An Analytical Approach on Material Selection for Increasing Design Performance in Interior Architecture Projects

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ABSTRACT

One of the most significant decisions having effect on the kitchen design performance is the selection of materials. As such, in the first phase of the study, a literature research was carried out to determine whether a scientific method that would help the designer to give the right decisions in selection of materials existed in the projecting process thereof for the kitchen. However ,inasmuch as there are numerous material alternatives incident to kitchen design the purview of this research was kept limited only to research of the scientific methods employed in selecting kitchen countertop materials with an eye to obtain more accurate results. No scientific methods were obtained in the literature researches conducted in this context. Factors that affect the selection of kitchen countertop materials were firstly identified with a view to remedy this lack and they were found to be 31. A long-term study is required for the creation of scientific data that will help the designers germane to all these factors. Therefore the purview and purpose of the present study has been determined as obtaining the statistical data which describes the mathematical relationship between the type of kitchen layout and selection of the kitchen countertop materials which is one of the most important of said factors and conversion of such data into an analysis table. A literature search has been conducted to determine all the kitchen layouts in the first stage within this defined scope and aim as the methodology of the study. Subsequently, 1.309 actual kitchen projects have been examined in order to obtain statistical data showing the relationship between the all kitchen layouts and kitchen countertop materials and the results of these examinations have been described in the form of a data analysis table. The designer will be able to perform the kitchen countertop material selection thereof in a more appropriate way in accordance with the kitchen layout through employment of said data analysis table. And this will enable higher levels of performance for the kitchen countertop functionally and aesthetically in almost all activities such as washing, preparation and cooking. Furthermore, it will be revealed which kitchen countertop materials are more preferable by the user thanks to this data analysis table. This information will especially help wholesaler kitchenware manufacturers and supplies companies in determining the inventory amount of materials in a more accurate way.

Keywords: Interior architecture, Countertop material selection, Kitchen design, Performance based design

INTRODUCTION

Increase in specialization in the field of interior design and application, an increase of competition in line with same consequently, as a result, has rendered "performance" one of the key concepts and caused rethinking of the whole process within the context of "performance-based design" in an inevitable way.

Performance is a measurable phenomenon. Level of performance and criteria in the achievement of a target is the important issue (Arslan and Kanoğlu, 2010). Kitchen is the

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field which is one of the most studied areas with a view to improve the performance of interior design. The reason for this is that it is the most important area of working compared to other areas and as such the area from which high performance is expected in terms of numerous criteria such as functionality, durability and hygiene. It has been observed in the researchers conducted that much as an average of two hours is spent in the kitchen during the day, the cupboards are opened and closed more than 80 times during this time of and activities as to different functions are repeated more than 50 times (Dynamic Space, 2008). Furthermore, kitchen is the area which is renewed mostly by34% and again it is the most costly area in terms of design (Amana, 2009; Edic and Edic, 1999). In addition to all these, kitchen is the area for a designer which has to be resolved almost in all projects.

One of the most important decisions that affect the kitchen design performance is the selection of materials regarding aesthetics and functionality. Materials that can be employed in interior design offer almost unlimited color, pattern and texture options. The performance of the design can be improved through utilization of various materials according to the locations in appropriate manner. Giving wrong decisions in this regard leads the project's failure in meeting the expectations of the users while in some cases same causes exceeding the limits of the budget. As such, in the first stage of the study, a literature research has been carried out with an eye to determine whether there is a scientific method that will help the designer in making the right decisions regarding the selection of materials during the process of projecting of the kitchen. However ,inasmuch as there are numerous material alternatives incident to kitchen design the purview of this research was kept limited only to research of the scientific methods employed in selecting kitchen countertop materials with an eye to obtain more accurate results. In the literature researches carried out within this context technical specifications and information as to application methods related to kitchen countertop materials have been found however any scientific method that will help the designer to make right decisions in selection of the kitchen countertop material have not been found (Asensio and Ubach, 2003; Baden-Powell, 2005; Beamish, 2013; Beazley, 1999; Bouknight, 2013; Brunk et.al. 2003; Calley, 2007; Cerver, 2006; Cheng and Olsen, 2002; Clark, 2003; Conran, 2002; Cool Springs Press, 2013; Grey, 2002; Goldberg, 2012; Hufnagel, 1991; Jankowski, 2001; Kimball, 1996; King, 2006; Lovett, 2006; Maney, 2003; McLellan, 2003; Meyer and Roth, 2007; Mielke, 2005; Piccirillo, 2010; Rand and Perchuk, 1991; Sweet, 2003; Taylor, 2003; Veilette, 2007).

A literature research to determine the factors affecting the selection of kitchen countertop materials has been carried out firstly with a view to overcome this shortcoming that has been found during the study. As a result of these researches it has been observed that Jankowski (2001) has identified the cited factors as the user's lifestyle, other materials in the kitchen and the form of the kitchen countertop. It is emphasized that the kitchen countertop materials should be in line with the user's lifestyle and appropriate with the style of the kitchen in Taylor's study (2003). Bouknight (2013) states that aesthetic appearance of the material in the selection of kitchen countertop materials, their durability, hygien, cost, type of kitchen layout and the style of the kitchen has to be taken into consideration. Similarly, Piccirillo (2010) also underlines the importance of the durability of the kitchen countertop material as well as its hygien, aesthetic appearance, easy maintenance availability, frequency of use, changes in the structure thereof that may occur over time and its being eco-friendly. Sweet (2003) defines the effective factors in the selection of the kitchen countertop material as the style of the kitchen, aesthetic appearance of the material, its cost, maintenance and ease of use. In Conran's study (2002) lifetime of the kitchen countertop, hygiene, aesthetic appearance, cost, easy clean ability, resistance against heat, impacts and scratches, ease of installation, thickness, design style of the kitchen countertop, type of the kitchen sink, material type of the

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backsplash, the kitchen's style, colors of the cupboard doors, type of kitchen layout, the user's cooking and life styles, size of the kitchen's area and how much sunlight this area receives are expressed as the important factors to be taken into account in choosing kitchen countertop materials. Beamish (2013) identifies these factors as the kitchen countertop‘s material, color, texture, surface brightness level, finish and skirting details of the kitchen countertop as well as material type of the backsplash, kitchen style, the user's lifestyle, relationship of the kitchen with other areas of the house, flooring of the kitchen and the model of the appliances, kitchen sink and fixtures. When the studies of Asensio and Ubach (2003), Baden-Powell (2005), Beazley (1999), Brink et al, (2003), Calley (2007), Cervin (2006), Cheng and Olsen (2002), Clark (2003), Cool Springs Press (2013), Grey (2002), Goldberg (2012), Hufnagel (1991), Kimball (1996), King (2006), Lovett (2006), Maney (2003), McLellan (2003), Meyer and Roth (2007), Mielke (2005), Rand, and Perchuk (1991) and Veilet (2007) were analyzed information other than the above-cited factors have not been found. As a conclusion of all these literature researches that were conducted, all of the factors affecting the selection of kitchen countertop materials were found to be as in Table 1.

Table 1. Factors affecting the selection of kitchen countertop materials for the kitchen projects

Factors that are Effective in the Selection of Kitchen Countertop Materials
User’s lifestyle
User’s way of cooking
Usage frequency of the kitchen
Style of the kitchen
The color of the cupboard doors
Other materials utilized in the kitchen
Floor covering of the kitchen
The size of the kitchen area
How much sunlight the kitchen are a receives
Type of kitchen layout
The models of the appliances
The model of the kitchen sink
The models of the fixtures
The type of backsplash
The form of the kitchen countertop
The color of kitchen countertop materials
The texture of kitchen countertop materials
The brightness level of the surface of kitchen countertop materials
Finish details of the kitchen countertop materials
Skirting details of the kitchen countertop materials
Aesthetic appearance of the kitchen countertop materials
Changes that may occur in the structure of the kitchen

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countertop materials over time
Resistance of the kitchen countertop materials against heat, impacts and scratches
Hygiene of the kitchen countertop materials
The cost of the kitchen countertop materials
Easy repair of kitchen countertop materials
Status of being environmentally friendly of the kitchen countertop materials
Ease of use and maintenance of kitchen countertop materials
The use life of the kitchen countertop materials
Easy installation of the kitchen countertop materials
Thickness of the kitchen countertop materials

A long-term study is required for the creation of scientific data that will help the designers germane to all these factors these factors that are effective in the selection of kitchen countertop materials stated in Table 1. Therefore it was decided to keep the purview of this research limited only to investigation of the relationship between type of kitchen layout and selection of the kitchen countertop materials by scientific data. The reason of choosing "the type of kitchen layout" among all the factors that are effective in the selection of kitchen countertop materials stated in Table 1 was due to its being one of the first and most important decisions in the projecting process of the kitchen (Conran, 2002).

PURPOSE AND METHODOLOGY

The purview and purpose of the present study has been determined as obtaining the statistical data which describes the mathematical relationship between type of kitchen layout and selection of the kitchen countertop materials which is one of the most important of said factors and conversion of such data into a data analysis table. A literature search will be conducted to determine all types of the kitchen layout in the first stage within this defined scope and aim as the methodology of the study. Subsequently, 1.309 actual kitchen projects obtained from a company that has dealers in different cities of Turkey will be examined in order to obtain statistical data showing the relationship between the all kitchen layouts and kitchen countertop materials. And the mathematical relationship between the statistical data obtained as a result of these examinations will be described in the form of a data analysis table.

TYPES OF KITCHEN LAYOUT

In the literature survey of how types of kitchen layout could be defined in the model we learned that King (2006), as single line, gallery, L-shaped, U-shaped, peninsula and island; Jankowski (2001), as L-shaped, U shaped, gallery, peninsula and island; Beazley (1999), as one-wall gallery, two-wall gallery, L-shaped, U-shaped and island; Lovett (2006), as one-wall, gallery, L-shaped, U-shaped, peninsula and island; Asensio and Ubach (2003), as linear, L-shaped, U-shaped and island; Baden-Powell (2005), as in-line, gallery, L-shaped, U-shaped and island. A study of types of layout that are defined differently in other sources showed that these could be grouped as indicated in Table 2 (Yazıcıoğlu, 2012).

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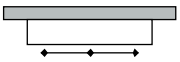
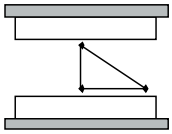
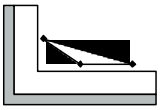
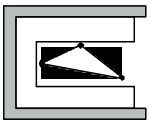
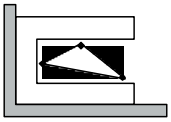
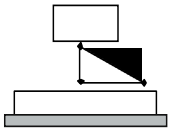
Table 2. Types of kitchen layout

One wall	*Corridor*	*L shaped*	*U shaped*	*Peninsula*	*Island*
One-wall gallery Single line Linear In line	Two-wall gallery Gallery				
The type of kitchen designed so that the main areas of activity are along one wall.	The type of kitchen designed so that the main areas of activity are along two opposite walls.	The type of kitchen designed so that the main areas of activity are along two intersecting walls.	The type of kitchen designed so that the main areas of activity are along the three walls of the kitchen.	The type of kitchen designed so that part of the counter is detached from the wall taking the shape of a peninsula.	The type of kitchen designed so that one or more of the main areas of activity are at the center of the room.
					

The investigation of the 1.309 projects used within the scope of this study showed that types of layout given in Table 2 were the only ones utilized and there seemed to be no application of another type (Yazıcıoğlu, 2012).

OBTAINING THE STATISTICAL DATA SHOWING THE RELATIONSHIP BETWEEN THE KITCHEN LAYOUT AND KITCHEN COUNTERTOP MATERIAL

1.309 actual kitchen projects obtained from a company that has dealers in different cities of Turkey has been analyzed by using an architectural CAD software named ArchKitchen with an eye to obtain the statistical data showing the relationship between all kitchen layouts and kitchen countertop materials.

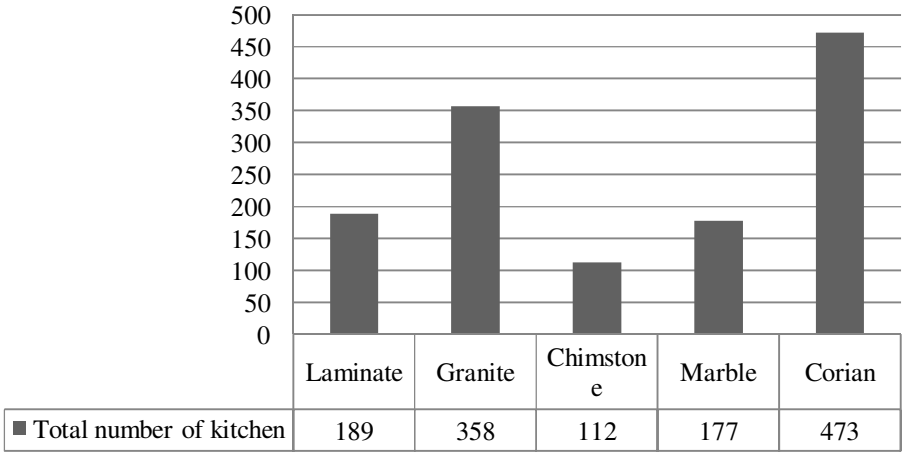


Figure 1. Data distribution as to the use of kitchen countertop materials in kitchen projects

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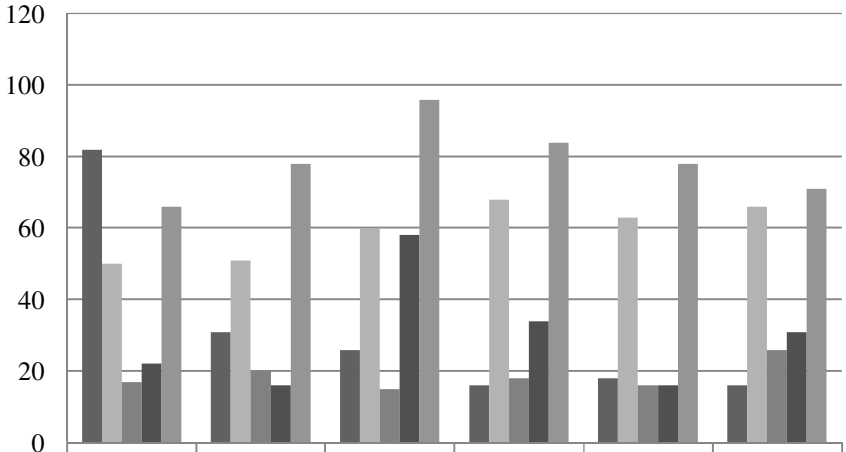
The reason for preference of ArchKitchen software in this study is because the company employs the same software in delivery and order of the kitchen projects and the presence of all three-dimensional kitchen projects of the company in the cited software. As such, in lieu of performing data collection by hand they were performed via computer by virtue of ArchKitchen software and in this way significant time saving was realized. As a result of the examinations made, data distribution indicating the amount of use of kitchen countertop material has been found as shown in Figure 1.

When the data in Figure 1 were evaluated it was found that the most used kitchen countertop materials in kitchen design was corian by 36% and granite 27% compared and the least preferred materials were chimstone by 9% and marble and laminate had equal usage share by 14%.

When the data in indicating the amount of usage of kitchen countertop materials according to the type thereof were examined in a total of 1.309 actual kitchen projects the results in Figure 2 were found.



	One wall	Corridor	L shaped	U shaped	Peninsula	Island
Laminate	82	31	26	16	18	16
Granite	50	51	60	68	63	66
Chimstone	17	20	15	18	16	26
Marble	22	16	58	34	16	31
Corian	66	78	96	84	78	71

Figure 2. Data distribution of kitchen countertop materials according to the types of kitchen layout

At this stage of the study, utilization rates of kitchen countertop material for each kitchen type have been analyzed separately with an eye to render the numerical values in Figure 2 more meaning full in order that designer could benefit there from in the selection of kitchen countertop materials. As a result of this analysis relative values in Table 3 were obtained.

All these statistical results obtained within the study comprise important data that will help the designer's giving the right decision incident to kitchen countertop materials depending on the type of kitchen layout. As such, at the next stage of the study all these statistical results in question will be construed in a systematic manner and converted into a data analysis table.

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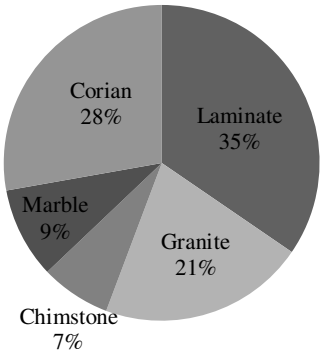
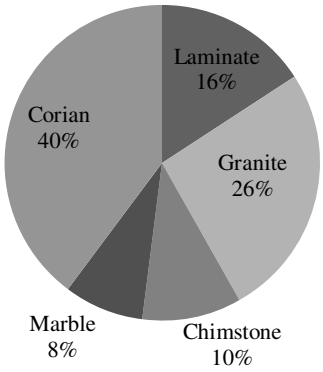
Table 3. Utilization rates of kitchen countertop materials according to types of kitchen layout

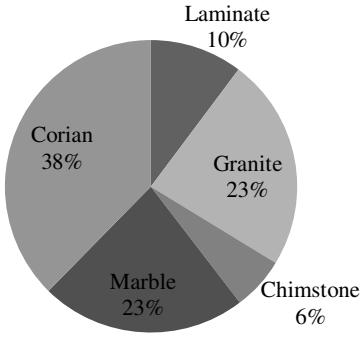
One wall



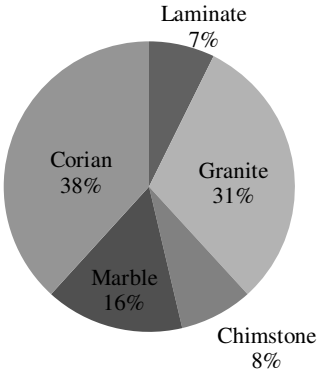
Corridor



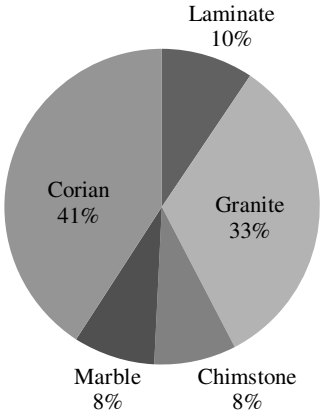
L shaped



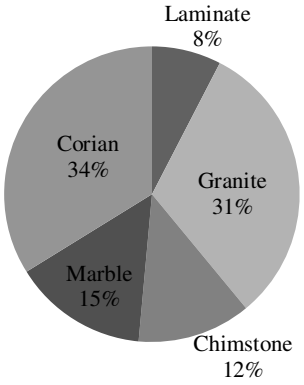
U shaped



Peninsula



Island



CREATION OF THE DATA ANALYSIS TABLE THAT WILL HELP THE DESIGNER TO GIVE THE RIGHT DECISION AT THE DETERMINATION STAGE OF KITCHEN COUNTERTOP MATERIALS

The statistical results in Figure 1 and Table 3 obtained from 1.309 actual kitchen projects showing the relationship between kitchen layout and kitchen countertop materials were interpreted in a systematic way and converted into a data analysis table from which the designer can benefit kitchen during selection of countertop materials (Table 4).

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Table 4. Gives the designer could benefit analysis when choosing the kitchen countertop material

Kitchen layout	*Data Analysis*
One wall	The most preferred countertop materials are laminate by 35% and corian by 28%. The least preferred countertop materials are chimstone by 7% and marble by 8%. Granite countertops are used with an average of 1/4 in all of the one-wall types of kitchens.
Corridor	The most preferred countertop material is corian by %40. The least preferred countertop materials are marble by 8% and chimstone by 10%. Granite countertops are used with an average of 1/4 in all of the corridor types of kitchens.
L shaped	The most preferred countertop material is corian by %38. The least preferred countertop materials are chimstone by 6% and laminate by 10%. Granite countertops are used to form average 50% in all of the L-shaped types of kitchens while marble countertops are used by 23% in all of the L-shaped types of kitchens.
U shaped	The most preferred countertop materials are corianby38% and granite by 31%. The least preferred countertop materials are laminate by 8% and chimstone by 16%.
Peninsula	The most preferred countertop materials are corianby41% and granite by 33%. The least preferred countertop materials are marble by 8%, chimstone by 8% and laminate by 10%.
Island	The most preferred countertop materials are corian by 34% and granite by 31%. The least preferred countertop materials are laminate by 8%, chimstone by 12 % and marble by 15%.
All kitchen layouts	The most preferred countertop materials are corian by 36% and granite by 27%. The least preferred countertop material is chimstone by 9%. Marble countertops and laminate countertops are used equally by 14%. When all types of kitchens are examined separately it is found that marble countertops are used within the range of 6% to 12%. When all types of kitchens are examined separately it is found that laminate countertops are used within the range of 7% to 35% When all types of kitchens are examined separately it is found that granite countertops are used within the range of 21% to 33% When all types of kitchens are examined separately it is found that chimstone countertops are used within the range of 6% to 12% When all types of kitchens are examined separately it is found that corian countertops are used within the range of 28 % to 41%. The kitchen layout in which marble countertop is most widely used is the L-shaped type. The kitchen layout with least usage thereof is corridor and peninsula types. The kitchen layout in which laminate countertop is most widely used is the one-wall type. The kitchen layout with least usage thereof is U type. The kitchen layout in which granite countertop is most widely used is the peninsula type. The kitchen layout with least usage thereof is one-wall type. The kitchen layout in which chimstone countertop is most widely used is the island . The kitchen layout with least usage thereof is the L-shaped type. type The kitchen layout in which corian countertop is most widely used is the peninsula type. The kitchen layout with least usage thereof is the one-wall type.

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RESULTS

The designer will be able to make the countertop material selection in a more appropriately way with the kitchen layout by using the data analysis table describing the mathematical relationship between the kitchen layout and the kitchen countertop material. And this will enable a higher level of functional and aesthetical performance of the kitchen countertop on which it realizes almost all works thereof such as washing, preparation and cooking activities. Furthermore, it will be known which kitchen countertop material is more preferred by the user thanks to this data analysis tables. For example: corianis the most preferred kitchen countertop material by 36%while chimstone is the least preferred kitchen countertop material by 9% among the 1.309 kitchen projects. And this information will help especially wholesaler kitchenware manufacturers and supplier companies of materials in determining the amount of their stocks in a more accurate way.

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