General and Special Materials Selection Criteria for Interior Design Projects

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***Abstract*—In the field of interior design, materials are considered of the most important elements that play a vital role in the functionality of internal spaces. The selection of these materials according to clear criteria is considered one of the most important inputs guaranteeing the project's success and practical efficiency. In this context, this study aims to look into the general criteria for the selection of a material according to previous studies, in order to explore and clarify the special criteria that should be adopted and implemented when selecting materials in the internal design project. This research work is mainly due to the researchers' observation of an evident lack in the quantity of information on the selection criteria of materials in the field of interior design, whereas most of what has been reported in numerous related studies are information only showing the technical properties of the material, thus qualitatively limiting the designer's choices and the application of his creative ideas.**

This research in previous studies showed that there are general criteria for materials, which are essentially artistic, technical, functional, aesthetic, economic and environmental, that should be considered when choosing the material as a design element. This research also concluded the special criteria for the selection of materials as a design element and as an element listed as part of a group of elements that constitute a comprehensive aesthetic functional system reflecting solutions for the interior environment, which, in turn, reflects a range of sensory effects emanating through the material, shape, texture and color. It is expected for the results of this research to assist those who work in the field of interior design from the academics who teach this discipline, the students, as well as the professional working at consulting and executive offices in the labor market, by providing them with the selection criteria for materials in interior design projects.

***Index Terms*—materials selection criteria, Interior spaces, Materials, Interior design, Design projects.**

I. Introduction

Materials are defined as the basic building materials for engineers, architects and interior designers, whereas they are adopted in the innovation and giving form, shape, diversity and distinction of the interior space and its various components. Researchers also mentioned that these materials usually translate the physical and psychological form of the space as well as the structure, finishing and contents used by man [1,2], to express a comprehensive functional and aesthetic system reflecting solutions for the interior environment. Kang & Gueri mentioned that the designer works through these materials and the good utilization of them to achieve functional quality and provide aesthetics for the human senses [3].

Within this framework, materials are considered one of the most important elements involved in building the functional and aesthetic system for interior spaces. Despite the simplicity reflected in the use of the term by many members of the field of interior design, yet deeper understanding of the concept reflects, as part of the design process, whether space had succeeded in performing its function or not for some of the materials to become, as explained by Kilmer & Kilmer, and integral part of the structure of the building, while others are applied as a surface treatment or used in the components of interior space as furniture elements [2].

II. Characteristics and Source of Materials

The characteristics of the material varies and differs according to its source as explained by many researchers [1,2,4], with emphasis on the presence of three categories for classifying materials as follows:

- Natural Materials: That is for the substances to remain in their condition without change unless there is a need to introduce superficial modifications to use them, such as "stone, wood"
- Converted Materials: Which is the conversion of Natural Materials into Converted Materials, such as "converting silt by burning into bricks or tiles"
- Artificial Materials: These are the materials that do not exist in nature and are manufactured through industrial processes, such as "glass, plastic".

Manuscript received March 1, 2018; revised October 23, 2018.

doi: 10.18178/ijscer.8.1.16-20

It is worth mentioning here the diversity and variation of the materials derived of these three classifications. The texture, color and overall sensory effects of these formations keep expanding through technological development. In this context, Kilmer & Kilmer indicated that technological development is not limited to the emergence of new materials in each generation, but shows new methods of using old materials, in addition to enriching new design ideas [1].

In the face of this diversity, variation and development parallel to the expansion of the variety of materials in general, and those used in interior spaces in particular, the designer is faced with a number of difficulties in selecting the appropriate materials for the project to suit his design idea on the one hand and the executive aspect of that idea on the other. Here, we note that the designer is also invited to consider the use requirements, usage and how the user deals with the interior space.

III. The Relationship between Materials and Interior Space between Use and Formation

Architecture and user can be considered two key elements that embody the urban environment, with the need to focus on the former as a material structural element - architecture and its extensions - and the latter as a moral material element - the utilizing person - embodying its performance and thus humanizing it. In this context, this special interactive relationship between these two elements cannot be ignored or overlooked instead, there should be focus on the nature of the user's dealing with architecture within its sensory and cognitive framework in all that is related to it, material or otherwise. This, of course, with the need to adopt the importance of the visual aspect as the primary factor on which this relationship is based. In this context, Wastiels and Wouters indicated that designers do not design space for functionality alone, but in order to create a mental image for the users as the materials used in the space greatly affect the user's perception [5].

From this perspective specifically, materials are considered some of the most important design elements that contribute, significantly, in reflecting a comprehensive image of the buildings, particularly through their active role in providing consistent and interdependent images that facilitates the user's integration into his surroundings and environment. This integration is evident in enabling the user of being well aware of the functional meanings and his ease of movement in the interior spaces, with a positive interaction with the material elements contained in these spaces, ranging from pieces of furniture, walls, and lighting, which are supposed to form the overall aesthetic system where materials are harmonious through coordinating their texture, color and distribution.

Attention should be drawn here to the importance of the role of the characteristics of materials as a design element in itself, as well as the method of distributing them in quantity and quality as an overall formation system, to help users affirm the design idea and realize the meaning or function of the building as stressed by Soliman [4]. Wastiels & Wouters explained that it is important for the architect to take into account the elements important to the user's experience through his senses, such as the color or texture of the material [5], which will be essential in the formation of this image, affirmation of the design idea and perception of the functional meaning.

With regard to the methods for the distribution of materials, Soliman mentioned that if the texture and form of materials were combined in a single material, that can affect the function or aesthetic perspective of the material itself, and can affect the level of mental image formation for the user of the space as well. Here he gave an example for using ceramic with the texture or form of wood in the living room, indicating that it may not necessarily be the most appropriate choice in such interior spaces, especially if we consider that perception is in the form of the wood. However, the combination and use of the two materials here eliminates one of the most important characteristics represented in the feeling of warmth, which makes the user feel uncomfortable, when this choice may be appropriate in other spaces [4].

It is also possible in this context to shed light on the difficulty of identifying the priorities for the selection of materials in general, and the clarity of the considerations related to them in particular, which led to a consensus among most researchers, that overall, it is a complex process that includes numerous conditions, decisions and considerations [5,6]. It is not possible, for example, for the design architect to choose the stronger and less expensive materials, or the materials available, without consideration for other characteristics and inputs that may add to the building as mentioned by Wastiels & Wouters, who had defined other dimensions in this context, such as the warmth, shape and function of the material, in addition to local materials [5].

IV. General Criteria for Material Selection

Many researchers have addressed the general criteria for the selection of materials. There are those who divided them into three categories, the first of which includes the overall functional criteria represented in the suitability of the material for the purpose of use, its durability for the intended purpose, in addition to the ease of maintenance, repair, cleaning, resistance to damage and sabotage, safety characteristics and acoustic performance. While the second category is represented in the aesthetic criteria related mainly to color, texture, drawings and patterns, with the need to allow for visual coordination with the intended use. As for the third and last category, it is related to the economic criteria usually related to initial and ongoing cost and the estimated cost of maintenance, cleaning, and repair [1].

There are researchers who focused on the interior designer and the need for him to be knowledgeable about the fundamental characteristics and practical values of the materials, in addition to possessing an aesthetic sense and judgment to determine the best materials for the intended purpose. Kilmer & Kilmer mentioned four basic

criteria the interior designer should verify, the first, second, and fourth of which fit what Pile mentioned, yet they are relatively different in their own inputs. With respect to the functional characteristics, in addition to being suitable for use, durability, ease of maintenance and the acoustic characteristics, Kilmer & Kilmer mentioned the need to be resistant to damage and fire, with insulation according to the regulations and standards. With respect to the aesthetic characteristics, and the material should suit the design idea as well as being visually appropriate for the mood and space area with consideration for the weight and size and their percentage of the space, in addition to what Pile addressed with respect to surface characteristics represented in texture, style, color, light and reflection qualities. they dedicated the third category for environmental considerations, which they identified through mentioning the environmental effect of acquisition and manufacturing, where they are renewable materials that can be recycled and are non-toxic. With respect to the fourth category, researchers mentioned economic considerations that he specified in the initial costs of the materials, shipping and installation, availability of materials, cost of maintenance and the possibility of replacement [2]. Florez and Castro-Lacouture confirmed that visual features of materials [7]. In addition to the technical, environmental and aesthetic features [8]. While others, Zhou *et al*, set three important characteristics that should be given attention when selecting materials, namely First: Mechanical characteristics that include strength, hardness and density, Second: Economic characteristics that are related to the cost of each of purchase, process, transport, recycling and the possibility of disposal, and Third: Environment characteristics related to environmental pollution, power consumption, recycling, reuse and division [9]. Kenneth & Michael and others mentioned the presence of chemical characteristics [10]. and physical characteristics [10-11]. Others also added mechanical characteristics of the materials [10,11,13]. Ljungberg mentioned that sustainability is important when it comes to choosing a select material [12]. Therefore, this study aimed mainly to identify the selection criteria of the material and to comprehend its various characteristics according to the different nature of every field. Through the previous studies, it becomes evident that there are general agreed upon criteria for the material as follows: Artistic, technical, functional, aesthetic, economic and environmental that should be taken into consideration when selecting the material as a design element.

V. Criteria for Material Selection and Bases of Interior Designer Trends

Researchers conducted several studies to define the various criteria that designers should follow when selecting materials. Here we mention for example the study conducted by Researcher Moussatche, through which survey results showed that the selection of materials by an interior designer is, primarily, according to clients' preferences and needs, aesthetics, and cost. Initial results also indicate that there are health factors that were not important criteria in the selection of materials, such as the emission of volatile organic compounds (VOC), susceptibility to microbial growth and long-term environmental impact [14].

In another study by researchers Kang & Guerin, sustainable interior design was addressed, which is interested in working on enhancing the quality or the interior environment through improving the quality of air indoors, human comfort and the use of sustainable internal materials. This study focused on how interior designers use environmentally sustainable interior design standards to provide a basis for developing assimilation and adoption strategies for sustainable interior design. Within this framework, sustainable interior design practice was defined through three factors: Global sustainable interior design, quality of interior environment, and interior materials. Participants among environmentally sustainable interior design were asked to evaluate three dimensions: Repeated application, its importance to the designer's company, and its importance to the designer himself. Results showed that the highest grade was its importance to the designer and the lowest was for repeated application. Also, the use of sustainable interior materials was defined as the least applied in sustainable interior design with respect to the quality of the interior environment. It was emphasized that the practice of sustainable interior design is not as important as it is perceived to be. The researchers added that there is a need to focus on the teaching methodology that works on improving the practice of environmentally sustainable interior design and understanding the impact of the life cycle of the internal materials in it. Finally, they stated that the environmental, economic, and social dimensions should be in full balance in order to achieve sustainable results on the long-term in interior design. They pointed out that the stages of the design process here was not very much affected by environmental issues [3].

It is noticeable from these two studies that interior designers have failed in the criteria for sustainable health.

Through the study, it is evident that many designers in various fields lack information on materials. Kang & Guerin explained for example that many interior designers have limited knowledge of the characteristics of the materials that negatively affect the environment. While environmental issues are always of particular importance in the process of selecting materials in interior design [3]. Researchers Wastiels & Wouters also indicated that architects need to get comprehensive information on the criteria for material selection so that their choices are justified and correctly studied through the design process, and that there are many sources that addressed materials, but to date, there are deficiencies in the study of the intangible aspects of the material within the space. Whereas the current tools and data for the selection of materials provide sufficient information on the artistic and technical aspects of the material and are useful for determining its performance, yet these tools and data lack the considerations and

descriptions for assessing the sensory and moral aspects, which are important and necessary to architects [5]. While Karana *et al*, explained that the product designers are the ones responsible for the selection of the materials appropriate for their products, through taking into consideration the artistic and sensory characteristics of the materials. He also added that they feel disappointed as those designers do not have variety in the sources of tools and systems that enable them of getting sufficient information on the materials [6].

VI. Special Criteria for Material Selection in Interior Design

Previous studies on the selection of materials in various fields show that there is a set of measures that fall under the aforementioned general criteria such as the life cycle of the material, sustainability, and quality of the material. While the selection of the material in interior design is specifically based on special criteria in addition to these general criteria, which are based on considering the wishes and choices of clients, the needs of users, requirements of use, and a set of cultural, social, and economic dimensions related to the material as an independent design element.

Within this specific framework, it is possible to address the use of the material from a special angle that sheds light on its structural framework and its characteristics derived from its source, quality, value, and effect as an independent design element. Thus the material is defined in this context as a set of elements that reflect visual effects that include, at the same time, the substance, its texture, and its color, under the effect of the amount and type of lighting as shown in Fig. 1,

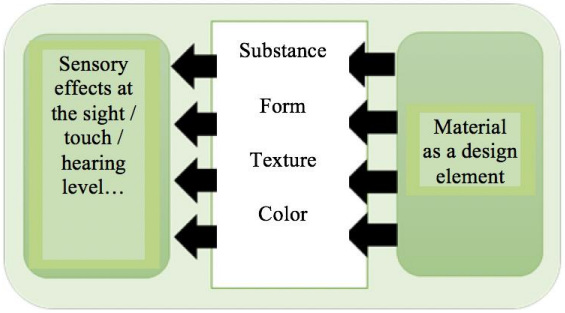

Figure 1. Characteristics of the Material as an Independent Design Element

However, these special criteria, in turn, impose other important criteria that cannot be overlooked, as the latter are related to the importance of the role of the material characteristics as an independent design element included in the actual design, within a functional and aesthetic combination for the interior space as a whole. This space is then regarded as a collective formational system that reflects a quantitative and qualitative distribution method of the materials as the whole of its constituent elements.

In this context, the material loses the part related to its independence and maintains its overall characteristics, so it becomes a formational "part" of a "whole", in which independent elements react and interact including the configurations and combinations of each element, for the formation, in turn, to become a "whole", that is usually of a great importance in helping users as part of reaffirming the design idea or perceiving the meaning or function of the building as shown in Fig. 2,

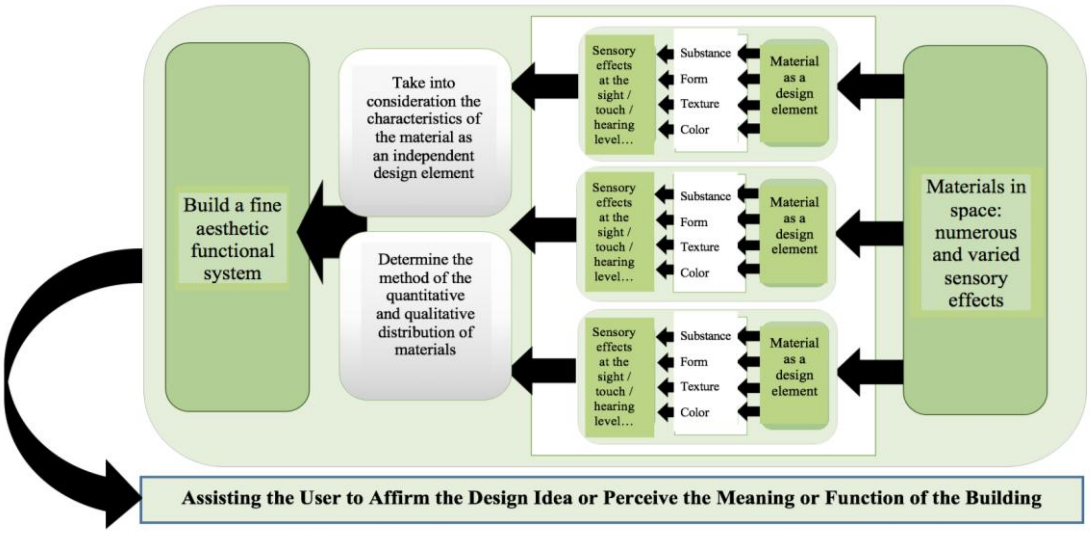

Figure 2. The relationship between materials and interior space between use and formation

From this perspective, the need becomes clear and evident for awareness of the importance of defining the overall general criteria of the element as an independent design element, as well as the overall special criteria for the selection of materials or listing them within a set of elements that will react and generate, within the scope of its aesthetic structure, special visual effects, thus forming a comprehensive aesthetic functional system reflecting solutions for the interior environment, which, in turn, reflect a set of emerging sensory effects, particularly through the substance, shape, texture, and color.

VII. Conclusion

This research shows that there are general criteria that should be considered when selecting the material. These are classified as artistic, technical, functional, aesthetic, economic, and environmental, which are usually considered according to the reality and requirements of every project. This in addition to the need for considering other criteria that were classified by researchers as special criteria related to the design in interior spaces. These criteria exceed the characteristics of the material as an independent design element, to be related to the fact of interaction of multiplicity of materials in the designed space and the quality of the resulting sensual effects at the sight, touch, and hearing level. While focusing on defining the method of distributing the materials for the project, with respect to quantity and quality, and define the extent they relate together in building a functional and aesthetic system in the space.

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