

## **Benefiting from the nanotechnology applications in the design and production of metal furniture and construction**

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### **Introduction:**

Design is an interactive process among the designer, the environment and the needs of consumers on the one hand, and the design idea and the recipient on the other. Design thinking is found at every stage of this design journey, from the customer's lines to the completion of the work. A simple change in this process can result in another solution leading to different levels of creativity, practicality and budget. Hence the relationship between design and the thinking process, and a trend of thinking emerged in the late 2000s known as design thinking, which is a type of organized and interconnected creative thinking, directed towards customers and working on their needs and improving the efficiency of the service provided to them, and depends on the mind to understand the complex problems, also to find out their causes and reach innovative solutions. Therefore, the role of the designer overlaps in every stage of design thinking as a creative methodology. The most important characteristic of design thinking is that it is an approach that can be practiced by ordinary individuals, and it derives its tools and practices from the sciences of design, management and engineering, and it follows more than one way of thinking. And building on them through the ideas that are built and developed through the design thinking team through its various stages, and the ideas are often visible and practiced through visual thinking. Which are often outside the box and out of the ordinary, then finding appropriate solutions for them, and identifying the negatives of the prototypes to meet the unsaturated needs of consumers through successful goods and services.

-Design thinking is closely related to the creative process, as companies and organizations need to innovate in response to competition and to meet changing market demands, for this reason, design thinking is a successful way to link the present with the future. Future creations depend on intuition and uncertainty. Design thinking takes its data from the present from an already existing problem and uses design tools to reach innovative solutions that satisfy users in the future. Therefore, design thinking is linked in all its steps to the consumer experience, as it is considered the creative reference to which it directs the creative energies of design thinking. The competition between brands has intensified, companies have to innovate and differentiate themselves by offering customer-centric campaigns and experiences, and companies have to give their target audience a compelling reason to become loyal customers.

### **Defining design thinking as a theory or approach to creativity:**

-Design Thinking is a comprehensive, innovative, customer-oriented approach aimed at generating and developing creative business ideas or entire business models. Essentially, Design Thinking attempts to follow the approaches and methods of designers to solve different problems and issues. This approach applies to all types of business ideas - whether they have a product or a service.

**User experience:**

- The experience of each individual user is nothing but his/her personal opinion about your site, your application, your commodity, etc... Many people think that user experience is (UX), but in fact it is an abbreviation of User Experience Design (UXD).
- The designer's goal in this case is to reach the efficiency of the user experience, which is what design thinking seeks through its stages and tools. Each project or commodity has two goals, a user goal and a project goal, and the successful designer is what can combine the two goals, and what is meant is how to make the goal of the project be achieved when the user gets what he wants.

**Design thinking and user experience and their relationship to advertising design:**

- Design thinking is defined as an approach to solving problems, as it is a method for knowing their formation, it begins with defining the problem, then taking the next stages of forming ideas, and testing solutions to see how successful they are. It is also used in both the business and creativity sectors to create solutions to multiple complex problems. aspects. There are 3 main axes on which design thinking is based: empathy, innovation, and overlap.

**First:** Sympathy with the consumer on which the innovative solutions to be created are based, in order to fully understand his/her pain and needs, and work to satisfy them.

**Second:** Creating something new or enhancing something that already exists. Innovation touches the future and helps to imagine it instead of accepting reality. It is about creating what should be instead of what already exists.

**Third:** Overlap, because acquiring the masses is not an easy thing, and it requires many efforts, making and testing the proposed solutions to find out what they need.

- With the intensification of competition between brands, companies have emphasized customer experience as a major competitive differentiator, as it brings many advantages to their business, such as repeat customers and increased demand. An emotional connection between the brand and the customer by engaging them and placing them at the center of their strategy.

**The relationship between design and design thinking as a creative approach:**

Design thinking uses the methodology of the designer's mind when solving problems.

This can be explained as follows:

**First:** Design thinking uses design through two stages:

- 1- Analytical stage for detection and discovery.
- 2- The stage of industry, which is the stage of invention and innovation. It will lead to innovation by research, observation and ethnographic information generated in the research process, creating frameworks for understanding data, analyzing the needs of new customers and developing new solutions or products to meet those needs.

**Second:** Use of innovative design sciences and tools:

- The designer is always thought of as a professional who possesses many abilities such as the use of aesthetics, ergonomics, and the exploitation of emotion. He also possesses skills such as sketching, the ability to imagine, drawing, and prototyping the design.

Design thinking uses some design's principles, which are:

- Empathy
- Innovation, or what is known as Expansive thinking in some references.
- Experimentation

## **Design thinking from an operational point of view as a method for studying and solving design problems:**

From an operational point of view, design thinking consists of a set of steps and stages that are sequential and overlapping among themselves. These steps can be reviewed as follows:

### **1 - (problem forming study):**

The stage of inspiration takes place through its four steps, which are:

- A- Defining the problem.
- b- Gathering information.
- C- Observation
- D- To form a vision or insight about the problem.

### **2- (problem solving study):**

The stage of innovation, prototyping, and testing of solutions takes place.

### **Type of information and how it is collected:**

Design thinking combines:

- Intuitive thinking: which requires qualitative (primary) information that guarantees sympathy with the recipient or stakeholders.
- Analytical thinking: which requires quantitative information about competition, the market, etc...

### **How and how to collect qualitative and primary data through user experience-based observation:**

- It is the information that enables sympathy with the recipients and the public, and it can be collected through opinion polls, questionnaires, etc. as previously mentioned.
- Information can also be collected by going and living (immerse) in the field of the owners of the same problem.
- To enhance the understanding of consumers and knowledge of their needs, it is not enough to ask questions at this stage. Asking questions will answer the main points, but it is not enough to understand the users' pain. Companies must leave their places and deal with the user's experience, and therefore the problem must be lived with them.

### **Thus, the methods of collecting information at this stage can be summarized:**

- Observation
- Interaction with the user (engage).
- Immersion in the user experience.

Through empathy we can analyze the problem. It is about dividing complex concepts and problems into smaller components that are easy to understand. This stage involves creatively breaking the puzzle together to form complete ideas. This occurs during the defining of the problem phase when we organize, interpret, and understand the data we have collected to create a problem statement.

**Types of observation used in design thinking to study (User experience):**

- 1- Usage-tested observation: It is used for goods and services, the primary value exists in observing their actions towards the goods and services.
- 2- Contextual research: It relies on observing people in their natural environment, as they go about their normal lives and transactions where users explain what they are doing, but the main value is about observing the details of the way they usually perform their tasks.
- 3- Natural Observation: Through it the researcher tries to observe one or more people in secret, without interacting with them. The goal is to observe the normal behavior of the participants.
- 4- Shadows: The researcher follows the users as they go about their daily activities without interacting with the user, or the session may be more interactive, where the users talk about what they are doing and the researcher asks questions.
- 5- Covert observation: It is similar to natural observation, but the researcher observes people without them knowing that they are being observed. Of course, people can be morally monitored only in public places, where there is no expectation of privacy.
- 6- User observation by participation: It is a traditional ethnographic method in which a researcher joins a group and participates in its activities. The researcher observes and interacts with the group members while performing the same activities. For example, a researcher may become a (call-center operator) for a few days, in order to better understand the work and experience of these operators.

**2- problem solving study****A- Ideation stage:**

- The goal of this stage is to find solutions to the problem, what we mean is the stage involved in the design process where we come up with a large amount of ideas in an attempt to find and implement the most creative ideas that can be implemented in later stages, as this stage allows the design team to consider creative ways to meet the needs Highlighted by consumers in the empathy stage and their context in dealing with problems.

**There are some criteria to consider when choosing ideas:**

- It must be inspiring, new and exciting, and relevant to the challenge.
- It must solve the problem and address the specific dissatisfaction or pain.
- It is recommended that the inspiration phase team that worked on formulating the challenge or problem be responsible for this step, as the concepts developed should be related to the problem.

**B- Implementation stage:**

- Now that we have dozens of concepts instead of the hundreds that were in the idea generation stage, we need to choose from them, to do so, we will engage users. We are already in the third and final stage of the design thinking project where the implementation stage, at this stage, as in the inspiration stage, the user is very important.

**The goal of the implementation phase:**

- Test the assumptions behind the solutions.
- Get feedback from the user about solutions.

- In fact, the solution was created after the ideation phase, which starts from the existing challenge and the ideas generated by the inspiration phase. Therefore, solutions are based on abduction and intuitive thinking. In the implementation phase, we rely on assumptions about users' behavior and their preferences and dislikes, but these are just assumptions that need to be tested and validated. Once the design thinking team understands what it wants to create a prototype for, the decision stage comes for how to create a prototype for it, whether it is cardboard, paper, physical or screens. The prototype can also be just sticky notes on the wall. The poster can be a prototype too, as long as it achieves connecting with people and getting feedback. The whole idea of building a prototype is to make sure to get feedback, and communicate with the user to know their opinions about the solution. Prototypes bring with them many unexpected surprises.

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