# Universal Design Principles on Three Generations of Residential Kitchen in South Jakarta

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**ABSTRACT**
The background of this research problem is the importance of interior design to be used by everyone regardless of differences in ability, size, language, knowledge effectively and efficiently. The purpose of the study was to review how the universal design principles were applied in kitchen interior design in residential case studies. The house taken as a case study is a house inhabited by a family of 3 generations. The Universal design formulated by Ronald Mace aims to make everyone's life easier through product creation, built environment and communication to be used by as many people as possible and add value to everyone of all ages and abilities. The method used in this study is qualitative method with triangulation analysis method by comparing data from various sources and approaches. The assessment criteria are formulated by referring to the universal design principles of the selected library study. The findings of this study can be concluded that the kitchen of a residential house in Pejaten, South Jakarta in general received a low rating in the application of universal design principles.

***Keywords:*** *Universal design, kitchen, home, three generations*

## 1. INTRODUCTION

Background research issues this important interior design can be used by everyone regardless of differences in ability, size, language, knowledge effectively and efficiently. The purpose of this study is to review how the application of universal principles of design in the kitchen space and case studies of residential houses in Pejaten, South Jakarta in relation to the activities and characteristics of its users. The house taken as a case study is a house inhabited by a family of 3 generations and also a household assistant. The building and kitchen space of the research object house has been more than 20 years old.

Ronald Mace's Definition of Universal Design in (Andanwerti, 2005) is an effort to design products and environments that are intended for everyone, within the widest possible scope, without the need for over-adaptation and custom design [3].

Whereas according to Sheryl Burgstahler [4], in (Andanwerti, 2005) universal design can also mean a process, a form of application of the bond of various principles in designing to ensure that the product or environment created pays attention to and includes everyone, different groups, with different levels of physical condition, size, language, culture and knowledge [3].

Universal Design aims to make everyone's life easier through product creation, built environment and communication to be used by as many people as possible and provide added value for everyone of all ages and abilities. The term universal design is often replaced with the term design for all, adaptable design, barrier-free design, inclusive design, life-span design, ageless design [3].

The principles of universal design formulated by The Centre of Universal Design, North Carolina State University are then in their implementation described as follows [8]:

1. The design is useful and can be used for all users with a variety of capabilities.
2. Design accommodates a variety of preferences and individual abilities of kitchen users
3. The use of design is easy to understand, regardless of user experience and current level of knowledge, language skills or concentration levels.
4. The design effectively provides the user with the necessary information, regardless of the surrounding conditions or the user's sensor capabilities.
5. The design minimizes harm and negative consequences of accidental or unintentional actions.
6. The design can be used efficiently and comfortably and with minimum fatigue.
7. Appropriate sizes and spaces are provided for approach, range, manipulation, and use regardless of the user's body size, posture, or mobility.

Understanding Kitchen is a space in the service area that has a function as a place to process ingredients into cooking or food supply. Activities carried out in the kitchen are commonly called cooking activities. Kitchen in addition to food processing, also as a storage area, and waste disposal waste food processing that is temporary. Thus, the kitchen

 

becomes one of the important spaces in the process of designing a residence.

The existence of the kitchen is actually very important both physically and non-physically. But in reality, the kitchen is considered less important. This can be seen from the position of the kitchen itself which is usually placed at the very back of the house with no regard to the function of the actual kitchen [9].

The kitchen does not only need utensils such as stoves, preparation tables and storage. But there are also many other elements that need to be observed such as fire, water and oil in the kitchen space. The three elements must exist but they are located in separate kitchens. The thing that should not be forgotten is that the design of the kitchen is to keep an eye on the aesthetic side [2].

The needs of the increasingly complex community also affect the function of the kitchen, it is seen the existence of activities in the kitchen in addition to cooking, among others [1].

(1) Family members can gather and witness firsthand the processing of food and its presentation so as to create a warm and intimate atmosphere.
(2) Children can do homework in the kitchen while accompanied by their mother.
(3) Even in a house with an open layout, the kitchen can be a place to receive guests such as family or close friends, they can chat while watching the homeowner prepare his dishes.

The principle of arranging the kitchen, there are 3 zones in the kitchen, namely [5].

(1) Cooking zone, serves as: activity area ranging from preparing groceries, cooking, cooking to preparing food.
(2) Storage zone, in this area there are 2 (two) storage areas, namely the first store wet or per rotting foodstuffs (refrigerator) and dry food storage area.
(3) The zone of providing clean water, water is not only used for cooking but also for washing foodstuffs and cooking utensils [1].

## 2. METHOD

This study uses qualitative method with descriptive analysis of existing facts from residential kitchen case studies. Data consists of primary data that is data taken directly from subjects and research objects. Secondary data in the form of supporting data obtained from library studies.

Data collection methods use user interviews, object location measurements and observations. The method of data analysis uses triangulation method which is a method used to examine interrelated phenomena from different points of view and perspective.

Researchers in an effort to understand the phenomenon studied by presenting the facts studied in the form of description and visual analysis of the results of the situation images / photos of field documentation. The object of this study is a dirty kitchen room and a clean kitchen that each equipped with a kitchen set in a residential house located in South Jakarta [6].

## 3. RESULT AND DISCUSSION

### *3.1 Kitchen's User Characteristics*

Kitchen users are a family of 3 generations namely:

(I) Grandfather, Grandmother (elderly).
(II) Father, mother (both 44 years old)
(III) One granddaughter (10 years) and additional a household assistant (ART).

This house belongs to generation I (kakek-nenek) who lives with her daughter (generation II) who is married and has one child (generation III). In duration (length/time of use) maid is the most dominant person using from the kitchen room.

**Table 1** Data of Kitchen's User

| No | Users | Ages | Duration (hours/day) | Passive | Active |
|---|---|---|---|---|---|
| 1 | Grandpa P | 73 | 0-1 | √ | |
| 2 | Grandma M | 59 | 0-1 | | √ |
| 3 | Father R | 43 | 1-2 | | √ |
| 4 | Mother D | 43 | 1-2 | | √ |
| 5 | Daughter A | 9 | 0-1 | √ | |
| 6 | Household Assistant (ART) | 50 | 3-4 | | √ |

The fewest users to use/access the kitchen are grandparents, grandmothers and children. This is due to the different levels of the kitchen floor, limiting the movement of elderly users and children who are physically more at risk when moving up and down the floor level far enough. The decrease in the level of stairs in the kitchen door line also has a fairly dangerous level of risk in circulation movement.

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### *3.2 Kitchen's User Activities*

The kitchen which is the object of research, as in general, has 3 main functions/activities, namely food processing (cooking), storage and cleaning activities (washing) [1].

**Table 2** Kitchen's User Activities

| No | Users | Cooking / Preparing | Wash The Dishes | Stock up |
|---|---|---|---|---|
| 1 | Grandpa P | - | - | - |
| 2 | Grandma M | - | - | √ |
| 3 | Father R | √ | √ | √ |
| 4 | Mother D | - | - | √ |

| | | | | |
|---|---|---|---|---|
| 5 | Daughter A | - | - | - |
| 6 | Household Assistant (ART) | √ | √ | √ |

### *3.3 Existing Kitchen*

The kitchen studied is a dirty kitchen that includes a service zone, its position next to the dining room and accessible from the car garage. Inside there is a kitchen set consisting of a table made of concrete construction square ceramic layer 10cm for cooking, washing and processing food. The height of the kitchen table is 80 cm for the washing area and 60 cm for the cooking area, in addition there is also a wooden table used as a place to process foodstuffs (cleaning, cutting, etc.).
The kitchen is located adjacent to the dining room and next to the bathroom connected by a door. The kitchen is also accessible from the garage.

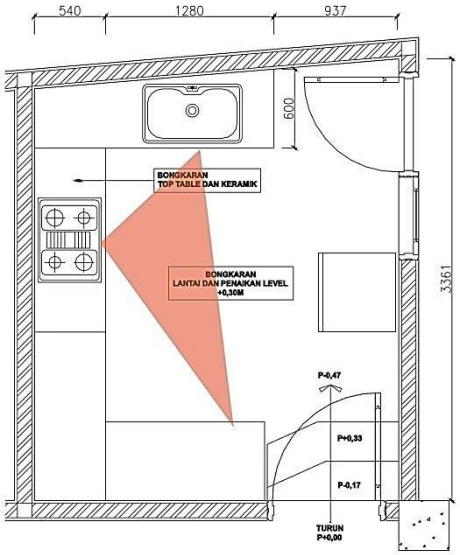


**Figure 1:** Existing kitchen layout plan (by Author Team, 2019)

The difference in kitchen floor level is down / lower 47 cm from the dining room floor and there are 3 steps of stairs with the dimension of floor increase per rung 14-17 cm. Kitchen floor level is also 12 cm lower than garage floor (semi outdoor space).

**Figure 2:** The difference between the levels of the kitchen and dining room (by Author Team, 2019)

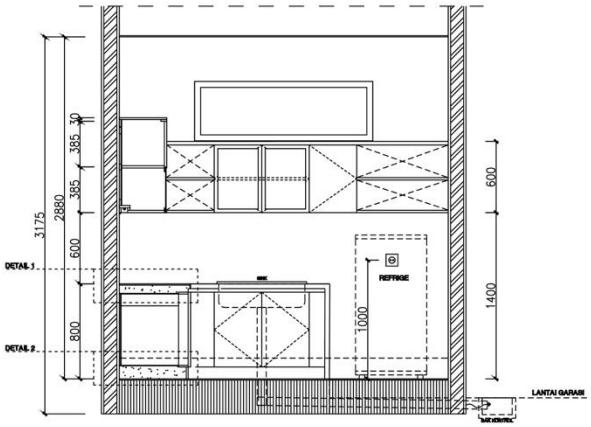


**Figure 3:** Section/Elevation A (by Author Team, 2019)

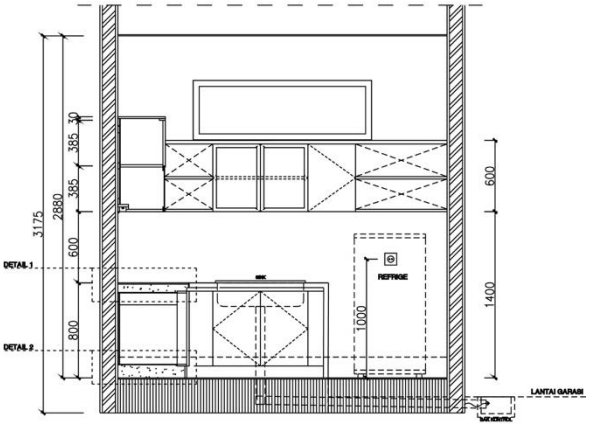


**Figure 4:** Section/Elevation B (by Author Team, 2019)

### *3.4 Existing Kitchen Overview*

Existing Kitchen Overview:

1) The condition of furniture (kitchen set) in the kitchen is partially damaged because it has been used for 24 years, especially storage facilities made with wood / plywood construction.
2) Kitchen table upholstery: broken ceramics and detached.
3) Different floor level/down 47 cm from dining room.
4) Different floor level/down 15 cm from garage.
5) Poor air circulation so that the space is moist.
6) Plumbing dirty water waste exposed on the wall is prone to leakage.
7) Position control tub on the front door of the kitchen to the garage, lack of depth and less comfortable for circulation.

**Figure 5:** Existing Kitchen Condition (by Author Team, 2019)

### *3.5 Analysis of the universal principle of design on objects*

To analyze the application of universal design principles to research objects, researchers used the Universal Design Principle [4]. which is adjusted only to the scope and limitations of this residential user problem, with 20 (twenty) criteria as follows:

1) Ease of access to the kitchen for all users with various physical abilities.
2) The selection of materials for kitchen table surfaces is easy to clean and will withstand normal damage for many years.
3) Get good natural lighting through the glass window.
4) Lighting task lighting over certain areas, such as cooking areas (stoves) to ensure safety for cooks.
5) The selection of kitchen floor materials is comfortable and safe (anti-slip) due to high traffic areas.
6) Provide storage of cleaning substances and other hazardous materials out of reach of children in enclosed cabinets equipped with safety locks.
7) Selection of tap water / faucet one lever to ensure everyone of all abilities can turn the water on and off.
8) The single lever model can be managed with open arms or a closed fist, comfortable enough for people suffering from arthritis.
9) Provides an open shelf to make it easier for users to find and retrieve items/tools that are often used when cooking: Providing a glass front cabinet makes it easy to find the item they're looking for and can also help the small kitchen feel more spacious.
10) Provides storage space with pull-out racks for easy and shortened storage time.
11) Storing plates for dishes in the bottom shelf/drawer is safer and more convenient than storing them in the top cabinet.
12) Oven placement is easy for users of all ages and abilities.
13) Vary the height of the kitchen table to ensure users of all ages, sizes and abilities have a place to work.
14) The larger the grip, the easier it is for people with arthritis or other mobility problems to reach for it. D shape pull/handle - the most convenient doors and drawers for a wide variety of people.
15) For safety if you have young children, the bottom storage cabinet comes with a safety lock.
16) The oven is installed multilevel on the kitchen wall. Ovens should be installed lower so that people who are smaller or who use a wheelchair can easily access the oven.
17) Provides ample space in the cooking area including the vertical distance of the stove and cooker hood, so that the eyesight is not obstructed and enough space to bend.
18) A higher position of the dishwasher/sink area reduces bending distance at work to reduce fatigue.
19) Provide depth of space on the bottom kitchen table that is comfortable for the feet
20) Provide tap water to the pot in the stove area, to facilitate the supply of clean water at the time of cooking.

Based on these criteria, the analysis of its application to research objects through interviews and observations and measurements is carried out. Assessments are conducted by giving tiered assessments: low, medium and high.

**Table 3** Analysis of the application of universal principles in the kitchen

| No | Criteria for Applying Universal Principles of Design | **High** | **Medium** | **Low** |
|---|---|---|---|---|
| 1 | Accessibility | - | - | √ |
| 2 | Maintenance | - | √ | - |
| 3 | Natural Light | - | - | √ |
| 4 | Task Lighting | - | - | √ |

| | | | | |
|---|---|---|---|---|
| 5 | Safety Floor – anti slip | - | - | √ |
| 6 | Child safety - storage of harmful substances | - | - | √ |
| 7 | Easy to use faucet | - | - | √ |
| 8 | Easy to reach open-tool | - | √ | - |
| 9 | Easy to find items - transparent | - | √ | - |
| 10 | Easy to find and store items with shelves – pull-out | - | - | √ |
| 11 | Dish rack position | - | - | √ |
| 12 | Oven position | - | √ | - |
| 13 | Kitchen table level variations | - | √ | - |
| 14 | Comfortable Handle/Pull | - | √ | - |
| 15 | Cabinet safety lock | - | - | √ |
| 16 | Comfortable Oven position | - | √ | - |
| 17 | Comfortable cooking room | - | √ | - |
| 18 | Comfortable sink position | - | √ | - |
| 19 | Space for foot | - | - | √ |
| 20 | Supply clean water when cooking in the stove area | - | - | √ |

## 4. CONCLUSION

The conclusion of the findings of this study, the kitchen that became the object of the study is a dirty kitchen that is widely used by users every day. This dirty kitchen is positioned in the service area to the dining room and is most often used by maid because of its duty to prepare food for the family.

Mr. R who has a hobby of cooking, is a user who often uses the kitchen, especially on holidays or weekends. While Mrs. D quite rarely use the kitchen.

Grandpa P and Grandma M very rarely access the kitchen. They for reasons of elderly factors find it difficult to access the kitchen because the kitchen floor level is lower and quite steep about 47 cm with 3 steps of stairs (14-17 cm).

Child A, also very rarely access or use the kitchen, because he is still 9 years old. Another reason that is the reason child A is very rarely access the kitchen because the difference in floor level is quite steep, Mrs. D works and does not like to cook so there is no mother-daughter interaction in the kitchen area. The kitchen design in this three-generation house was 24 years old and at that time the homeowner (Grandpa P) was still 49 years old, and classified as a young /productive age which still has good physical abilities.

The facilities and conditions of the kitchen room when this research was conducted pretty much found technical problems: damage to the door hinges of storage cabinets, damage to ceramic materials on the kitchen table, damp due to lack of air circulation and lack of natural lighting and lack of special lighting in the work area that reduces work comfort and visual comfort, etc.

The results of a general analysis on the application of 20 criteria formulated from the principles of universal design in the kitchen of this house, it is concluded that the level of application is low. This means that the kitchen still does not quite apply universal design principles that aim to be easy for everyone to use and accommodate different levels of ability. This can be seen from 11 (eleven) of the 20 (twenty) criteria received a low assessment) and 9 criteria got a moderate assessment and no criteria got a high rating.

For further research, it can be suggested that other assessment criteria can be added to make the research more comprehensive. Recommendations are also intended for residential kitchen planning to pay more attention to the universal principles of design so that the resulting design can be durable and sustainable.

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