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Defining the Design Process: Methodology and Creation

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ABSTRACT The current study is unique in its emphasis on investigating design operation and concept from multiple scientific perspectives: including invention, technique, and design components. This research tends to study the methodology and creation of design process in a holistic manner so that the readers may grasp their characteristics and properties down to its minute epistemological detail. The investigation of the design concept is where the real groundwork and pressing need for the study begin. Creation and methodology are two primary concepts in relation to design these relationships can be formed in any design because of the various forces that act upon it. The primordial objective of this study is to evaluate the relationship between methodology and creative sides of design on epistemological grounds.

INDEX TERMS Creation, design process,methodology, scientific evaluation, thoretical framework.

I. INTRODUCTION

Distinct design approaches have distinct stories to narrate regarding their intellectual vision. The creative potential inherent in the act of designing is lost once the groundwork is laid for systematic and organized labor. The design work, in a broader sense, is a methodical strategy for integrating traditional and innovative production techniques.

Thus, this study's primary objective is to pinpoint the overarching, primary design concept by tying together its creative and methodological aspects. So, the study begins with the declaration and submission of the research problem, which is "the total knowledge view for the relationship between the methodology and creative sides of the design operation". The current study has been segregated into four sections:

- The first section focuses on the design's over-lapping goals; and the discussion in relevance to the blueprints.

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- In the next section, we will discuss the creative process in design; and will identify its fundamental elements.

- In the third section, we will discuss the factors that influence design; and the entire thought process regarding them. The study is a bird's eye view towards developing an overarching framework for how to approach design and the steps involving it.

- In the closing section, we will do a comprehensive analysis of the overarching structure of nascent theories and how their relationship with design. Moreover, the study will also integrate the preceding discussion of the significance of thinking and creativity-theories.

II. VISION OF THE GENERAL THEORY

A. EFFECTIVENESS OF THE DESIGN (GENERAL FRAMEWORK)

Initial interpretations of designer thought (Lawson) suggested that designers' approach problems in two ways: either through an act of design, that involves various generic applications in everyday life; or others more specialized in the domain of knowledge (such as industrial design and engineering design etc.) where there is an eminent difference between designs and these fields [1]. According to J. Watson, this has shifted the focus on process rather than the product design, even if the study was geared toward finding a solution. He also addressed the issue throughout the design phase. In lieu of this, a requirement list has been generated that the designer must comprehend and verify by comparing them to implicit knowledge criteria in order to form or create the design Afterwards, the designer may relate the concept to the client [2].

Design, in a broader sense, is the process of simultaneously illustrating the issue and its resolution. Without few probable solutions, the issue cannot be grasped fully. In addition, one ought to adopt a proper thinking-approach as a designer in order to comprehend the core essence of the issue. This is, in fact, the major step in resolving it. Some academics see the issue as one of design effectiveness even when they are working to define the design problem. In contrast, they asserts that their prime focus is on the working of the designs instead of designers' or the process of design itself [3]. Only then it will enable the designers to comprehend the strategy used in the thought process of creating the designs. The following

table shows how the designer, J. C. Jones, plans the nomenclature of definitions in his work *Design* Method.

TABLE I

PLANNING FOR NOMENCLATURE [4]

Sr. No.	Researcher	The Definitions
1	Asimov	The adoption of the penalty as a means of decision making in the face of ambiguity.
2	Alexander	Locate the proper structural or chemical make-up of the substance.
3	Booker	Author engages in extensive mental modeling of the eventual product or process.
4	Feer	Any part of a product that is used by or related to humans will require some degree of modification.

By instructing the designers' thought processes for each design problem, you can see that, the overall vision and the philosophy of design has been built on forms either naturally or artificially. This serves as a pre-requisite to vividly comprehend standards, indications, and determinants. The current study examines the preliminary stages of analysis with regard to design. Whereas, the indicators not only offer answers; but occasionally they cross paths and may also produce new design hypotheses.

B. THE IMAGINATION OF CREATIVITY

Researchers have attempted to identify some kind of conceptual relationship between the actions of the mind and the processes of fashion: given that the design process is a collection of mental operations that often appears to be unrelated and do not follow a single model. Despite the fact, most researchers discussed a model of thought based on stages (such as analysis, synthesis, and evaluation). However, it is challenging to identify these connections in a more general sense due to the overlapping and permeable nature of the elements involved [5].

According to Zeisel, there are three overlapping patterns of thought involved in the design process: imagination, view, and testing. Moreover, the test arrives with two forms of information which in turn stimulates the

imagination in the form of knowledge that disappears to operate in a spiral design pattern [6].
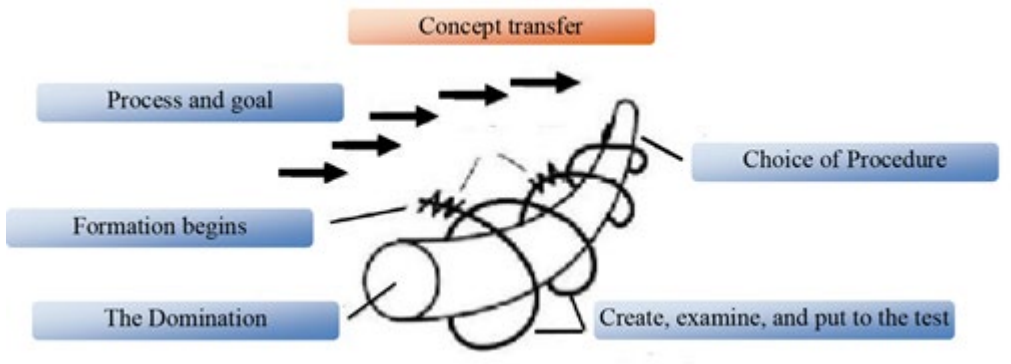

FIGURE 1 Conceptualization is a mental procedure [7].

Additionally, the analytical assessment and evaluation activities are synthesized by the intellectual interactions that take place during the design process. Due to this reason, it became practically impossible to segregate them. Moreover, it undermines to ascertain as to what extent the content's tasks has been finished timely [8].

Given that creativity and innovation depend on mental capacity of possessing those thought-processes, Hegel claims that the imagination—and the creator in particular—are viewed as a process. It is challenging to explain to someone that Homer created poetry while dozing off or without thinking. Without any comparisons, the artist is unable to manage the content of the selection process's [9].

More specifically, B. Tversky, claims that when attempting to comprehend or actualize the visual challenges, the designer is frequently tempted to mentally engage in pictorial events or the process of creating forms.

C. THE CREATIVITY (FRAMEWORKS AND VERIFICATION RANGES)

In order to create an interconnected coordinated image, the *Theories of Scientific and Technical Needs* require a more pronounced imagination. Humans are the source of all scientific and artistic discoveries since they are the ones who creates art [10], [11]. Rochka believe that qualities and characteristics that are connected to creativity, such as the ability to be emotionally and mentally motivated, are important, especially in the field

of design. Fluency, adaptability, inventiveness, and originality were identified as the four criteria of creativity [12].

Design scholars agree that individual's harbor striking and distinctive design elements. Numerous researches have established connections between the characteristics of both form and content. While the majority of evidence favoring form in terms of structural elements. When a new concept is introduced, it must be met on all fronts, from the depth of thinking to the novelty of the individual components, thus integrating the creative idea of the designer.
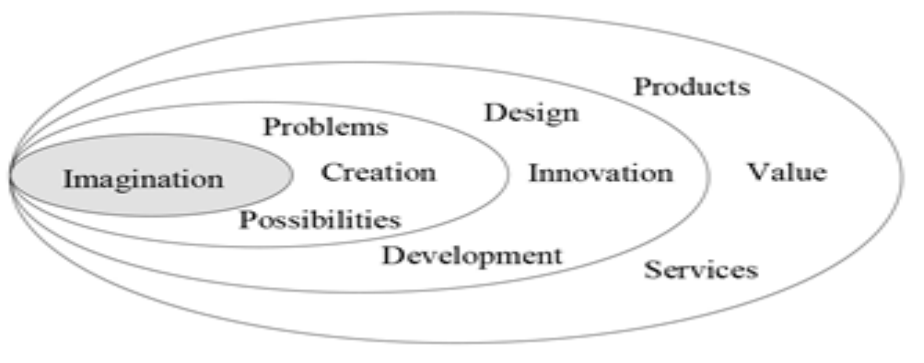

FIGURE 2. Stages of creativity [12].

III. THE REAL SITUATION OF SYSTEMATIC

A. THE SYSTEMATIC

The German philosopher Heidegger upheld the custom of introducing a novel understanding of man and life to the world through common experience by raising philosophical issues. Akin to him, the framework of creativity serves both to identify the design process; and to vividly delineate the possibility of incremental improvement. Consequently, the path taken by this philosopher can be summed up as follows:

1) METHODOLOGY

The procedures or approaches in question that are formulated in the right ratio to the production process are known as the method. Likewise, methodology is a group of techniques, but there are rules that tell you how to use them in a certain way. These rules are often needed when "methodology" refers to the widest and most important techniques.

Many philosophers have endeavored to link the logical approach to research methodologies and analysis. Jean Piaget claims that scientific crises inevitably arise whenever a mistake is made or the veracity of a theory is questioned, particularly when using traditional scientific procedures [13]. We can sum up this strategy by saying that it involves in organizing activities that best befits the current situation. The link with the theoretical side is also strengthened by the vision narratives specialist approach to design, which is used to analyze problems; and come up with logical solutions and to stress how important it is to clarify the adopted curriculum [14].

The usefulness of a creative and systematic conceptual vision in determining a thorough approach and the best strategy to be adopted and applied to the topic of design in general and design in particular. In order to address the issue of theoretical study, which states: "There is no understanding of how the systematic design process and the creative side of the mind work together"[15].

For the research to go in the right direction, the following goals must be met:

- By looking at methodological and creative thinking issues, we can build a theoretical base for cognitive perception.

- Individual indications and design components are represented through the application of cognitive model theory.

- It is critical to strike the right balance between being creative and methodical during the design process.

2) CONSTRAINTS OF DESIGN

The design effort is exposed to variety of internal and external limitations. Representation of the interior is the underlying problem because the receiver uses it as a constraint, and the designer adopts it in order to find answers. The second one, which has a time and spatial border [16] represents the substance of the situational problem related with the results of the solutions. Consequently, the following restrictions can be used to segment the design problem:

- Radical restrictions: Are the constraints that address the system's aims and contain the main issue?

- Practical limitations: This type is in charge of the technical details and aesthetic design since it deals with production-related issues that enable a product's functionality.

- Symbolic restrictions: These give meaning to aesthetic design because it is responsible for the expressive parts of design that serve as the symbolic communication.

B. THE THOUGHT-PROCESS OF DESIGN

The designer's notion is the initiating point from where he seeks to transmit his entire experience and heart's impulse–on paper to generate forms. Before deciding on the model's content or shape, the designer demonstrates how closely the design concept connects the designer's creative talent. The art work is accurate and intended to be mindful of the circumstances [17].

To achieve full integration, the designer must create a loop relationship between the, the customer and the receiver. To identify this missing link, we might argue that the designer organizes the integration process via expressing his experience. Moreover, the designer seeks to combine social ideals and cultural history into the design to ensure that the results are in accordance with the values and norms of the society. To achieve this, following sources are commonly used to establish the Design idea:

- An online resource

The designer usually incorporates traditions, social norms, and cultural history into the design in order to ensure that the finished product is in accordance with the values and norms of the society.

- Discerning source

The idea is applied to a variety of aspects that are related to the designer.

- Impressionist sources

There is a back-and-forth relationship between what it takes to design, the knowledge to store, the information to gather; and the experience of the receiver in order to come up with final ideas that support the theme of the design.

- Influential source

The substance of a form significantly impacts a designer's capacity to devise a concept that will elicit the desired response from the recipient. The field of design integrates intuitive reasoning with the process of transitioning between two states in order to establish coherent modes of operation. The initial stage involves posing preliminary inquiries, whereby the solution is already stored in memory. The objective is to resolve design issues and to organize research into three cognitive phases of analysis, synthesis, and evaluation.

IV. THE COGNITIVE PROCESSES OF DESIGNERS?

In an effort to progress towards this approach, Jones espouses the perspective that design is fused with the realm of intuition and logic, progressively transitioning towards the concrete steps that culminate in rationality. This approach equips designers with techniques to: regularly externalize their information from memory [18].

According to him, the three stages of thought in the design process are:

- Diverse thought: To get the most out of the issue, extend it in all directions.

- Consider thought: It is intended to be the point at which a solution is created, and in this instance, the objective is to alter how people perceive the issue in order to make it more straightforward and understandable.

- Formal thought: A basic set of guidelines for what determines proportions, color, texture, and other things is established by addressing the qualities or optical organization of the visual system and the performance of form.

- Converging ideas: Reductionism is a cognitive approach that arises from decisions made in the initial phase.

To ascertain the exact solution, it is necessary to evaluate the general or partial solutions that have been proposed. The field of design integrates intuitive reasoning; and the interplay between two scenarios to establish consistent mechanisms of operation. The approach under consideration acknowledges the interdependence of the initial phase with the formulation of fundamental inquiries, whose responses are already retained in the cognitive system, to resolve design predicaments.

Additionally, it segments the investigative process into three cognitive phases that pertain to design, namely analysis, synthesis, and evaluation.
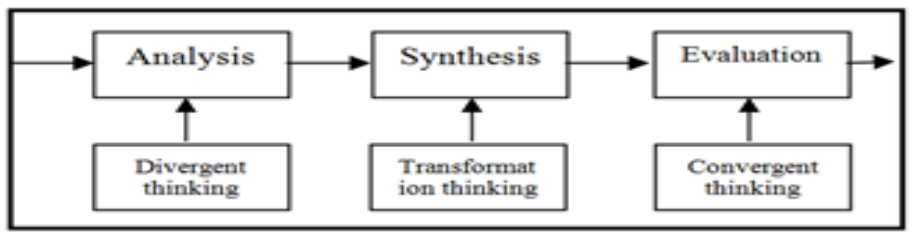

FIGURE 3. Stages of the design work for the kinds of thinking [19].

V. THE FRAMEWORK OF KNOWLEDGE PERTAINING TO DESIGN

This discussion pertains to the frameworks utilized by a cognitive adopter in alignment with the principles previously expounded upon. The three main phases of the design process: namely, analysis, synthesis, and evaluation acknowledge the significance of the cognitive perspective of the design process in determining the boundaries and limitations that constitute the fundamental aspects of the design problem.

The notion of ownership and coverage, even in the context of private entities, presents a spectrum of opportunities for innovation that can be explored within the boundaries of these limitations.
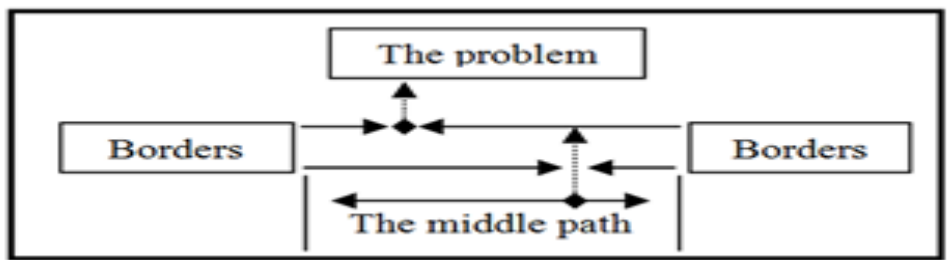

FIGURE 4. Preliminary vision to study the problem[19]

A. BUILDING FRAMEWORKS

The investigations demonstrate that the knowledge frameworks use four design theories to describe the origins of shape; or four classes, techniques, and designs that interact to create a type of knowledge. The ultimate result of a vision tends to exhibit a greater degree of creativity than being

systematical. It can be inferred that these frameworks are established on a set of scenarios that stem from the initial design process [20], [21].

1) TYPICAL PERCEPTIONS

The comprehension of sources regarding the advancement of the stages of production concept is influenced by distribution patterns.

2) VIEWS OF SPECIFICS

Within the parameters of the analysis process, indicators are what determine when a product will emerge. Product phase composition emerges based on indicators that are on the systematic side. Through overlap and systematics, indicators from the creative side's evaluation phase determine how a product emerges.

3) OPINIONS ABOUT CREATIVITY

Adopting a variety of roles, identifying the conceptual nexus between synthesis and analysis.

4) APPLICATION OF IMAGINATIVE CREATIVITY

The concept draws a line between analysis and evaluation through the application of imaginative creativity. The concept, which embraces the zeitgeist, simultaneously serves as a synthesis, analysis and evaluation point.

5) ADAPTATION TO SOCIAL AND ECONOMIC CIRCUMSTANCES

Design impressions can refer to the overall aesthetic impact or visual appeal of a design. Utilitarianism is a philosophical approach that emphasizes the practicality and usefulness of a particular style or approach. The concept of symbolic style refers to the use of symbols or symbolic language in artistic expression. It is a technique that has been employed by artists throughout history to convey complex ideas and emotions in a concise and impactful manner. This style is often characterized by the use of metaphor, allegory, and other forms of symbolic representation to communicate meaning to the viewer or reader.

B. DESIGN PATTERNS

The design has various aesthetics; and is manufactured to resemble naturally occurring forms by using contrast to direct the designer's thinking. As we've already mentioned, this depends on both the creative

and systematic sides, but what are the key elements that inspired them to come up with the idea [22], [23]?

Between analysis and synthesis, pattern depends on function for the interpretation of shape before stabilizing. The examination of the pattern depends on the creative imagination. Whereby, the design parameters determine the pattern. This pattern, in turn, is backed up by the formal constraints.

VI. THEORIES OF DESIGN

Prior to proceeding, it is imperative to establish a mutual comprehension of the parameters that define the concept of design and those that do not. The concept of design is ambiguous due to the existence of multiple theories pertaining to it, originating from diverse design-related disciplines, all of which warrant inclusion in the discourse. Prior to contemplating the adaptation of design theory, individuals must possess a comprehensive understanding of the definition of design and ensure that the associated terminology is unambiguous [24].

According to Lawson, there exists a distinction between engineers' and designers' designs, with the former being associated with technical aspects and the latter with imaginative aspects. This differentiation is evident in the execution of designs. Both of these characterizations are somewhat exaggerated as effective engineering necessitates a significant amount of ingenuity and yields unforeseeable outcomes, while proficient fashion design is improbable without a substantial amount of technical proficiency. Consequently, numerous design modalities encompass both precise and ambiguous notions, demand both methodical and disordered thinking, and mandate both innovative idealization and technical calculation [25].

Furthermore, design is a collaborative process that involves a group of individuals working within the confines of scientific rationalism, drawing upon the freedom of artistic creativity, and being motivated by the traditions of craftsmanship to produce novel creations. The act of designing involves the systematic development of a product or system that can be recorded and formalized. This volume presents design as dialectic. This study pertains to the deterministic and procedural constrained field of planning, while its underlying philosophy draws from post-structuralism and critically creative principles of art [26].

To attain a comprehensive understanding of this particular set of concepts, it is advantageous to examine the design definitions put forth by preceding scholars. The definition proposed by Christopher Jones, one of the oldest and most influential writers in design theory, is the one that highlights the strength and power of a designer. He states that design is: "Initiating change in objects manufactured by humans [27], [28].

Additionally, he categorizes the design theories as follow:

1) As per the initial concept, the process of design involves the creation of a structure that is derived from the intended purpose.

2) The second hypothesis posits that the form in question was generated through the use of imaginative creativity.

3) The third theoretical perspective posits that the configuration of the community is derived from the circumstantial evidence.

4) The fourth notion posits that the configuration is fashioned in accordance with the prevailing social and economic conditions.

5) The fifth conjecture maintains that the shape is derived from the principles of the eternal form.

According to the designer, the ability to perceive a developing path instead of a chaotic mess enables them to design strategy. The author places significant importance on comprehending the concepts of identity and emergence. Hence, the discipline of design can be perceived as a cognitive process, a cognitive disposition and a philosophical framework that employs these constructs [29].

VII. CONCLUSION

The concept of design involves emulating the visual characteristics of natural phenomena as well as the human-made artifacts. The approach facilitates designers in contemplating a design problem from various perspectives that are contingent upon the design discipline they opt for. Furthermore, the proper functioning of systematic creativity is contingent upon two factors. Whereas, utilizing one's innovative and creative abilities act as a catalyst for generating novel ideas.

One approach to achieve this objective involves establishing a workable methodology that fosters ingenuity and innovation. Thus, enabling the individuals to produce artifacts that align and corelates with their enduring,

time-bound, and spatial circumstances. By replacing the distinct stages of design work (namely analysis, synthesis, and evaluation) with the notion that encompasses a meticulous duration of the suitable boundaries helps in establishing the design language of the issue at hand. It is possible to modify the subject perception by external parties. Formulate perspectives on knowledge that are grounded in its originality and its potential applications, its initial conception, or its functional mechanisms. The study examines the distributional patterns of knowledge within a context that is both pluralistic and overlapping. The concept is uniformly distributed across the three phases of the production process. Through the utilization of two distinct analytical methodologies, two disparate structural classifications, and one evaluative approach.

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