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A Systematıc Approach For Increasıng The Success Of Kıtchen Interıor Desıgn Wıthın The Context Of Spatıal User Requırements

Dr. Deniz Ayşe Yazıcıoğlu
Istanbul Technical University, Interior Architecture Department
Taşkışla, 34437 Taksim Istanbul/Turkey

Prof. Dr. Alaattin Kanoğlu
Istanbul Technical University, Architecture Department
Taşkışla, 34437 Taksim Istanbul/Turkey

Abstract

One of the most studied areas for increasing the performance of interior design is the kitchen. The reason for this is it's being the most important area of work compared to other areas from which high performance in many criteria is expected such as functionality, durability and hygiene. As a result of the literature survey carried out within the purview of the study as to increasing the design performance it was found that scientific efforts for increasing the performance of kitchen design is divided into two groups. The first group consists of those germane to industrial kitchen products. Studies in the other group provide information as regards basic design rules for increasing the kitchen design performance. There was no study on establishing the relation between "basic design rules" and "user requirements" in a systematic way for increasing the kitchen design performance in these obtained resources. As such, the purpose of this study is establishment of a systematic classification in which a relational link between the design rules proposed for increasing the performance of kitchen design with user requirements in kitchen is created. The scope of the study is limited to only one of the user's requirements with an eye to reach more accurate results. In line with this identified scope and purpose, the methodology of the study is determined as which of the user requirements will be discussed in the first phase with the reasons thereof. Subsequently, a literature survey was conducted and the set of design rules for increasing the kitchen design success was created. A systematic classification in which the relational link has been established between the design rules and user requirements at the last phase.

Keywords: Performance based design, kitchen interior design, designer performance.

INTRODUCTION

One of the most studied areas for increasing the performance of interior design is the kitchen. The reason for this is it's being the most important area of work compared to other areas from which high performance in many criteria is expected such as functionality, durability and hygiene. Researches conducted as to the issue have revealed the fact that 30% of all the works done at home consists of meal preparation and actions associated to this [1; 2]. Another study has revealed 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 [3]. Furthermore, kitchen is the area which is renewed mostly by34% and again it is the most costly area in terms of design in a house [4; 5; 6]. In addition to all these, kitchen is the area for a designer which has to be resolved almost in all projects. [7; 8; 9].

In this context, when the scientific studies carried out on performance of kitchen design were examined, it was observed that Palma and Rehman [10] addressed the issue of oven-range cooker technology design in rural residential kitchens in order to increase the kitchen performance in different cultures and living standards. On the other hand Demirkan and Olguntürk [11] identify the design criteria for adults, elderly, disabled and for those with vision problems in order to project certain areas and kitchen within the house in terms of design performance for adults more correctly. Morishita et al.[12] [12] propose an electronic system in their study in which the counter height is adjusted automatically by changing according to the user' actions for cooking meals for increasing the kitchen design performance. Cline [13] is observed to examine the performance of kitchen design criteria defined for users with disabilities. Rivet [14] 's study is as to the performance of kitchen ventilation systems. Mak and Francis [15] discussed the issue of thermal comfort and natural ventilation performance of the kitchen. 42 different window sizes were tried on a typical kitchen and measurements were taken while doing so and it was revealed that the minimum window size required to ensure thermal comfort in a kitchen should be at least 23:33% of the total area of the kitchen. Panwar [16] evaluates the kitchen design performance regarding the effective use of gas in the stoves. Lamkins [17] examined the performance of the kitchen sink systems. It is emphasized in the studies of O'Heir [18] and Stander et al.[19] that use of industrial products equipped with digital technology in the kitchen will increase the design performance of the space. Lyon et al. [20] have evaluated the way of cooking depending on the user's age and examined the design performance of the kitchens within this context. Boynton Child [21] mentions that grouping kitchen tools according to the way of usage will provide time saving for users and as a result kitchen design performance will increase. When the works of Asensio and Ubach [22] Baden-Powell [23], Beamish et al. [24] Beazley [25], Bouknight [26], Cerver [27], Conran [28], David[29], Edic and Edic[5], Jankowsk[30], King[31], Lester and McGuerty [32], Lovett[33], Maney [34], Mielke [35] and Rand and Perchuk [36] are examined it is observed that they describe the basic design principles of the projecting process for increasing the kitchen design performance. In Grandjean [37], Panero and Zelnik [38] and Pheasant [39]'s works, standards as to human measure to increase the interior and kitchen design performance and design criteria based on these measures are mentioned.

As a result of the entire literature survey conducted within the purview of the study, it has been determined that scientific studies to increase the performance of the kitchen design are mainly divided into two groups. The first group is those related to performance of the industrial kitchen products. The studies in the other group describe the basic design rules to increase the kitchen design performance [7; 8; 9]. There was no study on establishing the relation between "basic design rules" and "user requirements" in a systematic way for increasing the kitchen design performance in these obtained resources. However, a high performance kitchen design can be achieved only by producing appropriate solutions according to the requirements of the person (s) who will use the kitchen. In other words, there is no systematic classification as to for user requirements the design rules in the literature are proposed. However, such a classification will have the nature of a means to guide the designer is a way towards for increasing the kitchen design performance during the design process.

PURPOSE AND METHODOLOGY

The purpose of this study is establishment of a systematic classification in which a relational link between the design rules proposed for increasing the performance of kitchen design with user requirements in kitchen is created. The scope of the study is limited to only one of the user's requirements with an eye to reach more accurate results. In line with this identified scope and purpose, the methodology of the study is determined as which of the user

requirements will be discussed in the first phase with the reasons thereof. Subsequently, a literature survey was conducted and the set of design rules for increasing the kitchen design success was created. A systematic classification, in which the relational link has been established between the design rules and user requirements, will be fictionalized at the last phase.

IDENTIFYING USER REQUIREMENTS TO BE DISCUSSED WITHIN THE SCOPE OF THE STUDY

User requirements can be described as all environmental and social conditions which help people to sustain their lives without discomfort in terms of physiological social and psychological requirements. In other words, they determine the minimum qualities to be present in a space. If there is any deficiency in these qualities discomfort is created in the user [40; 41]. User requirements are basically divided into two main groups, namely as physical and psycho-social groups as shown in Table 1 and they consist of different sub-groups within themselves.

Table 1. User requirements

User requirements			User requirements are environmental conditions which are necessary for individuals or societies to fulfill their actions in the most effective way [1].
Physical user requirements	Physical user requirements are spatial features related to the number of users, characteristics of the actions and other features is related to units in the environment [40].	Spatial requirements	These include static and dynamic anthropometric dimensions of people in a space as well as their actions and means of their actions [1].
		Thermal requirements	These include the appropriate temperature, humidity, radiation and air movement within the space [1].
		Audio requirements	These include appropriate intensity of sound in a space and echo-distribution properties of sound [1].
		Visual requirements	These include appropriate light intensity – level of illumination in the space [1].
		Health requirements	Health requirements denote environment's having qualities that will prevent harm to the user's health such as clean water supply, sewage discharge and disposal of garbage and other waste (Woods et al., 2006).
		Safety requirements	These include appropriateness of the structural stability of the space and protection against, fire, natural disasters, thefts and accidents that may occur in the action area [1].
Psycho-social user requirements	Psycho-social requirements are environmental conditions necessary for fulfillment of an activity is the without psychological discomfort [40; 41].	Privacy requirements	This denotes suitability of the space for auditory, personal visual and social privacy [1].
		Behavioral requirements	Behavioral requirements are distances people need when carrying out their activities in the space. These distances are defined to be 45 cm as individual limit of and 45-120 cm as distances between individuals [1].
		Aesthetic requirements	These include appropriate form, color and textural properties of the space [1].
		Societal requirements	Social relations in the space include the social structure-establishment and the needs [1].

When literature work was made as to which issue must be discussed within the scope of the study among the user requirements in Table 1 it was determined that the following steps must be taken when preparing a design program in order to increase the kitchen design success [24]:

1st step : Determination of project scope and variables,
2nd step : Determination of purposes and priorities,
3rd step : Determination of actions and their way of implementation

In the 3rd step of the design program or in other words user's requirements it is emphasized that" spatial requirements" need to be determined among "actions and their way of implementation". In this context, it has been determined that "spatial requirements" in Table 1 has to be the user's requirement to be discussed within the scope of the study for the realization of the 3rd step in a healthier way.

FORMATION OF SET OF DESIGN RULES FOR INCREASING THE KITCHEN DESIGN SUCCESS

A literature research has been conducted for formation of set of design rules for increasing the kitchen design success [1; 3; 5; 22; 23, 24; 25; 26; 27; 28; 29; 30; 31;32; 33; 34; 35; 37; 38; 40; 42; 43; 44; 45; 46; 47; 48; 49; 50; 51; 52; 53; 54;55;56;57;58;59; 60; 61; 62; 63; 64; 65; 66;67; 68; 69; 70; 71;72; 73; 74; 75;76; 77; 78; 79; 80]. Similar ones among all design ruless obtained from this research were combined and a set containing 130 rules as shown in Table 2 was formed.

Table 2. Set of kitchen design rules

No	Design Rules
R1	Kitchen entrance must be at least 81cm wide. If there is a counter or divisive element in the entry which creates a corridor, maximum depth of this corridor must be 61cm. If this corridor' depth will be more than 61cm, The width of the kitchen entrance must be at least 91cm.
R2	If there are two kitchen counters opposite to each other located close the kitchen entrance, the distance between the nearest point of these counters must be at least 81cm.
R3	There must be an empty space with a length of 152cm and width of more than 46cm in the opening direction of a standard hinged door or swing door. There must be an empty space with a length of 122cm and in the same width of the width of the door in the opening direction of the door to outside.
R4	The width of the circulation line (in the case of presence of a work counter wider than 61cm perpendicular to the circulation line or if there is more than one work counter or a device) must be at least 91cm.
R5	If there are circulation lines perpendicular to each other the width of one of them must be at least 107cm.
R6	The width of the corridor must be at least 107cm in a kitchen where there is a single-user work triangle or devices and where the counters are perpendicular to each other. If the number of users is more than two this distance must be at least 122cm.
R7	Kitchen work triangle must be planned clockwise for right-handers and in the opposite direction for left-handers.
R8	Refrigerator, kitchen sink and stove order must be respected in one-wall kitchens.
R9	The total length of the legs of the kitchen work triangle should be maximum 793cm. Length of one leg of this triangle must be minimum 122cm and maximum 274cm. Each leg of the kitchen work triangle is measured from the center of the front face of the kitchen sink and the devices at home.
R10	If the kitchen work triangle intersects an island or peninsula this intersection must be no more than 31cm.
R11	When the number of legs of the kitchen work triangle is more than three, length of each additional leg must not be more than 274cm and less than 122cm.
R12	If two or more persons are preparing meal at the same time in the kitchen, a kitchen work triangle must be created for each person. However, these work triangles must not intersect each other in any way. In such cases, primary or secondary leg of the work triangles can be shared.
R13	Main circulation line must not pass through the work triangle.
R14	Entrance, cabinet or device doors should be placed in a way not to interfere each other when opening.
R15	There must be space to maneuver for each position when entrance, cabinet or device doors are opened.
R16	If the kitchen is narrow, cupboard doors which can be opened 170^{o} must be used. Such doors will create larger areas while passing.
R17	If there will not be a circulation line behind the sitting person in the sitting space there must be an 81cm distance between the side of the table and the separating unit. If some other persons will pass behind the sitting person and sit this distance is increased to 91cm. If a circulation line will pass behind the sitting person this distance must be 112cm. If this circulation line will be used by a person with wheelchair this distance must be increased to 152cm.
R18	There must be enough spaces at least on three sides of the table where meals will be eaten.
R19	There must be top cabinets at least with 31cm depth and 366m length and adjustable shelves with 76cm height in small kitchens (with an area less than 13.95m^2) .
R20	There must be top cabinets at least with 31cm depth and 472m length and adjustable shelves with 76cm height in large kitchens (with an area greater than 13.95m^2) .
R21	There must be a top cabinet at least with 31cm depth and 152cm front side length in the place where the primary kitchen sink to be between a distance of 183cm to both sides from the central axis of the kitchen sink.
R22	A cabinet with legs can be placed at least with 31cm depth and 152cm front side length instead of the top cabinet in the place where the primary kitchen sink to be between a distance of 183cm to both sides from the central axis of the kitchen sink.
R23	The basic rules to be followed regarding the storage areas to prevent unnecessary movements in the kitchen: 1. Storage must be planned in 5 basic areas 2. Capacity of drawers in each place must be identified correctly and width/depth of the objects to be stored must be identified correctly for each area 3. The drawers must have divider systems and interior roll-outs.
R24	There must be lower cabinets with at least 53cm length and at least 396m depth in kitchenettes (with an area less than 13.95 m^2).
R25	There must be lower cabinets with at least 53cm length and at least 488m depth in large kitchens (with an area greater than 13.95 m^2).
R26	Total shelf or drawer length must be 3556m, 4318 and 5080 for small kitchens (with an area less than 13.95 m^2), medium sized kitchens (with an area between 14,04 m^2 and 32.55 m^2) and large kitchens (with an area larger than 32.55 m^2) respectively. The recommended distribution amount of cabinet types is as indicated in the table:
R27	Cabinet type in the "Other cabinets" category must be no more than 102cm, 241cm and 368cm for small kitchens, for medium sized kitchens and large kitchens respectively to ensure the total cabinet length.
R28	The cabinets containing condiments and sauces must be placed in the cooking section and near the stove if possible.
R29	Adjustability of inner parts of drawers with divider units increases the functionality thereof.
R30	More storage space can be gained by using drawers with more height. This is particularly advantageous for the storage of tools in the dry foods storage section.
R31	Storage systems used at cabinet doors increase functionality.
R32	Adjustability of the heights of the shelves in cabinets increases functionality.
R33	Most comfortable access distance is between 64cm-115cm vertically. The user can access the objects without need to lean or to reach out. In this way, the open shelves between counter provide quick and one-handed access and increase functionality.
R34	The drawers which can be fully pulled outside provide easier access compared to those which can be opened 2/3.
R35	Cabinets in which large and heavy pots will be placed must be positioned immediately below the counter and near the work surface.
R36	Base drawer enhances functionality.
R37	Drawers at the bottom of oven increase functionality.
R38	Shelves, rail cupboards and drawers which can be drawn at the bottom allow easy viewing of objects and provide quick access. Additionally, rail cabinets provide 55% more storage space compared to normal cabinets as well as more space to move in the place compared to the ones with doors when they are opened.
R39	Access to cabinets must be easy.
R40	Access to the bottom of the lower cabinets must be easy.
R41	Access to the upper parts of the top cabinets must be easy.
R42	Access to the rear part of the lower cabinets must be easy.

R43	Access to the rear part of the top cabinets must be easy.
R44	More frequently used objects must be planned in a way that they are stored in the top drawers of the lower cabinets and the lower shelves of the top cabinets. Less frequently used objects can be stored on or under these sections. The least used objects should be stored by placing them in the upper part of the top cabinets. Accordingly, the selection of storage units provide saving on time while working in the kitchen.
R45	Dry food cupboards turning left and right after opening increase functionality.
R46	Dry food systems which can be pulled out used in cupboards or top cabinets consist of wooden based baskets with adjustable heights and coated with steel wire or non-slip flooring material and in this way create storage space for foods and increase functionality.
R47	Undercounter dry food systems must be used for cases with spatial limitations where dry food cupboard systems cannot be used.
R48	Total facing length of wall and lower counter cabinets, drawers and dry food shelves/drawers must be 183cm at two sides from the central axis of the total primary kitchen sink. Front length of storage areas must be at least 1016cm, 1219cm and 1422cm for small kitchens, medium sized kitchens and large kitchens respectively. Storage areas must be intensively between 38cm-122cm vertically.
R49	There must be a drawer or sliding shelf with at least 305cm of front face length in small kitchens (with an area less than 13.95 m^2). There must be a drawer or sliding shelf with at least 419cm of front face length in large kitchens (with an area larger than 13.95 m^2).
R50	Removability of cabinet doors increases functionality.
R51	All devices must be placed at a height 38 cm and 122 cm.
R52	The maximum height for someone sitting in a wheelchair in front of a counter with 51cm-64cm depth to be accessed is 112cm. If there is not such a counter the access distance is between 38 cm and 122cm.
R53	At least 5 pieces of storage units, between 38 cm and 122 cm from the kitchen floor height must be positioned to increase the functionality.
R54	There must be a functional interior corner system within at least one of the corner cupboards in the kitchen.
R55	The trashes used for wastes for recycling must be near the kitchen sink. The trashes used for wastes which cannot be recycled can be placed anywhere in the kitchen.
R56	There must be at least two trashes in the kitchen for wastes for recycling and for wastes which cannot be recycled.
R57	The upper surface of the trash must not be higher than 91cm. The trash must be easily accessible and removable without need for lifting upward. A trash which can be removable from the side is the most preferred option.
R58	The knee space must be spared in every possible part of the kitchen sink, oven and range such as the bottom part or immediately next to it. The knee space must be at least 69cm high, 76cm wide and 48cm deep. Height of 69cm can be reduced depending on the increasing of the depth.
R59	The kitchen sink must be fixed lower than 86cm or its height must be adjustable between 74cm and 91cm. The hole of the kitchen sink must not be deeper than 17cm. There must not be a surface with sharp or rough end under the kitchen sink. A knee space must be planned for wheelchair users under the kitchen sink. This knee space must be 91cm in width, 69cm in height and with 20cm depth. If the distance is 43cm in depth, a space with 23cm height from the ground must be left for the toes.
R60	There must be an empty floor space of 76cmx122cm in front of all devices. These areas may overlap and maximum 48cm of the knee space (at the bottom of a device, counter, cabinets etc.) may be part of the total 76cm and/or 122cm clean floor space.
R61	Devices must be easily accessed.
R62	All the necessary components of the devices must be easily accessed in the correct positions.
R63	At least an area with 152cm diameter including knees and toe space must be allocated so that the wheelchair can rotate.
R64	There must be a T-shaped empty floor space floor space with a body length of minimum of 91cm and with arms with a total length of 152cm on both sides of the body in equal length so that a wheelchair rotation area is functional.
R65	The distance between the side of a dishwasher and a counter, another device or the side of cabinet placed upright to that must be 53cm. The 53cm distance in diagonal placement is the distance from the middle of the side of the kitchen sink to the side of the open door of the dishwasher.
R66	If it is possible to allocate enough free space for counter near the kitchen sink, rising the dishwasher for 15cm-31cm increases functionality.
R67	Max. distance between the primary dishwasher and the side of the kitchen sink must be 91cm.
R68	The dishwasher must be positioned in a way to be accessed by more than one person when it is open. For this purpose, a free floor space of at least 76cmx122cm must be left on either side of the dishwasher when its door is open. The dishwasher must not prevent access to this free space allocated for dishwasher or the kitchen sink when the dishwasher is open.
R69	If there will be a kitchen sink in the kitchen, it must be placed between the cooking and preparation area and the refrigerator or across them.
R70	The distance between the oven and the fire-resistant surface above it must be at least 6cm. If this surface is unprotected then the distance must be at least 76cm.
R71	If there will be an obstacle with 51cm-64cm depth in front of the ventilation controls, these controllers should be placed with a height of 38cm-112cm from the ground. If there is not such an obstacle, the placement height must be between 38cm-122cm. Ventilation controllers must be able to be operated with minimal effort, easy to read and with least noise.
R72	If the cooking surface does not have a distance of at least 8cm horizontally and 61cm vertically it must not be placed in front of a window. Flammable curtains must not be placed to the window in the place where there is the cooking surface.
R73	The ideal placement height of the microwave oven must be maximum 137cm from the floor and must be 8cm below the shoulder height.
R74	If the microwave oven will be placed under the counter, height of the microwave oven must be maximum at least 38cm from the floor.
R75	The height of the microwave oven from the floor is calculated to be 15cm. below the elbow height or 8cm below the shoulder height when the microwave oven is placed.
R76	Counters at least with two different heights are proposed to be designed for the kitchen. One must be constructed to be between 71cm and 91cm above the floor and the other must be constructed to be between 91cm and 114cm. above the floor.
R77	There must be an empty counter surface at least 335cm long in small kitchens (with an area less than 13.95 m^2). Furthermore, 61cm counter depth and min. 38cm gap between the counter are required.
R78	There must be an empty counter surface at least 503cm long in large kitchens (with an area larger than 13.95 m^2). Furthermore, 61cm counter depth and min. 38cm gap between the counter are required.
R79	Counter must be accessed easily .
R80	The entire surface of the counter must be used easily.
R81	The counter surfaces must come out when they are pulled.
R82	There must be a counter with length of at least 61cm on one side and with length of at least 46cm on the other side in secondary sinks (the same rule applies in the corner sinks) in the same height with the kitchen sink.
R83	In case of counters intersecting each other perpendicularly, if the distance of the kitchen sink to the corner in front of the counter is 8cm, there must be an empty counter space for the other counter at least with a distance of 53cm from the same corner.
R84	The distance between the nearest sides of primary dishwasher and the kitchen sink must be not more than 91cm.
R85	If the counter height in the area where the kitchen sink does not continue always the same height there must be a counter with length of at least 61cm on one side and with length of at least 8cm on the other side.
R86	There must be a counter with length of at least 8cm on one side and with length of at least 46cm on the other side in secondary sinks (the same rule applies in the corner sinks) in the same height with the kitchen sink.
R87	If the medicine cabinet is a need for the user it must be planned in washing work area.
R88	Detergents should be stored under the kitchen sink. If the rail cleaning materials basket to be mounted to the kitchen sink cabinet can be removed and carried at any time it will increase functionality.
R89	There must be a counter space at least 38cm in length and 41cm in depth on, under or near the microwave oven.
R90	If the height of the cooking surface is different from the height of the counter there must be a counter space with 31cm length on one side and 38cm on the other side of the cooking surface in the same height with the cooking surface.
R91	A knee space must be created at the bottom of a device oven upper surface of which is 86cm-71cm height above the floor.
R92	There will be a counter in the same height with the cooking surface with length of at least 23cm on one side and at least 38cm on the other side.
R93	There must be a counter depth of at least 23cm at the back of the device if there is not a blockage at the back of the cooking surface on the island or

	the peninsula in the same height with the device.
R94	Length of the counter from the corner to the oven in angled counters must be at least 23cm to one side and at least 38cm to the other side. This counter should be the same height with the oven.
R95	There must be a counter space of at least 38cm long on the side where the handle of the refrigerator is. If the refrigerator has two doors this counter space must be on the side where the fresh foods in the refrigerator are stored. If it is not possible to allocate a counter space immediately near the refrigerator this counter space with the same size must be max. 122cm away from the refrigerator and across the refrigerator. The depth of this counter space must be at least 41cm.
R96	If the oven and the refrigerator shall be positioned side by side the refrigerator must be close to the counter. In such a case the place of fridge can be changed with the oven for security purposes if a service area cannot be placed the oven.
R97	The refrigerator must be near the entrance of the kitchen and at the beginning of the counter array.
R98	There must be a counter space on the refrigerator under the counter or adjacent to it at least 38cm in length and 41cm in depth.
R99	Dry foods storage cupboard should be placed immediately next to the refrigerator.
R100	There must be a floor space with 76cmx122cm side lengths which can shift max.61cm from the central axis of the refrigerator or freezer.
R101	The counter space must be on the side of the handle in the ovens door of which are opened to sides.
R102	If the oven door is opening to the main circulation line there must be a counter space next to it or on top of it with at least 38cm in length and 41cm in depth. If the oven door is not opening to the main circulation line this counter space can be maximum 122cm away from the oven or across the oven.
R103	If the counter space will be against the oven, it must be positioned 122cm away from the front and middle of the oven.
R104	There must be a continuous counter space in the preparation section with at least 61cm of depth and 91cm of length. This counter space should be right next to the kitchen sink.
R105	The drawers in which cutlery will be placed must be positioned close to the dishwasher not to be very far away from the oven furnace in the preparation section.
R106	Kitchen utensils consist of 1/3 of all the stored objects. Easy access to them is very important whether they are stored in lower cupboards or upper cupboards. In addition, when the actions in the kitchen were examined, it was observed that 20% of these actions took place in the places where such objects were stored or in the cleaning activity area. Therefore, such storage areas must be close to the kitchen sink and dishwasher.
R107	If two or more persons are working in the kitchen at the same time, a counter area for each person with at least 91cm in length and with 41cm in depth for preparation is needed. If two people will stand side by side the total length of the counter must be at least 182cm.
R108	Counter space of the preparation section can be placed, between the cooking surface and the primary kitchen sink; between the fridge and the primary kitchen sink; next to a cupboard section or next to a secondary kitchen sink.
R109	There must be at least one empty counter space in a kitchen in height of max. 86cm or in adjustable height of 73cm-91cm and in length of 76cm.
R110	If the two working centers will be next to each other, the minimum length of the counter between these working centers must be found by adding 31cm to the longest of the counters which are side by side.
R111	There must not be a high and deep cabinet or a second refrigerator between the main activity areas.
R112	High cabinet unit must be at the corner not to cut the workflow and inside and between the primary working center in the case of presence of space for knees on one side.
R113	Sitting areas in the kitchen requires the following minimum distances for each user: 76cm width for a table with 76cm height and, counter or table space with 48cm depth and at least 48 cm space for knee
R114	Sitting areas in the kitchen requires the following minimum distances for each user: 61cm width for a table with 91cm height and, counter or table space with 38cm depth and at least 38cm space for knee
R115	Sitting areas in the kitchen requires the following minimum distances for each user: 61cm width for a counter with 107cm. height 61cm. counter or table space with a depth of 1cm and at least 3cm space for knee
R116	If service, kitchen and dining areas are placed within the kitchen the functionality increases.
R117	If meals are going to be eaten in another place, distance between the cuisine and this place must not be more than 350cm and this place must be directly connected to the entrance hall, living space and outdoor terrace, if any.
R118	The exposed counter corners should be beveled or rounded for security.
R119	Control buttons, knobs and handles must be able to be commanded by one hand, require minimum power and must not cause situations like twist of the wrist or hand's being caught.
R120	All necessary components of fixtures must be in the correct position and easily accessible.
R121	The control buttons of the devices must be easily accessible.
R122	Use of the control buttons of the devices must be simple.
R123	The devices must have alerting features.
R124	Control panels of the equipments must provide preliminary information that will help the user.
R125	All fixtures to be mounted in a wall such as switches, sockets, telephones, thermostats and etc. must have the height of 38cm-122cm from the ground.
R126	Outlets and power switches must be seen easily, must be used without much effort and easily.
R127	The grounding line circuit breakers in the kitchen must be indicated by signs on them.
R128	Fire extinguisher must be placed in a visible place in the kitchen, away from cooking equipments and with a height between 38cm-122cm from the ground. Smoke detectors must placed in a place close to the kitchen.
R129	At least 8% of the total area of an open or closed kitchen or a living room combined with kitchen must be an area allocated for windows/skylights a field.
R130	Surface of each counter must be illuminated adequately by private or public lighting in accordance with the function of the activity areas.

ESTABLISHMENT OF RELATIONAL LINK BETWEEN DESIGN RULES AND USER REQUIREMENTS IN A SYSTEMATIC WAY

A literature search was carried out firstly to determine the "spatial requirements" in a kitchen, which is a subtitle of user requirements in order to establish the relational link between design rules and user requirements in a systematic way. As a result of this literature search, it was found that spatial requirements of a kitchen were discussed in titles as seen in Table 3.

Table 3. Spatial requirements of kitchen

Spatial Requirements												
Activitiy Areas												Circulation Areas
Storage												
Food storage												
Short lived food stogare	Long lived food storage	Kitchen equipments storage	Cleaning materials and equipments storage	Waste Storage	Cleaning	Prepaing	Cooking	Service and eating	Resting	Other activities		

When the relational links between each design rule in Table 2 spatial requirements in Table 3 was examined one by one the results in Table 4 were obtained.

Table 4. Relational link between "Design Rules" and "Spatial Requirements"

	Spatial Requirements												
	Activitiy Areas												
	Storage												
	Foof stogare												
No	Short lived food stogare	Long lived food storage	Kitchen equipments storage	Cleaning materials and equipments storage	Waste Storage	Cleaning	Prepaing	Cooking	Service and eating	Resting	Other activities	Circulation areas
R1												X
R2												X
R3												X
R4												X
R5												X
R6												X
R7	X					X		X				
R8	X					X		X				
R9	X					X		X				
R10	X					X		X				
R11	X					X		X				
R12	X					X		X				
R13	X					X		X				X
R14												X
R15												X
R16												X
R17									X	X	X	X
R18									X	X	X	X
R19		X	X									
R20		X	X									
R21		X	X									
R22		X	X	X	X							
R23		X	X	X	X							
R24		X	X	X	X							
R25		X	X	X	X							
R26		X	X	X	X							
R27		X	X	X	X							

	Spatial Requirements												
	Activitiy Areas												
	Storage												
	Food storage												
No	Short lived food storage	Long lived food storage	Kitchen equipments storage	Cleaning materials and equipments storage	Waste storage	Cleaning	Preparing	Cooking	Service and eating	Resting	Other activities	Circulation areas
R66						X						
R67						X						
R68						X						
R69	X					X	X	X				
R70								X				
R71								X				
R72								X				
R73								X				
R74								X				
R75								X				
R76							X					
R77							X					
R78							X					
R79												X
R80							X					
R81							X					
R82						X						
R83						X						
R84						X						
R85						X						
R86						X						
R87		X										
R88				X								
R89								X				
R90								X				
R91								X				
R92								X				

R28		X										
R29		X	X	X								
R30		X	X	X								
R31		X	X	X	X							
R32		X	X	X	X							
R33		X	X	X	X							
R34		X	X	X								
R35			X									
R36			X									
R37			X									
R38		X	X	X	X							
R39												X
R40		X	X	X	X							
R41		X	X	X								
R42		X	X	X	X							
R43		X	X	X								
R44		X	X	X	X							
R45		X										
R46		X										
R47		X										
R48		X	X	X	X							
R49		X	X	X	X							
R50		X	X	X								
R51	X					X		X				
R52		X	X	X	X			X				
R53		X	X	X	X							
R54		X	X	X								
R55					X							
R56					X							
R57					X							
R58						X	X	X				
R59						X						
R60	X					X	X	X				
R61												X
R62	X					X		X				
R63												X
R64												X
R65						X						

R93								X				
R94								X				
R95	X											
R96	X							X				
R97	X											
R98	X											
R99	X	X										
R100	X											
R101								X				
R102								X				
R103								X				
R104							X					
R105			X									
R106			X									
R107							X					
R108							X					
R109							X					
R110	X					X	X	X				
R111	X					X		X				
R112	X					X		X				
R113									X	X	X	
R114									X	X	X	
R115									X	X	X	
R116									X			
R117									X			
R118												X
R119	X	X	X	X	X	X		X				
R120						X						
R121	X					X		X				
R122	X					X		X				
R123	X					X		X				
R124	X					X		X				
R125	X					X	X	X				
R126	X					X	X	X				
R127	X					X	X	X				
R128								X				
R129						X	X	X	X	X	X	X
R130						X	X	X	X	X	X	X

When the data in Table 4 is evaluated, it is observed that a bigger amount of design rules must be included in the design of areas such as cooking areas cleaning areas, kitchen equipment storage areas and short lived foods storage areas in order to increase the kitchen design success of the designer. The least important areas determined in this respect are areas allocated for other activities, resting areas and service and eating areas (Figure 1).

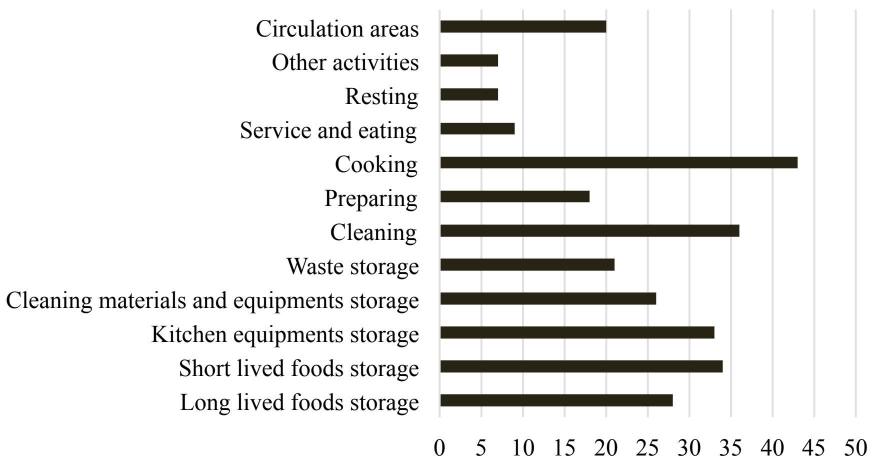

Figure 1. Usage intensity of design rules

Furthermore, the designer will be able to see which design rules he has to take into account without fail with an eye to fulfill which spatial requirements shown in Table 5 thanks to this systematic.

Table 5. Design rules to be observed to meet the spatial requirements

	Design Rules
Short lived food stogare	R7, R8, R9, R10, R11, R12, R13, R51, R60, R62, R69, R95, R96, R97, R98, R99, R100, R110, R111, R112, R119, R121, R122, R123, R124, R125, R126, R127
Long lived food storage	R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R37, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R52, R53, R54, R87, R99, R119
Kitchen equipments storage	R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R40, R41, R42, R43, R44, R48, R49, R50, R52, R53, R54, R105, R106, R119
Cleaning materials and equipments storage	R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R39, R40, R41, R42, R43, R44, R48, R49, R50, R52, R53, R54, R88, R119
Waste Storage	R23, R24, R25, R26, R27, R28, R31, R32, R33, R40, R41, R43, R45, R48, R49, R52, R53, R55, R56, R57, R119
Cleaning	R7, R8, R9, R10, R11, R12, R13, R51, R58, R59, R60, R62, R65, R66, R67, R68, R69, R82, R83, R84, R85, R86, R110, R111, R112, R119, R120, R121, R122, R123, R124, R125, R126, R127, R129, R130
Prepaing	R58, R60, R69, R76, R77, R78, R80, R81, R104, R107, R108, R109, R110, R125, R126, R127, R129, R130
Cooking	R7, R8, R9, R10, R11, R12, R13, R51, R52, R58, R60, R62, R69, R70, R71, R72, R73, R74, R75, R89, R90, R91, R92, R93, R94, R96, R101, R102, R103, R110, R111, R112, R119, R121, R122, R123, R124, R125, R126, R127, R128, R129, R130
Service and eating	R17, R18, R113, R114, R115, R116, R117, R129, R130
Resting	R17, R18, R113, R114, R115, R129, R130
Other activities	R17, R18, R113, R114, R115, R129, R130
Circulation Areas	R1, R2, R3, R4, R5, R6, R13, R14, R15, R16, R17, R18, R39, R61, R63, R64, R79, R118, R129, R130

RESULTS

The classification systematic in which a relational link is established between the proposed design rules within the study and user requirements has the nature of a guiding tool for designers. The project process will progress more consciously by virtue of this classification systematic thereby increasing the kitchen design success significantly.

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