Design Process & Strategic Thinking in Architecture

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Abstract: Design can be viewed as a strategy of problem solving in which creative ability utilizes arts & science to generate solutions to problem situations. Designers solve problems in many different ways; however, they go through a pattern or sequence of steps that they have previously found effective for achieving their designs from conception to completion. The design process may be a conscious or subconscious effort the designers use on almost every project. Design process and methodology play a key role in the development of innovative design solutions for many architects. Many studies have been written on design methodologies, these studies critically analyze, evaluate, compare, and propose alternative methods for creative problem solving to help designers understand their own style and to offer new alternatives for achieving solutions. Further, the motivation for the research stems from the observation that each architect uses his own conceptual frameworks that can assist in setting boundaries and framing reasonable objectives, they can also enhance communication among an extended network of collaborators. This paper aims to focus on reframing the strategic thinking and the design process during the 20th century in Architecture, by analyzing the different methods & strategies of design process, then present a comparison between these different methods, to give a whole vision for the different views, to differentiate between the traditional design process and the integrative one during the information age, and it’s implement in Architectural design studio.

Keywords: Design nature, Design methodologies, Traditional design process, Integrative process in the information age.

1. Introduction

The methodology of Design process and Strategic thinking play a key role in the development of innovative design solutions for many architects. Design methodology emerged in the 1960s as an independent scientific discipline. Design methodologists have been moving away from ‘drawings and patterns’ in the notion of design, although it is perhaps still a common action of designers of all kinds. Since the literature on design methods began to appear, design methodology has become an independent discipline. Many studies have been written on design methodologies, these studies critically analyze, evaluate and propose alternative methods for creative problem solving to help designers understand their own style and to offer new alternatives for achieving solutions. Many designers, when probed for reasons to explain their actions, are unable to provide explanations that give the right descriptions of their actions. Under this model the design process assumes as a “Mystical” phenomenal. Therefore, the act of designing in architecture is a complex process. Further, the motivation for the research stems from the observation that each architect uses his own conceptual frameworks that can assist in setting boundaries and framing reasonable objectives.
1.1. Research Problem
Summarized in the existence of an expanding phenomenon within Architects and we cannot ignore it, which is the “Inspiration from existing buildings as a method”, the problem is that some of architects are experiencing difficulty getting inspired from existing buildings. Thus, sometimes the result of this process looks more like “Copy-paste” rather than conscious inspiration.

1.2. Research Questions
1. What methods are used by designers?
2. Does one method better than another, constitute ‘right’ and ‘wrong’ ways to design?
3. Do different Methods lead to different qualities of results?
4. Do we know How to filter out relevant knowledge with abundance of information?
5. Do we know how to choose and use the right “Inspirational Sources” in a way that enhances our buildings as the “Planning Process Generator to design high quality creative architecture?”

1.3. Research Objective
This paper aims to focus on reframing and de-mystifying the strategic thinking and the design process during the 20th century in Architecture, through a close scrutiny of existing literature about different design methodology and strategic thinking. To give a hole vision for the different views, and differentiate between the traditional design process and the integrative one during the information age.

2. Nature of Design Process
In his book (Design Methods: Seeds of Human Future) 1980 Jones, J. Christopher cited that the design process does not represent the process of creating, but based on the principle of derivation of the final structure of elementary introductions, and the relevance of these introductions and the final structure depends on three primary operations:
• First, gathering information: to include the collection of information along with how to organize, analyze and make sure they relate to the design position, and that such information be integrated in the image.
• Second, testing: include the design decisions through the process of representing the intellectual capabilities and intuitive, and personal experience of the designer.
• Third, evaluation process: include judgment on the appropriateness of these decisions to the problem of design.
And he described also the Design process as a very complex process which contains two types of intellectual activities:
- Unconscious intellectual activities: which related to the designer’s intellectual and creative abilities
- Conscious intellectual activities: This related to the designer’s rationality and logical abilities.

2.1. Intellectual Ideological Approaches for Design Process
It means the intellectual method that is used by the designer in dealing with any design problem, and the intellectual approaches for the design process can be divided into three ideological approaches (Jones, J. Christopher, 1980):
- **The Logical Rational Model**: This approach is based on the fact that the design process is a logical process and can be explained which Christopher Jones called Glass Box (Alexander, Cristopher, 1976), it depends on analyzing all the design problems and attitudes to a group of minor problems and initial molecules that are easily analyzed to basic components and solving each part separately, and then assemble these molecules once again well to create the best solutions.
- **The Creative Intuitive Model**: represents the development of the patterns language penned by Christopher Alexander, so that they become more flexible and tailored creative thought of the designer,
which he described as Black Box, where the more creative ideas inside the mind of the designer, involuntary way inside the dark box containing the stock of knowledge and previous experience of the designer.

- **The Participation collective Model:** This approach represents the development for the two previous approaches, where can activate the user role or group designer in the design process, and it highlight that the participation of the user in the design process and decision making also is a must, and it has been used in different ways and a variety of methods such as questionnaires that contribute to the explanation of the design positions to the users (Jencks, Charles, 1991).

From studying these three approaches we can conclude an important fact that the Architectural Design Process is located on a linear scale between two opposites, Scientific and Artistic Processes, one of them consider this process as completely opaque, and the other consider it as completely transparent (Peterson, John, 1980) as shown in (figure1).

![Figure 1: Architectural Design Process views](http://dx.doi.org/10.17758/UR.U0316313)

### 2.2. Nature of Solving a Design Problem

- The complexity of issues involved in solving a design problem requires different types of thinking throughout the design process. Solving a design problem requires problem-solving strategies (follow some sequential processes) and creative efforts to reach a solution. The nature of the design process changes from traditional to creative to innovative depending on many factors, including (Peterson, John, 1980):
  - The quality of the design problem that may be determined from the beginning to impose specific solutions.
  - The nature of the content and whether natural or physical environment for the surrounding buildings.
  - Capacity, expertise and self-inventory of knowledge for the designer, which focuses on the creative side.
  - Other actors involved in the design process (owner, user, and specialized agencies).

### 3. Historical Overview About the Design Process

#### 3.1. The Traditional Vision of the Design Process

A lot of theorists wrote about the design process stages, the Royal British Institute of Architecture one of the educational institutions, which focused on the disclosure of the design process nature and stages, and they described the design process as a "two-dimensional process" as shown in (figure2): The first dimension (the sequential stages of design process) and The second dimension (the decision-making process).

#### 3.1.1. The First Dimension (The Sequential Stages of Design Process)

A vertical time line formulation reflects the sequential stages of design process from identifying the problem and put the program down to the implementation phase of the project. Many architects and theorists worked and
studied the design process trying to put some main sequential stages for the architects to follow it in their designs to achieve successful architectural outcomes. The architect’s views regarding the stages of the design process varied and the following is some architectural models for the design process stages and sequence:

- **RIBA’s Model**: Royal Institute of British Architecture decided and stated that the design process consists of twelve steps which categorized into four main stages (RIBA, 1967):
  - Briefing (Inception - Feasibility Study)
  - Sketch Planning (Outline Proposal - Scheme Design)
  - Working Drawing (Detailed Design - Production Of Information - Bill Of Quantities - Tender Action)
  - Site Operation (Project Planning - Operation On Site – Completion - Feed Back)

(table1) concludes and presents a review of some architects and theorists opinions about design process stages.

3.1.2 The Second Dimension (The Decision-Making Process)

A horizontal formulation of the decision-making process with repeated courses which occur within each stage of the architectural design processes (analysis, synthesis, evaluation, and decision-making).

- **Archer’s Model**: He determined the decision making process into some steps: (Brief – Programming - Data Collection – Analysis – Synthesis – Development – Communication – Solution).
- **Laseau’s Model**: He determined the decision making process into six sequential steps (Laseau, Paul, 1982): (Problem Definition – Information Gathering – Developing Alternatives – Evaluating Alternatives - Solution Selection – Communication). (table2) concludes and presents a review of some architects and theorists opinions about decision-making during design process stages.

3.2. Architectural Process between Traditional and Creative Processes

There are 3 different types of design processes: creative, traditional and innovative processes. (figure3) differentiates between them according to their relationship to components used to configure alternative designs.
On the other hand there are two types of design thinking: the implicit approach & the explicit approach, the following is a comparison between both of them according to the concept upon which this approach is built, the process that each one of them follow and the effect and final result for each one of them.

**The Implicit approach**
- **Concept:** Design is a holistic and creative process. it is mysterious and springs from the depths of the designer's subconscious.
- **Process:** design is best learned by watching. Once a student's sensitivity is developed, his work will be more sophisticated.
- **Effect:** design process is best taught through implication, recognition based on intuition.

**The Explicit approach**
- **Concept:** Design is only valid so far as it addresses the problems underlying the process. in a fully conscious way, human problems to be solved by design.
- **Process:** designer's first effort is to ask questions of, the problem until it loses its mystery. What the project's Premise is? What its Program Concept is? What his Design Concept for the project is?
- **Effect:** level of understanding must grow from careful analysis. This is the basis of critical judgment.

4. New Models of Design Methodology in the Contemporary Architecture

Unlike the Conventional design methodologies which tend to go through the design process in a sequential manner (usually start with analysis, followed by synthesis, then evaluation), the new models of design methodology allow different thinking modes to participate in any stage of design activities. In this part, the research will analyze 2 different approaches for the design methodology in the contemporary Architecture:
- Academic model for design methodology
- Practical models for design methodology.

**4.1. Academic model for design methodology**

This part of the research analyzes the academic views for the Design Thinking Approaches during the Contemporary Architecture. Among various teaching/learning models reviewed by the Author, there are a few approaches which make a considerable effort to acknowledge the interaction between the student and the educator in its teaching/learning model. This study has developed an integrated thinking methodology for teaching Architecture design studios by which three types of: initial, logical, and originative thinking are at work. Therefore, the model suggests that a comprehensive design methodology in Architecture requires an interactive process of thinking to employ various modes of thinking and implement flexible design approaches in different stages of design in order to develop a proper solution (figure 4).

Fig. 3: The three different types of design processes (Peterson, John, 1980)
4.1.1. Initial significant Thinking Approach

Basic thinking acts as a major processing mechanism in the designer's mind and as an archive of information and images, it considered as the most important component of thinking processes during the design process. All types of information including: the experiences they have had, the environmental background of designers, images they have seen in the past, and even those new information that they seek and collect throughout a design process, are collected and processed in this stage. Basic thinking approach can be defined as being part accepted knowledge which is responsible for presenting a solution. It involves problem solving, designing, and decision making in the model of the design process (Mahmoodi, 2001).

- **Problem Solving:** Students need to collect information and formulating the Problem in its wide range, sensing and researching the Problem, find ways of responding to those problems, finding alternatives and different ideas. Finally, choosing the Solution.
- **Designing:** This part includes Imagining and formulating a Goal and focus on it, Students need to invent a new approaches for producing solutions. And develop deeper criteria for evaluating the work in-process. Finally, revising the Product.
- **Decision Making:** In this stage students need to generate alternative design solutions, assessing the Consequences and visually explore the effects of their visual decisions on the final solution. Making a choice and appropriate decisions which are not solely based on personal taste, then evaluating the Choices.

4.1.2 Logical Thinking Approach

Logical thinking could be defined as being of recognized knowledge which is responsible for understanding a problem. It involves Analyzing, criticizing, and comparing in the model of the design process.

- **Analyzing:** Students need to demonstrate their verbal ideas in a visual/spatial manner and Patterns. Identifying assumptions about the problem, classifying various collected data. Students need to identify their major objectives and ideas of solving a problem and finding Sequences. Students need to record all of their design ideas and develop their ideas based on the old ones.
- **Criticizing:** To develop criteria of evaluating students work, Students need to assess their work, in addition to the educators' assessments, also determining some major criteria for developing solutions. Students need to recognising Fallacies and Looking for weak points for developing solutions. Also students need to verify the appropriateness of their solutions.
• **Comparing:** Students need to compare their solutions with others and to develop reasonably logical solutions for all design problems. Then the students need to infer the relative success of their solution. Students need also to identify the causal reasons in their thinking process.

4.1.3 **Creative Thinking for idealising solutions**

Creative thinking is suggested by the Author to be under the dominance of right hemisphere, responsible for intuitive, visual, and simultaneous thinking during the design process. The Author defines Creative thinking as being of generated knowledge which is responsible for idealising a solution (Mahmoodi, 2001). It involves Synthesising, Elaborating and Imagining in his model of the design process. With regards to creative thinking, the following lists of activities are suggested by the Author to be considered by students and educators of design during the design process.

- **Synthesising:** Students need to implement some design types which would help them generate solutions and to apply some design strategies to exercise their design ideas so they can prepare a plan of work to generate ideas.
- **Elaborating:** Students need to be able to expand their initial ideas and modify the initial as well as newly generated ideas to extend on the ideas which are generated by others. So they can be able to shift their perspectives and viewpoints and not stick with one idea to develop concrete ideas.
- **Imagining:** Students need to develop fluent responses to problem to predict the final solution and its effects, in order to visualize and speculate on their solutions. Besides they need to trust their judgments and decisions.

4.2. **Practical models for design methodology**

This part present a review of some famous architects’ opinions about The Design Process for the Contemporary Architectural projects, through analyzing their quotes which reflects their thoughts, present their knowledge backgrounds, analyzing their inspiration sources, understanding their development tools and displaying the final results as shown in (table3). And all these factors are related to each other (figure5).

4.2.1. **Frank Gehry’s Vision for Design Process & Strategic Thinking**

One of the most famous Gehry’s Quotes: “I know I draw without taking my pen off the page. I just keep going, and that my drawings I think of them as scribbles. I don’t think they mean anything to anybody except to me, then at the end these little drawings are damn close to what the finished building is”(artquotes.net).

**Knowledge background:** Canadian American architect, he belongs to the Modern architecture Schools.

**Inspiration Sources:** Sculptors and Painters as shown in (figure 6)

**Development Tools:** Scribbling a sketch - New floor plan – Strategies (Codex rules)

**Final results:** Morphological forms in a wonderful composition
4.2.2. Zaha Hadid’s Vision for Design Process & Strategic Thinking

The most important quote from Zaha Hadid’s Office which explains her vision in most of her works: “Digital techniques have become essential ingredients of the project development. Intermediate techniques established a fertile ground for the quick assimilation of the new digital tools in the process of form finding (A new Architectural language) and Conception of space was developed” (artquotes.net)

**Knowledge background:** Iraqi British architect - American Architecture schools -following Le Corbusier and Frank Lloyd Wright schools in architecture.

**Inspiration Sources:** Nature Sculpture artwork and Organic architecture (figure 7).

**Development Tools:** Digital techniques and Advanced Sculptural techniques.

**Final results:** Sculpted buildings appear like a mystical object. Express fluidity, velocity and lightness.

*Fig. 7: Zaha Hadid’s inspiration sources. ([www.archidialog.com](http://www.archidialog.com))*
4.2.3. **Toyo Ito’s Vision for Design Process & Strategic Thinking**

Some of the most famous Toyo Ito’s quotes are: “Architects have made architecture too complex. We need to simplify it and use a language that everyone can understand.” “We have to base architecture on the environment, the natural world systems are fluid. In contrast to this, architecture has always tried to establish a more stable system of grid; it made the world’s cities homogenous. In response to that, by modifying the grid slightly I have been attempting to find a way of creating relationships that bring buildings closer to their surroundings.” ([http://www.brainyquote.com](http://www.brainyquote.com))

**Knowledge background:** Japanese Architecture schools - following Le Corbusier and Oscar Neimeyer styles in architecture.

**Inspiration Sources:** natural forms and structures, Islamic patterns, organic design, and Tree structure.

**Development Tools:** Digital techniques and Sculptural techniques and models.

**Final results:** Branching design - Tree Buildings - Façade as structure that directly expresses the flow of force.

![Tama Art University Library – Tokyo -2007](image)

![Serpentine Pavilion, Hyde Park, London. 2002.](image)

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**Fig. 8:** Toyo Ito’s inspiration sources. ([www.archidialog.com](http://www.archidialog.com))

4.2.4. **Peter Zumthor’s Vision for Design Process & Strategic Thinking**

From the most popular quotes for Peter Zumthor’s is: “I work a little bit like a sculptor. When I start, my first idea for a building is with the material. I believe architecture is about that. It’s not about paper, it’s not about forms. It’s about space and material.” “What I try to do is the art of building, and the art of building is the art of construction; it is not only about forms and shapes and images.” ([http://www.brainyquote.com](http://www.brainyquote.com))

**Knowledge background:** Swiss architect – following Le corbusier’s style in architecture - Five points of architecture - conservation architecture.

**Inspiration Sources:** lifting building PILOTIS, to allow a sequence of green areas and free movement of pedestrians (figure9,10).

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http://dx.doi.org/10.17758/UR.U0316313 40
Development Tools: physical model to represents the initial phase of the project.

Final results: raised horizontal beam, up on pilots very large amorphous surface.

Fig. 9: Peter Zumthor’s inspiration sources. (www.folio.brighton.ac.uk)

Fig. 10: Peter Zumthor’s inspiration sources. (www.folio.brighton.ac.uk)

5. Conclusion

- Designing is a process formed from three main phases: “knowledge”, Developing Tools = “Codex Rules” and “Invention”.

- Designing Method for the famous Contemporary Architects consists from 3 main stages:
  - **First phase: Knowledge**: Knowledge is the foundation for all designing process. We architects and designers are obliged to be informed about everything that was designed in the past and on a daily basis.
  - **Second Phase: Developing Tools= Codex Rules**: Develop tools to analyze buildings and “Understand” them. Tools that will help us cope with the abundance of architectural information.
  - **Third Phase: Invention**: Once we develop our tools, it will lead us to realize our design idea, our “invention” and get a high quality and creative architecture. New architectural language and conception of space was developed.

http://dx.doi.org/10.17758/UR.U0316313
• The Design process is a very complex process which contains two types of intellectual activities: Unconscious and Conscious intellectual activities.
• The Conventional design methodologies tend to go through the design process in a sequential manner (usually start with analysis, followed by synthesis, and then evaluation).
• The new models of design methodology allow different thinking modes to participate in any stage of design activities.
• The following diagram concludes how to be inspired in a conscious way by using the different knowledge background and inspiration sources (tool box) to generate the Inspiration Techniques Tools = Codex Rules.

The following diagram Reflects processes of “conscious and unconscious” inspiration among Architecture.

• Complex thinking processes are viewed as an interaction between three types of thinking: Critical Thinking, Creative Thinking and Content/Basic Thinking.
• The “conscious Inspiration method” is formed from three main phases: knowledge, Developing designing Tools = “Codex Rules”, and Invention.
• The natural development of architecture design is based on inspiration techniques…. = Codex Rules.
• With the methodology of “conscious Inspiration,” we don’t need to be intimidated to get inspired from relevant buildings. Get inspired consciously from existing buildings, and you will experience a unique design process that will serve your creative desires.
• Once we develop our tools, it will lead us to high quality and creative architecture.

6. Acknowledgements

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7. References

## TABLE I. Review of some architects and theorists opinions about design process stages

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### Design development

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## TABLE II. Review of some architects and theorists opinions about decision-making during design process stages.

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<td>4- solution selection 5-communication &amp; implementation</td>
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### Synthesis/Creative Phase

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TABLE III. A review of some famous architects’ opinions about The Design Process.

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<th>Toyo Ito</th>
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<td>Developing tools</td>
<td>Scribbling a sketch New floor plan Strategies (Codex rules)</td>
<td>Digital techniques Sculptural techniques</td>
<td>Digital techniques Sculptural techniques and models</td>
<td>physical model to represents the initial phase of the project</td>
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<tr>
<td>Product</td>
<td>Morphological forms in a wonderful composition</td>
<td>Sculpted buildings appears like a mystical object Express fluidity, velocity and lightness</td>
<td>Branching design Tree Buildings Façade as structure that directly expresses the flow of force</td>
<td>raised horizontal beam, up on pilotis very large amorphous surface</td>
</tr>
</tbody>
</table>

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