and applied them into their design to achieve good design view that satisfied the aesthetical requirement of the client, user and surrounding environment. Due to the fact that designers know what can be done about a design it then becomes easier for them to innovate new design features and incorporate them into their design to satisfy the aesthetic needs of the design (Lawson 2004). A design has to be visually pleasant and artistically comfortable before it can satisfy the requirement of aesthetic as a function of creativity and innovation in architectural design. Figure 2 illustrates a comparison between two different images one is considered as aesthetically good while the other is considered as aesthetically poor.



Fig. 3 The Appearance of Two Designs

Figure 3a illustrate a design in which the designer introduce some aesthetical elements such as concrete eaves, hip roof, arch top windows, and some brick walling. These elements improve the visual perception of aesthetics on physical elements use for the façade design. Hence, the design is considered as aesthetically

good design. Figure 3b illustrates a design in which the designer has not been able to use elements that could enhance the visual perception of aesthetics on physical elements use for the façade design. The design looks structurally stable but it lacks some elements that could improve the aesthetical qualities of the design such as roof exposure, wall cladding, window styling, and painting. The introduction of these element could have influence the aesthetic qualities of the design. Hence the first design is consider been more creative and innovative.

#### **4. Materials**

Innovations in building materials are by no means a simple process. Initially, the material is invented or introduced, followed by testing the material, improving performance and finally expanding the development of the material. Newly innovated building materials such as carbon fibre, glass fibre, Teflon glass fabric, translucent glazing, carbon nana tubes, spider silk, Kevlar, Styrofoam are used by architects and engineers in innovating complex designs. These newly innovated building materials offered designers and engineers the opportunity to innovate all sort of complex designs (Bowley 1960, Brookes & Poole 2004).

Conventional building materials have to give way to improved and newly innovated building materials due to rapid increases in population, urban requirements and climatic influence. Steel construction dominates the structural part of the modern construction industry due to its strength in workability. On the other hand glass, timber, plastic and aluminium dominate modern lightweight construction. The nature of space and settlement determine how designer deals with external features of the design. For example, the environment, influence the functional and conceptual requirements of the users. Designer investigates and analyzes the proposed construction site and identifies possible links between proposed and existing natural features on site. The choice of materials is subject to the creative ability of the designer.

According to Scruton, (1979) architectural knowledge can be used to provide a more general insight as to how ideas are generated. One applies imagination to perceive form, order and balance in a given architectural design. But, one can apply creativity to imagine how to upgrade nature for human needs and leisure or to integrate nature with a proposed need.

#### **5. Conclusion**

The study introduces Architectural design process where creativity and innovation are specifically mentioned as aspect of the process. The study further categorized creativity and innovation into three (3) different aspects of the design process. The categorization includes designer ideation process, visual perception of aesthetics on physical elements use for façade design and choice and applicability of building materials. Each aspect was explained according to its function in creativity and innovation in the design process. The explanation includes the transformation of ideas from diagramming to schematic drawings in design process as it was illustrated in figure 2a & 2b. The visual perception of aesthetics on physical elements use for façade design was also used to explain how creativity and innovation was used to differentiate between two different designs. The choice and applicability of newly innovated building materials was the final issue explained in the paper. As creativity and innovation enhance quality, appearance, and demand (Brookes & Poole 2004) this paper is expected to aid in exploring its function in architectural domains. Future study can further categorized creativity and innovation in design process through other methods of empirical studies such as statistical tools protocol studies.

#### **6. Acknowledgment**

We hereby acknowledge the contribution made by Universiti Teknologi Malaysia, which have provided financial support for the publication of this paper under an institutional research grant scheme (VOT 77260)

#### **7. Reference**

- [1] A. Brookes, and D. Poole. *Innovation in Architecture*. London: Spon press. 2004
- [2] B. Lawson. *How designers think: the design process demystified*. London: Architectural Press. 2006
- [3] B. Lawson. *What Designers Know?* London: Architectural press. 2004

- [4] G. Goldschmidt, and M. Smolkov. Variance in the impact of visual stimuli on design problem solving performance. *Design Studies*. 2006, **27**(5): 549-569.
- [5] H. Simon. *The Sciences of the Artificial*. Cambridge, MA: MIT Press. 1969
- [6] K. Dorst, and N. Cross. Creativity in the design process: co-evolution of problem–solution. *Design Studies*. 2001, **22**(5): 425–437.
- [7] M. Bowley. *Innovation in building materials*. London: Gerald Duckworth & Co Ltd. 1960
- [8] N. Cross. Can a Machine Design? *Design Issues*. 2001, **17**(4): 44-50.
- [9] R. Scruton. *The Aesthetic of Architecture*. Princeton: Princeton university press. 1979
- [10] V. Goel. A comparison of design and nondesign problem spaces. *Artificial Intelligence in Engineering*. 1994, **9**: 53-72.
- [11] S. Gregory. *The Design Method*. London: Butterworth Press. 1966
- [12] V. Goel. *Sketches of Thought*. Cambridge, Mass.: MIT Press. 1995