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Case Study

Spatial Adaptation in Simple Housing: A Case Study of Changes in Size, Type, and Layout of Space in the Moncongloe Area, Maros

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Abstract - *The subsidized modest housing program helps lower-middle-income families own their own homes. Subsidized houses are built simultaneously in the buffer areas of Makassar City, including Moncongloe, Maros, and Indonesia. The main houses undergo significant spatial changes in less than five years from construction, despite regulations that require maintaining the original structure for the first five years of occupancy. This research examines changes in these houses' function and spatial layout, focusing on aspects of function, location, and space. The sample is selected purposefully based on changes that still reflect the original shape of the house and the occupants' willingness to participate. Data is analyzed descriptively, categorizing changes according to space area, space function, methods of modification, and the location of spaces on the site. The results show that changes occur in the front and back areas of the house, with the addition of functional spaces such as a business area (kiosk), dining room, and family room. Space expansion is evident in the living room and kitchen, while the bedroom and bathroom remain relatively stable. The front zone of the house (terrace and garden) is frequently converted into a living room or business area. This study provides insight into how modest homes are functionally modified to meet occupants' needs and offers guidance for designers and policymakers in developing more sustainable and comfortable housing.*

Keywords - *Simple Housing, Post-Occupancy Modifications, Design Flexibility, Space Needs, Moncongloe*.

1. Introduction

Offering subsidized housing to mid- and low-income people proves the human need for a safe dwelling. There is a housing project in the Moncongloe area of Maros, Indonesia, within the Mamminasata region, which includes Makassar, Maros, and Gowa. In relation to the housing deficit, Government Regulation Number 12 of 2021 necessitates the provision of affordable housing to be supplied with funding allocated at 25% subsidy and 75% non-subsidy [1,2]. The initiative intends to alleviate the housing problem of lower-middle-class people. The opposition arises when the local people's preferences are at variance with the preferences set forth by the action plan defined by the government and developers. Residents typically talk about the design, quality, and location instead of pricing, which indicates a gap between the housing places available and the demands of the people [3-5]. Moreover, Regulation 242 from the Ministry of Public Works and Public Housing [6] introduced a restriction on subsidized housing alterations within five years of occupation. This legislation has a weak point: there is not enough functional accommodation offered to meet the expectations of the occupants [7]. Therefore, design changes are needed to compensate for these new functional needs [8,9] even though the government strives to address the issue. This study attempts to resolve the gap in the designs of houses in Moncongloe and the needs of the householders, mainly during the five-year period when changes are not allowed. This research contributes to understanding the role of adaptable and flexible home designs within subsidized housing programs. The originality of this work lies in its attention to changes made after the occupancy, which is still poorly studied in Indonesia. These results contribute to the knowledge of house modification and have important consequences for policies concerning housing affordability, primarily in relation to sustaining subsidized housing programs considering residents' diverse needs. This research endeavors to merge constructive government housing policies with real housing options for the residents by developing flexible and responsive architectural designs to change family compositions and dynamics over periods of time.

2. Literature Review

2.1. Adaptation of Space Function

The study of housing adaptation demonstrates ways in which residents convey their spatial needs through alterations

performed to the existing housing structure. The more basic and simpler the housing design, the greater its adaptation potential, which indeed is an adaptation made by residents reflecting advanced and occasionally unwarranted special needs [6]. This suggests a paradigm shift in how housing adaptability is viewed in terms of responsive design[10]. Moreover, Rosenman [11] speaks of an evolutionary design approach where housing designs are allowed to evolve owing to users' changing needs progressively. The importance of being able to shift home functions during the pandemic is emphasized [12], supporting this argument is design which allows for these changes to occur.

An adaptation problem is also being dealt with in a few countries where simple houses are built. Several countries have difficulties adapting house designs within the context of climate changes, demographic shifts, and changing family sizes [13,14,15]. For example, in Japan, solar panels and rainwater harvesting systems are integrated into simple house designs, signifying the use of eco-friendly materials and showcasing the attainment of sustainable development goals [16].In Scandinavian countries, simple house designs use passive and minimalist architectural features such as larger windows for ventilation and lighting and reduced energy use in the winter [17].

2.2. Spatial Planning Adaptation

Theses on simple dwellings highlight adaptation theories in spatial planning that require form-dependent flexibility. Research shows that changes in spatial configuration, such as those made in the Next 21 experimental housing project, can be satisfactorily completed for residents after changes [18]. These changes emerge from a macro phenomenon where the spatial organization of the area, such as in the Klang Valley region, mitigated shortfalls in organizational changes to spaces like kitchens and bedrooms [19]. In Indonesia, studies on Kudus traditional houses established that changes in form but not in the physical configuration of space aid in the sustainability of space [20]. The phenomenon of space or equipotentiality, which permits the formation of complex interrelationships between spaces, underlines the need for changeable and flexible home designs [21]**.**

For simple houses, changes usually include adding or removing walls and using balconies or corridors. Gathering data shows that vertical divisions or space additions are commonly employed in vertical buildings to increase utility, particularly in communal areas where the need to save space is dominant.[22]. These changes result from socio-cultural developments or changing requirements, which apply to subsidized or low-rise housing that needs to be responsive to the demands of its occupants [23,24]**.**

2.3. Adaptation of Space Area Requirements

The adaptation of space requirements in simple houses addresses how residents modify their homes to meet both functional and social needs. Studies indicate that the original house design often fails to meet the evolving spatial needs of residents, prompting them to make alterations, such as adding rooms or rearranging layouts [10]. These adaptations are crucial for maintaining residents' quality of life as their family dynamics change, such as through the addition of family members or changes in personal needs [25,26]. In simple housing contexts, adapting spatial layouts is essential for the long-term satisfaction of the occupants.

2.4. Specific Literature Review and Research Gaps

The imprinted literature mostly focuses on adapting upper-class or traditional houses, which is problematic when designing simple houses for low-income people to accommodate the changes in space function easily. In a case study conducted on user preferences regarding the adaptability of low-income apartments in Erbil, Iraq, the users' preferences and the set designs have a negative correlation, which means most of them are very hard to adapt to [27]. This study demonstrates that a flexible layout is crucial to accommodating future needs. The objective of the study is to address the issue by examining the functional transformations of simple houses in Moncongloe to understand how flexible design can respond to residents' needs and improve the social housing design knowledge framework to minimize transformation waste.

2.5. Contextualizing Findings within Existing Research

The study results focus on the flexibility in designing simple houses, which was previously researched concerning affordable housing spatial adaptation. Emotional and basic needs of individuals living in a house can be met through housing designs that permit change as time flows, which Rosenman [28] identified. The shifts in social, economic, and cultural functions in the Moncongloe area correspond with changes in the simple houses' space functions and configuration, making the simple houses adaptable, which is frequently observed in developed nations with flexible housing designs [13,14,15]. This research also demonstrated that the changes from the terrace to the living room and garage to the business area are not only functional necessities.

Such changes signify shifts in family structure and endorse economic growth, which is a known phenomenon of simple house adaptation around the world. The results of this research greatly affect policies on housing as there is a growing need to respond to issues concerning the form and function of homes. Government and policymakers may need to rethink simple housing design policies to make these houses more adaptable to changes at a minimal cost.

Policies regarding housing modification regulations, especially the five-year rule, need to provide more flexibility to meet growing family needs. This study reinforces the necessity for policies that go beyond meeting the fundamental requirements of residents and respond to changes in family

composition, socio-economic position, and social values. Simple housing supportive policies will create adaptable environments and improve residents' quality of life in the long run. This research aims to study how people living in the Moncongloe region modify the structures and designs of basic houses to accommodate their needs after living in them.

This study is original in that it focuses on the functional changes of subsidized housing after occupancy, one of the least studied issues in Indonesia. This study covers the assessment of building changes by the residents in the form of alterations to the arrangement of spaces and the use of flexible design concepts in new subsidized housing developments.

3. Materials and Methods

This study uses qualitative descriptive research methodology. This methodology has established boundaries and requirements for data validity and temporary design. This research uses a case study approach, which involves examining a specific context, a collection of documents, and specialized studies. [29].

3.1. Research Samples and Data Collection

This study applies one of the qualitative approaches with descriptive techniques to study the sociospatial aspects of the subsidized housing changes within the residents' preferences. Qualitative research observes the phenomena unfolding in a research object and formulates an overall image of the phenomena from multiple sources of information [30].

Descriptive methods provide more detailed accounts of the observed phenomenon. Descriptive research aims to find the causes of certain phenomena or the reasons behind their existence [31]. This study covers subsidized housing as part of the Moncongloe sub-district of Maros Regency in the Province of South Sulawesi in Indonesia.

This research was conducted in Moncongloe Subdistrict, Maros District, Indonesia. This area comprises some subsidized housing like BSS 1, BSS 2, BSS Bukit Indah Kapuk, BSS Mandai, and Findaria Mas 1.

These subsidized housing schemes have been recognized by the Ministry of Public Works of Indonesia as the foremost subsidized housing project in the country since 2016 [6]. The research objectives are understanding the functional, spatial, and physical modification processes and reconfiguring simple housing units. The study's population comprises simple houses that are physically altered but remain in their basic form, categorized as not fully restored, in five housing places with row-type houses (Table 1).

In this case, the researchers used purposive sampling, which is the sample technique and procedure involving the selection of a research sample that is willing to participate in the study according to the set parameters of the study [32]. This enables an understanding of the problem being examined.

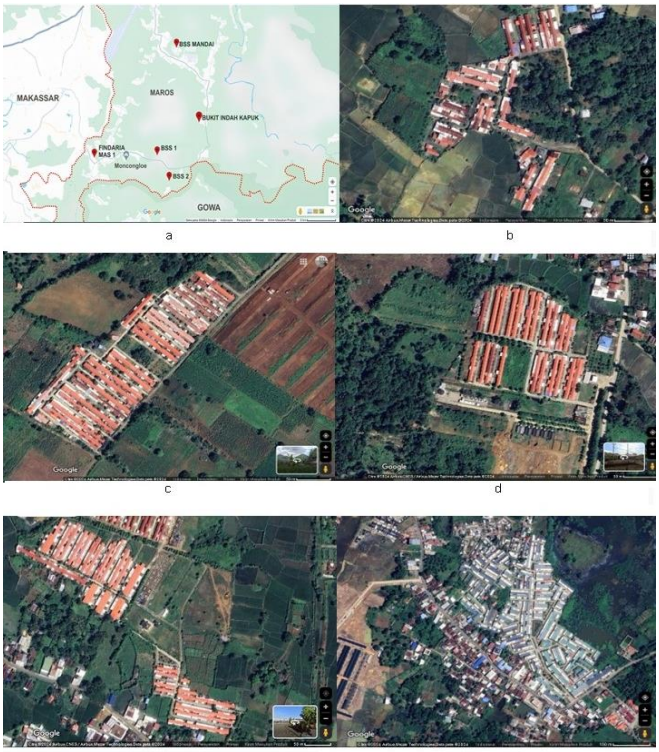


Fig. 1 Research sites: (a) Research location, (b) BSS 1, (c) BSS 2, (d) Bukit Indah Kapuk, (e) BSS Land Mandai, and (f) Findaria Mas 1 (Source: https://www.google.co.id/maps/search/perumahan+bss/@-5.1297532,119.5481094,13.5z?entry=ttu)

Direct observations and in-depth interviews with the house residents provided the primary data. The observations and conversations dealt with the physical alterations done once the residents occupied the house, focusing on the degree of change in the space's function, configuration, and processes and its rotatory movements. Space's function pertains to a designated area's distinct aim or role. It encompasses how the area is utilized or designed to be utilized, which can be determined by its design, position, and activities. The conditions for sample selection in the study are as follows:

- The simple house on the study site has been occupied since its construction.
- The house's layout has been changed, but its basic form is still preserved.
- That row of houses has 6 meters as its site’s frontage width.
- The respondents for the first owner of the house are the occupants themselves.

Considering time limitations and research context, including purposively chosen field observations (unoccupied dwellings, non-owner renters, and unwilling subjects), the research intends to work with a sample size of seventy-five houses. (Table 1).

Table 1. Number of households and willing sample

Location	Year of Build	Total of Build	Population Number (Houses)	Number of willing Samples (Houses)
BSS 1	2016	122	90	10
BSS 2	2017	200	70	13
Bukit Indah Kapok	2019	250	60	16
BSS Mandai	2019	235	90	10
Findaria Mas (Type 36)	2019	350	100	21
Findaria Mas (Type 45)	2019	150	30	5
Total			420	75

A variety of literature was reviewed to collect secondary data, including studies on housing for the elderly, changes in the required space and functionality of the house over time, and most modifications done by the occupants of the house. This literature review intends to position the results within the wider scope of literature on architecture and housing.

3.2. Initial Unit Layout at the Study Location

In this section, Data from five research sites are presented in Table 2. Each site's land area ranges from 60 to 84 m2, while the primary building area is between 30 and 42.8 m2. The number of houses sampled for different locations differs; there is a cumulative total of 75 houses.

Findaria type 45 has the least number of samples (5 houses), while Findaria type 36 has the largest number of samples (21 houses). Houses with room arrangements similar to those located at a few of the research sites are illustrated in Figure 2. Most houses have two bedrooms, a living room, a dining room, a kitchen, a bathroom, and gardens at the front and back. The floor plan indicates that the master bedroom is in the front, the second bedroom is at the back, and the dining room and the kitchen are behind the second bedroom. Behind each house are gardens or yards that differ in size. Some floor plans include garages or carports that are set aside for the cars of the occupants. This design best illustrates how to allocate the land for the construction of small houses in an efficient manner.

Fig. 2 Initial plan and facade of the study location housing unit

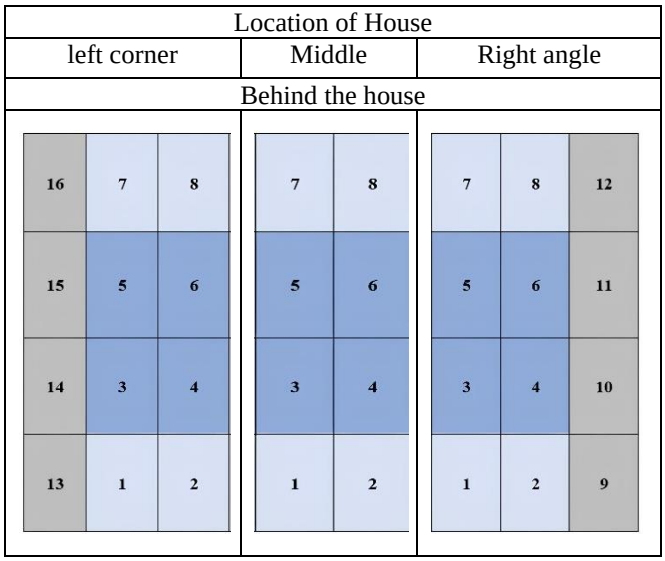
Table 2. Site area, initial area of the house, and number of samples for each research location

Location		Site Size (m)	Site Area (m^2)	Initial Plan Area (m^2)	Number of Houses
1	BSS 1	6 x 12	72	31.2	10
2	BSS 2	6 x 11	66	37.2	13
3	Bukit Indah Kapuk	6 x 10	60	30	16
4	BSS Mandai	6 x10.5	63	34.2	10
5	Findaria Type 36	6 x 11	66	36.8	21
	Findaria Type 45	6 x 14	84	42.8	5
Total					**75**

3.3. Analysis and Findings

This research examines to what degree residents can modify the functions and the spatial layout of subsidized houses in the absence of any major renovations. The research findings are synthesized by analyzing the phenomenon of spatial changes in the function and spatial area of the subsidized house, utilizing survey data to evaluate the spatial alterations in comparison to the original house. To accurately delineate the evolving spatial configuration of a duplex residence, the spatial zones are categorized according to the row position of the house (Figure 3).

The position of the house in the middle, right corner, and left corner of Zones 1 to 8 represents the room in the middle position, and Zones 1 to 12 represent the room in the right corner position. Meanwhile, the house in the left corner position is in Zones 1 to 8 and Zones 13 to 16. Then, the data will be combined to isolate recurring features and configurations in the changes of the space module, which contains space modification procedures. Analysis centers on how the spatial structure zones of the house are examined descriptively to establish the degree to which these modifications correspond with or differ from the original design (zona 3, 4, 5, 6). This research seeks to elaborate on the static evolution of residents' needs, architectural design, and development of living spaces in simple housing.



Front of the house
Description:
Zona 1: Front area of the house on the right side
Zona 2: Front area of the house on the left side
Zona 3: Inside area of the house at the front right side
Zona 4: Inside area of the house at the front left side
Zona 5: Inside area of the house at the back right side
Zona 6: Inside area of the house at the back left side
Zona 7: Back area of the house on the right side
Zona 8: Back area of the house on the left side
Zona 9, 10, 11, 12: House development area on the right side
Zona 13, 14, 15, 16: House development area on the left side

Fig. 3 Pattern of space zones on the site

4. Results and Discussion

4.1. Characteristics of House Occupancy

Looking into Table 3, this study uncovers differences in residential comfort, duration of stay, education, and employment among five different localities. Many respondents live in their residences for a period of between three to five years (50.7%), and a little over fifty percent of them have vocational education (60%).

The resident's main job is in business (54.7%). Table 4 reveals that a significant proportion of the residences are inhabited by more than five individuals (46.7%), signifying elevated population density. Many inhabitants perceive a high level of comfort, particularly with inter-room circulation, ventilation, and lighting. Nonetheless, certain grievances have been expressed, specifically concerning ventilation and lighting deficiencies, with around 14–16 residences in various locations indicating insufficient airflow and illumination.

These conclusions coincide with the prior analysis that stresses flexibility and adaptability in designing simple houses to improve the quality of life. Home design flexibility enables social functions and comfort to be integrated over an extended period [33]. Scandinavian countries construct simple houses that are well-ventilated and naturally illuminated to minimize the usage of mechanical heating and cooling [17].

Table 3. Characteristics of house occupancy

Length of Stay of the Residents	**Frequency**	**Percent**
<= 1 Year	4	5.3
>1-3 Year	30	40.0
>=3-5 Year	38	50.7
>=5-7 Year	2	2.7
>=7 Year	1	1.3
Total	75	100.0
Education of the Residents	**Frequency**	**Percent**
<=High School	20	26.7
Vocational education	45	60.0
Graduate	10	13.3
Total	75	100.0
Occupations of the Residents	**Frequency**	**Percent**
Entrepreneurs	42	54.7
Employee	34	45.3
Total	75	100.0
Number of Residents	**Frequency**	**Percent**
<=2 people	7	9.3
3-5 people	26	44.0
>5 people	35	46.7
Total	75	100,0

Table 4. Perception of living comfort

Indicator	**Location**					**Total**
	BSS 1	BSS 2	Bukit Indah kapuk	BSS Mandai	Findaria Mas I	
Circulation between spaces						
Less	2	1	2	2	3	10
Enough	7	13	5	8	16	49
Less	1	2	3	3	7	16
Total	10	16	10	13	26	75
Ventilation						
Less	1	3	2	2	6	14
enough	7	12	4	7	15	45
Less	2	1	4	4	5	16
Total	10	16	10	13	26	75
Lighting						
Less	1	10	2	3	4	14
enough	9	4	5	6	18	45
Less	0	2	3	4	4	16
Total	10	16	10	13	26	75

Unfortunately, in the Moncongloe region, as perceived by the residents' comfort perception data, ventilation and natural lighting leave much to be desired. Applying eco-friendly technologies, like rainwater harvesting and natural lighting, and their implementation in Japan significantly increases space efficiency and comfort for residents [16]. Therefore, improving ventilation and lighting in Moncongloe houses could follow the methods from other countries. Improvement in simple housing designs in Indonesia can be made from this study's findings, especially for inter-room circulation, lighting, and ventilation. More flexible and green designs need to be implemented due to complaints regarding inadequate ventilation and lighting in certain areas. Conejos et al. [34] noted that proposals that are more spatially allocative from the beginning can help reduce obsolescence rates and contest environmental sustainability. Natural daylighting and passive ventilation aids, as used in Scandinavian countries and Japan, will increase the users' comfort. This will also assist in the concept of spatial adaptability since residents can adjust their houses based on changing needs without major renovations.

4.2. Changes in the Room Area

The attached data, alongside Table 1. illustrates the differences in the growth of building area for the five research

sites. The highest observed increase was registered at BSS 1, where a single house saw an increase of as much as 289%. Other notable sites are Findaria Mas 1, where 16 houses saw an increase of 83%, and BSS Mandai, where 13 houses saw an increase of 84%. In BSS 2, 14 houses recorded more than a doubling - a 102% increase - for these five years. These modifications demonstrate the attempt of the residents to add space for their expanding families, even with the limitations placed on subsidized housing modifications for the first five years [8]. Discrepancies in growth patterns are signified by the variations in building spatial changes in these areas, as argued by the studies that connected economic activity and the development of residential areas within the city [35,36].

Some values have larger changes, such as 83% in Findaria Mas 1 and 102% in BSS 2. This variation indicates that these spaces may change over time due to economic considerations, regional planning or incoming investment at the local level. Imbardi [37], supports this arguing tendency for increasing building area in BSS 1 and BSS Mandai, where families are known to transform some other spaces such as corridors, terraces, and balconies to fit their changing needs.

In BSS 2 and Bukit Indah Kapuk, where modifications are less dramatic and more consistent, the findings show that the application of flexible space designs and moving walls, as proposed by Oyebanji et al. [38], can assist people in modifying their dwelling units with no major renovation primary works. The design's flexibility makes spatial modification simpler and more affordable. Conversely, for Findaria Mas 1, which is less spatially uniform, there is remarkable variation in the changes to some dwellings, which are substantially upgraded, while others are moderately upgraded. This suggests important changes to family composition, economic development, or population change tend to be more immediate in creating extensive spatial change adaptations in this region. Such conclusions offer a few noteworthy considerations about elementary housing arrangements in Indonesia.

From a scientific perspective, this study contributes to the body of knowledge on the dynamics of spatial adaptation within the context of simple housing in areas with diverse socio-economic features. Local factors like the economy and social and cultural factors impact spatial change adaptability, which is evidenced by changes in building areas. In essence, the findings of this study can help designers and policymakers in the development of housing that is more flexible and adaptive. Considering that changes in building areas often occur due to increased space requirements, applying designs that use mobile partitions, as noted by Nur Alim [39], can be an effective solution. These mobile partition designs harness flexibility and functionality, which residents appreciate, enabling them to change their homes without undergoing expensive and strenuous renovations. Adapted housing and primary housing around locations such as Findaria Mas 1, which are already popular for their extensive spatial adaptation, need special attention in future housing planning. There is a need to create comfortable and safe flexible housing to meet the diverse needs of the inhabitants. In this way, the quality of living will be enhanced and, at the same time, contribute positively towards sustainable development.

Table 5. Percentage change in built-up areas of houses

Percentage Increase in Area * Location Crosstabulation							
Count							
		Location					Total
		BSS 1	BSS 2	Bukit Indah Kapuk	BSS Mandai	Findaria Mas 1	
Percentage Increase in Area	42	0	0	0	0	1	1
	83	0	0	0	0	16	16
	84	0	0	0	13	0	13
	87	0	0	0	0	5	5
	100	0	0	9	0	0	9
	102	0	14	0	0	0	14
	111	5	1	0	0	0	6
	119	1	0	0	0	0	1
	139	0	0	0	0	1	1
	146	0	1	0	0	0	1
	150	0	0	1	0	1	2
	169	0	1	0	0	0	1
	172	1	0	0	0	0	1
	194	0	0	0	0	1	1
	203	0	0	0	0	1	1
	209	0	1	0	0	0	1
	289	1	0	0	0	0	1
Total		8	18	10	13	26	75

Such findings underscore the importance of developing a responsive housing plan that integrates the residents' social and economic context. This plan can enhance the level of responsiveness of the socio-economic environment and the socio-economic life of the inhabitants, thereby improving the quality of life standard of the people as per the changing lifestyle and economic development over a period.

4.3. Analysis of Space Function Categories

There has been a notable shift concerning the use of space functions at the five research locations, as shown in Figure 5 and Table 3. Spaces from the older layout, like bedroom 1 (99%), bedroom 2 (96%), and the garage (89%), remain key components for most houses.

However, major changes in the new spaces have emerged, such as the kitchen (99%) and the family room (93%), which now assume central importance in the house's spatial organization. This suggests that respondents of the house not only keep primary functions but also incorporate new spaces that conform to their contemporary requirements.

The introduction of kiosks (28%), drying areas (11%), and laundry rooms (15%) suggest an adaptation to the economic and functional needs of the residents. The presence of kiosk space clearly suggests that informal economic activities are gradually being carried out by the residents from within their homes.

Besides, some other residents have included extra multifunctional spaces such as bedrooms (3%), workrooms (3%), and storerooms (4%), which demonstrates a growing need for an adaptive approach to space allocation owing to changing household size or other lifestyle changes.

Fig. 4 Categorization of the use of space functions

Table 6. Categorisation of old and new room functions

Room Name	Category function	Houses that use	Percentage of Total Sample (%)
Terrace	Old	45	60
Garage	Old	67	89
Front Garden	Old	11	15
Sitting room	Old	64	85
Dining room	Old	59	79
Bedroom 1	Old	74	99
Bedroom 2	Old	72	96
Toilet	Old	74	99
Backyard	Old	6	8

Kitchen	New	74	99
Family room	New	70	93
Kiosk	New	21	28
Laundry Room	New	11	15
Stairs	New	4	5
Drying Room	New	8	11
Sitting Area	New	1	1
Work Room	New	2	3
Extra Land	New	4	5
Bathroom 2	New	7	9
Warehouse	New	3	4
Prayer room	New	1	1
Fishpond	New	2	3
Side Land	New	2	3
Bedroom 3	New	2	3
Bedroom 4	New	2	3

In this study, the identified changes in space function follow a global shift pointing to the need for adaptability in simple housing. Marco et al. [33] illustrate that design flexibility is important because it enables spaces to respond to the changing needs of the residents. Almost all households in Japan save space by using kitchens and family rooms, affirming the theory of space efficiency, where house designs are minimalist and multifunctional [16]. In addition, Scandinavian countries make use of family rooms which have natural lighting and passive ventilation for comfort without essential changes to the room [17]

Fanggidae's [40] findings, which draw attention to the employment of unsophisticated residential spaces in simple housing for informal economic activities, correspond with using kiosk space (28%) as an economic adjustment. Research on *tiny houses* in the United States shows this, too, where the small spaces are designed to achieve a minimalist lifestyle and serve commercial purposes [39]. Adding extra bedrooms and workspaces as multifunctional spaces corresponds to the work of Yasmin & Nilufar [41], which showed that simple house residents, as many, adjust for privacy and functional space divisions.

Moreover, Oyebanji et al.'s [38] study on mobile partitions and agile spaces is pertinent to the alterations taking place in these areas. The occupants of these modest dwellings in five areas actively show to us that they have devised design solutions that make it possible to optimize the use of spaces without incurring significant structural alterations, as is the case with the sustainable housing strategies of Conejos et al. [34]. These results bear numerous consequences for the planning of simple houses in Indonesia. In this case, spatial adaptation is an indicator that the original design of the house did not satisfactorily meet the expectations of the occupants, and therefore, the participants seek to use the available space to address social, economic and functional changes. The inclusion of new spaces, like kiosks and a family room, confirms that there is a need for the so-called simple to be more flexible in relation to the evolving demands of their residents over time.

The argument for more adaptable residential modifications by Oyebanji et al. [38] and Femenias et al. [25] will enable residents to change the internal layout of the house with minimal structural adjustment to the house. This will make constructing sustainable housing that responds to the residents' social and economic changes possible. Moreover, movable partitions and multifunctional designs can be a practical solution for other residents of basic houses who want to maximize their space without incurring extra costs associated with physical building extensions. Furthermore, the expansion of kiosks and other commercial activities essentially demonstrates the support required for emerging informal economic activities within basic residential areas.

Consequently, policies on housing should enable people to use their homes as economic resources. These results also confirm the need to adopt an integrative strategy for housing planning, which looks at the people's functional requirements and allows for space changes corresponding to their standard of living and economic situation.

4.4. Spatial Zone Analysis

According to Table 4, the five studied residential locations exhibit different patterns of spatial placement. The placement of essential features like the terrace (35%), the garage (53%), and bedroom 1 (47%) conforms with a zoning layout. Zone 1, which is frontal on the right side of the house, becomes the primary area of the house, which is occupied by public activity zones like terraces and garages. The inner zones of the house, such as zones 3 and 5, are allocated for bedrooms and other civilized private zones, which demarcate the social and personal space dimension of these houses.

The placement of the kitchen (35%) and the dining room (24%) in zone 8 at the rear of the house suggests that functional areas are being relocated further away from the central public zones. The front zone of the house, which contains kiosks (12%), also indicates that the area is not only of a social nature but serves an informal business function as well.

The alteration of open areas is also notable in the application of peripheral land (3%) and adjacent land (3%) which are located within development zones, for example, zones 9 to 12 and zones 13 to 16. This indicates that the people are taking advantage of the spaces surrounding the dwelling to enhance the purpose of the area without vandalizing the primary framework of the dwelling. The adaptive placement of space connects to the global trends about simple housing reorganization. Marco et al. [33] underscore flexibility in structural layout as a critical feature of residential homes. The placement of kiosks as commercial space in the front zone supports Fanggidae's [40] findings that simple houses in urban centre's particularly have economic functions in the front yard. This also relates to United States studies about informal economic activity often done in the front yard of "tiny houses" [41].

The backspace is frequently employed for functional and technical activities, as demonstrated by Handayani's [16] support of the backspace for the kitchen, dining room, and other additional rooms. This shows that residents are expected to have a private and technicized use of space that is not so visible from the outside. The shift in the geographic region of this area has certain effects on basic housing development within Indonesia. The housing developers should pay attention to the locations of flexible and adaptive spaces which enable residents to make full use of their spaces without many changes to the form of the house.

Table 7. Categorization of room functions based on room location

Room Name	Zone Location	Homes that Use	Percentage of Total sample (%)
Terrace	1	26	35
Garage	1	40	53
Front Garden	1	5	7
Sitting room	2	11	15
Dining room	8	18	24
Bedroom 1	3	35	47
Bedroom 2	5	36	48
Toilet	6	20	27
Backyard	17	2	3
Kitchen	8	26	35
Family room	4	14	19
Kiosk	2	9	12
Laundry Room	8	4	5
Stairs	6, 7, 12,14	4	5
Drying Room	2	3	4
Sitting Area	1, 2	1	1
Work Room	7, 2_2, 8_2	2	3
Extra Land	9, 10, 11, 12	2	3
Bathroom 2	7	2	3
Warehouse	1, 8, 10, 11	3	4
Prayer room	6	1	1
Fishpond	1, 6	2	3
Side Land	6, 14, 15	2	3
Bedroom 3	1, 6	2	3
Bedroom 4	6, 15_2	2	3
Note: _2 (Second floor)			

Integrating public spaces such as terraces or kiosks in front-zoned semiprivate areas and private spaces within the dwelling is a compromise among social, economic, and privacy aspects of the house residents. There is a housing plan that considers spatial zoning, as proposed by Oyebanji et al. [38], which may assist in designing efficient and more sustainable houses. Permitted alterations to the layout plan enable residents to expand a dwelling or develop additional structures as they require.

These approaches would enhance local economic development because residents could sell goods and services in the front space of their residences without interfering with the use of the other portions. The illustrations also reveal that aside from functional considerations, the socio-economic conditions and activities of the inhabitants of the simple housing also determine the space configuration. Hence, adaptable multi-use spaces integrated with housing policies fundamentally enhance the responsiveness of housing to resident needs.

4.5 Analysis of How to Change Space

The approaches residents use to change space into easy homes are illustrated in Table 4. The addition, reduction, and movement of space are carried out with different degrees of complexity depending on the space category. Approximately 50% of residents have increased the size of their terraces, while 70% have not decreased them, and 60% have not relocated. This indicates that terraces are frequently increased to satisfy additional space requirements. About 40% of garage residents added their garages, but 60% did not decrease them, and 60% did not move, indicating.

Most garage alterations tend to be enlargements rather than reductions or relocations (Figure 5). Front porches tend not to alter or experience minimal changes as the space increases slightly. A total of 10% of the residents expanded the front yard, with 70% maintaining size and another 70% remaining in the same location. This indicates that 50% of residents added a living room. The remainder of the residents either didn't reduce in number by 70% or didn't move, verifying that adding a living room has become the norm as an increase in comfort. A small proportion of 10% added dining rooms, but a larger 70% did not decrease, while 50% switched spots, concluding that dining rooms tend to be moved more than they are built. Half the residents added one bedroom, whereas only ten percent added two bedrooms. Most residents refrained from moving or downsizing for these two types of spaces, demonstrating a more fixed or growing need for sleeping space.

In the meantime, twenty percent added new bathrooms, with seventy percent not downsizing and sixty percent not relocating, indicating residential stability with the function and location of these bathrooms. Up to ten percent of residents increased the rear of the house, but eighty percent did not decrease, and eighty percent did not move, indicating the rear yard was, at best, slightly expanded or stayed the same.

About twenty percent of residents increased the size of the kitchen, fifty percent did not decrease the size of the kitchen, and seventy percent did not relocate, suggesting that kitchens are often enlarged to accommodate greater cooking needs.

The new addition to the terrace, living room, and bedroom underscores the fact that areas like corridors and balconies have been previously transformed into spaces for private and communal activities. This addition captures the desire for more privacy during rest periods and the need to support greater family activities. The lack of significant widespread space reduction coincides with most tenants trying to satisfy their increasing needs by adding or relocating space rather than cutting down on the existing area.

The further movement of the dining room and the bathroom shows available scope for more radical alterations to the interior design of the house for better space allocation. These results may guide planners and architects in constructing simple houses to help these types of residents transform their living spaces to suit their needs.

The new dedication of communal spaces like the terrace and living room proves that the housing needs social and family activity spaces that are adequate in size. At the same time, the constancy of spaces such as bathrooms and kitchens highlights the changing importance of the design for convenience and functionality of many residential spaces.

Table 8. Categorization of ways to change space

Way to Change Space	Space Function (House)									
	Terrace	Garage	Front Garden	Living Room	Dining Room	Bedroom 1	Bedroom 2	Bathroom	Back Garden	Kitchen
Making Additions	22	21	5	36	50	0	2	15	3	71
Do not make additions	53	54	71	39	25	2	73	60	72	4
Making Subtractions	35	12	68	14	75	1	2	5	68	5
Not Making Deductions	40	62	7	61	0	74	73	70	7	70
Making the Transfer	15	14	9	37	50	3	5	21	4	43
Do not make a transfer	60	61	66	38	25	72	70	54	71	32

Fig. 5 Condition Changes in the current function of the space: (a) Area in front of the main house, (b) Front view of the house, (c) Area behind the main house.

The more relocations of the dining area emphasize the need for a design that allows for adjustments to be made to the space with minimal changes done to the area, suggesting some redesign scope is always necessary. Considering these aspects, the study underlines the relevance of adaptivity in the minimalistic approach to understanding simple housing design. These patterns of spatial alteration can help sustainable adaptive home design by incorporating features that would answer the demands of the residents without needing drastic changes over time.

5. Conclusion

The analysis reveals that numerous sociocultural and individual characteristics, such as the education and occupations of the residents, as well as the number of people living within the house, determine the extent of spatial changes needed within the house. People with more stable economic backgrounds, like business owners and salaried workers, tend to execute major renovations that change the space's aesthetic and provide better comfort to the home. Meanwhile, multi-member families are more likely to seek changes that expand the available space to satisfy the high demand for private portions of the house, particularly the bedrooms and sitting rooms. Most residents at five different locations have enlarged their houses with additional spaces not part of the original house layout. Places like Findaria Mas 1 and BSS 2 indicate increased building space as respondents of these areas require more space as families grow or improve economically. This space increase enables residents to satisfy their needs for a good life in terms of privacy and everyday activities to a greater degree than was previously possible. In terms of the elements of the structure, the increase can be associated with adding new functional spaces, which include family kitchens, family sitting rooms and multipurpose halls. Residents frequently change old spaces, such as terrace and garage sitting spaces and front gardens, into new, more useful spaces. The space modification is consistent with the residents' flexibility and spatial efficiency needs, particularly in areas where housing land is limited.

Considerable modifications were made to the factor of spatial arrangement. Often, homeowners shift or extend the back or side area of the house to create more usable space. This is particularly apparent in kitchens and extra bedrooms, which are located towards the back of the house or on the second floor, making use of the unused vertical space. Changing the configuration of the rooms indicates that the occupants rent strive to make the best use of the available land to enhance the aesthetics of their living spaces.

In conclusion, based on the responses to the way of modifying the dwelling, most residents preferred to add space rather than reduce or relocate it. This is mostly observed in the functional spaces like the kitchen, dining room, and the family room. Such modifications are done to meet the dynamic demands of daily living. Along with these changes in space arises the change of function of some spaces, like converting garages into sitting rooms while terraces become family rooms; this shows flexibility in the designs and space used by the residents. In these five regions, the sociodemographic

variables and the dynamics of the evolving spatial structure of simple houses should consider the changes over time and space. Different homeowners have different motivations for modifying their homes, including affordability, increased family size, or increased comfort levels. Therefore, future simple house designs should consider greater attention to being more responsive and accommodating to the residents' needs over time. In essence, this study demonstrates that the structural modification of simple housing to deal with the socio-cultural and socioeconomic factors of change is very necessary for the survival of the citizens as well as for their social well-being. Designs need to be proactive and elastic to enhance the quality of life. For this reason, the initial design phase of basic residences must have a degree of flexibility to reduce the necessity for significant upgrades when modifications are needed. Future investigations could explore creating house designs that adapt easily to society's social and economic transformations. This could involve analysis of the effects that subdivisions, upward mobility, and cultural changes have on the spatial requirements of houses, for instance. Also, studies on the application of new technology to aid in modifying housing structures and assessing the environmental cost of such alterations would be very useful. Adapting housing designs to enhance their sociocultural relevance and efficiency in the long term is another urgent topic that needs further inquiry.

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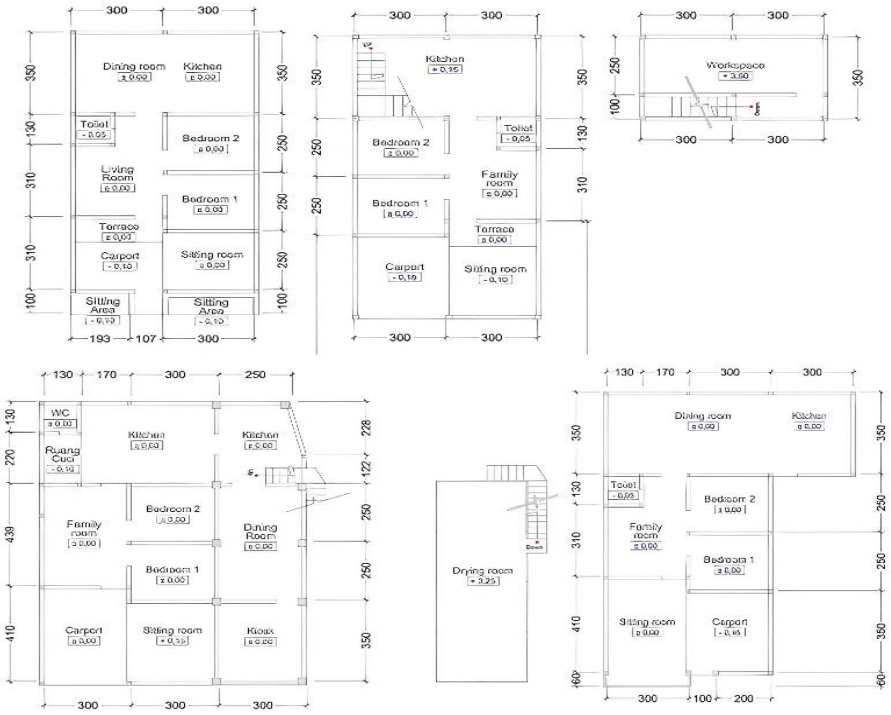
Appendix 1. Space Changes in the BSS 1 housing sample



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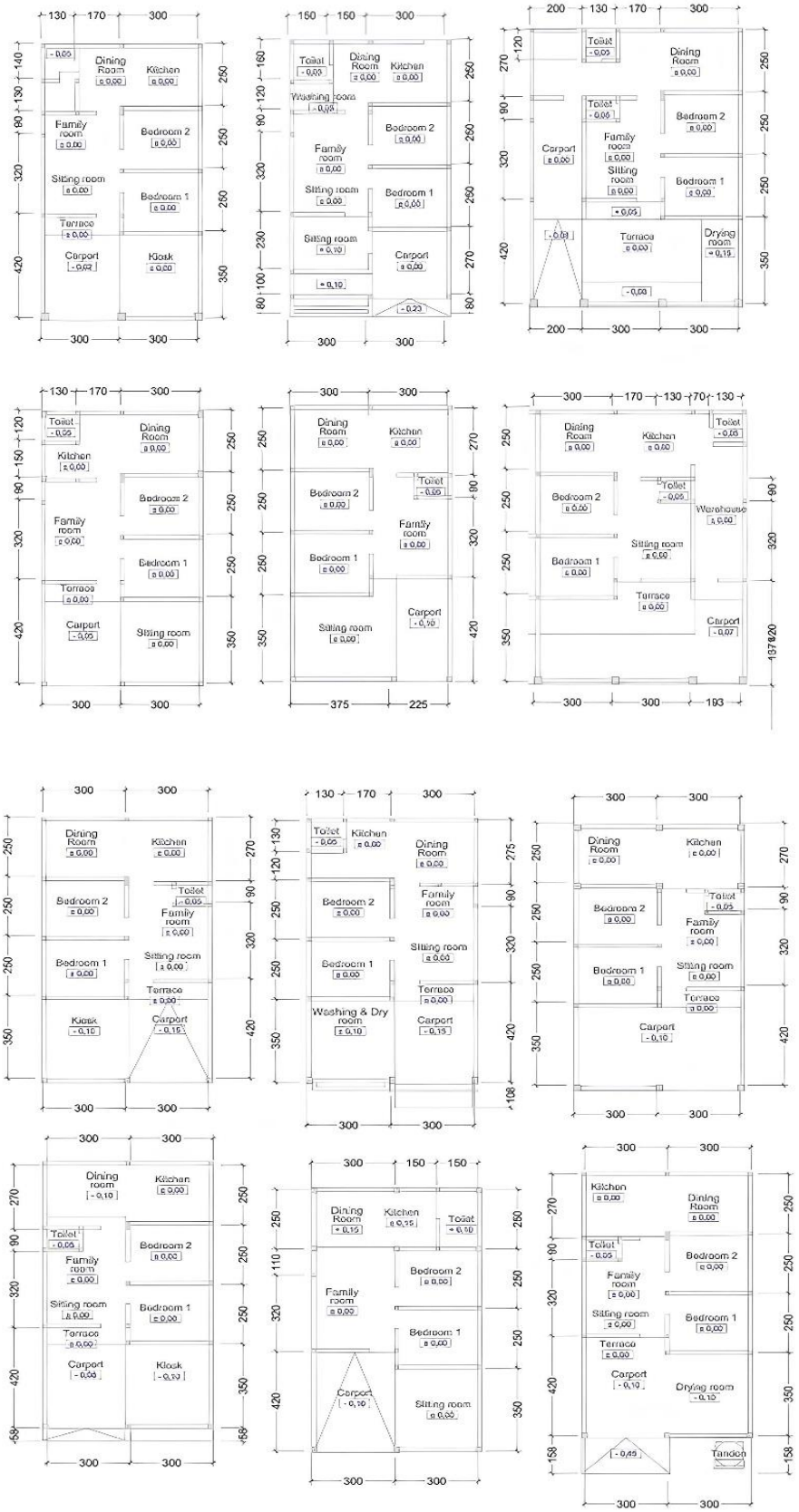

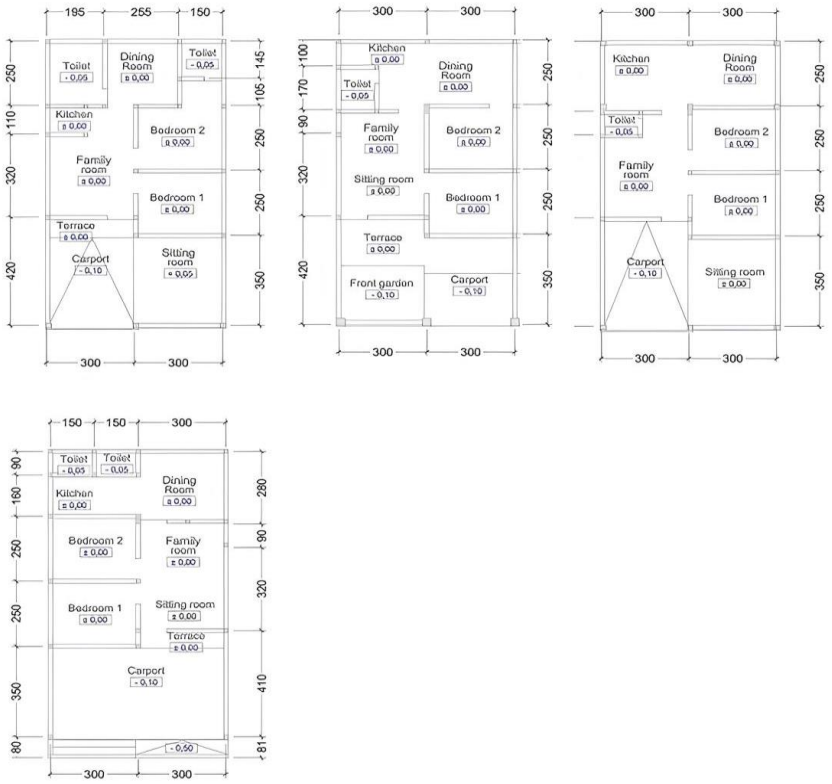

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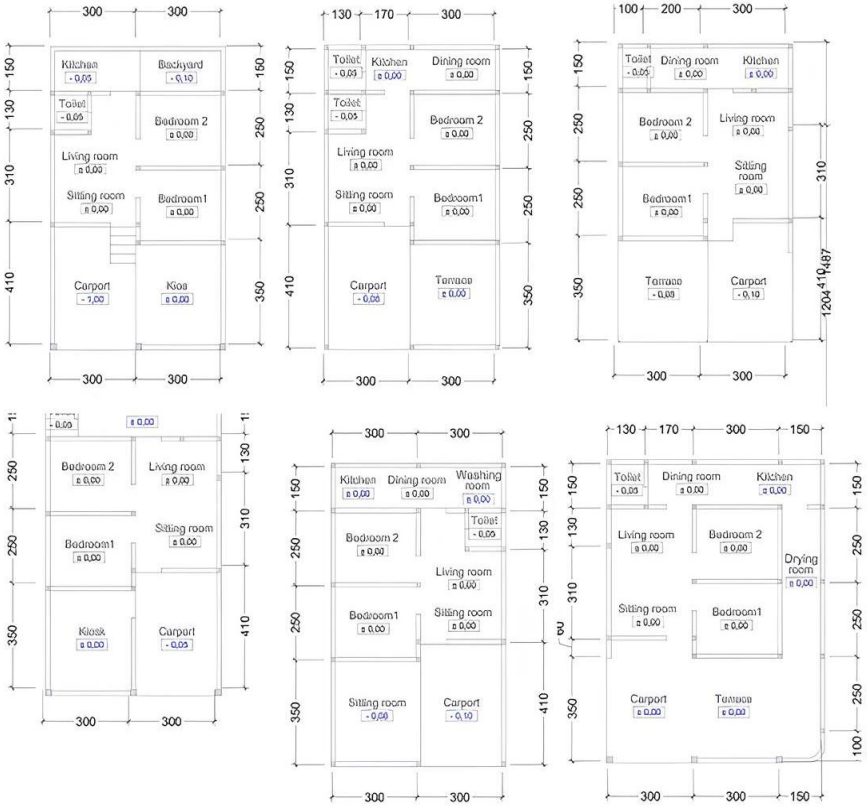

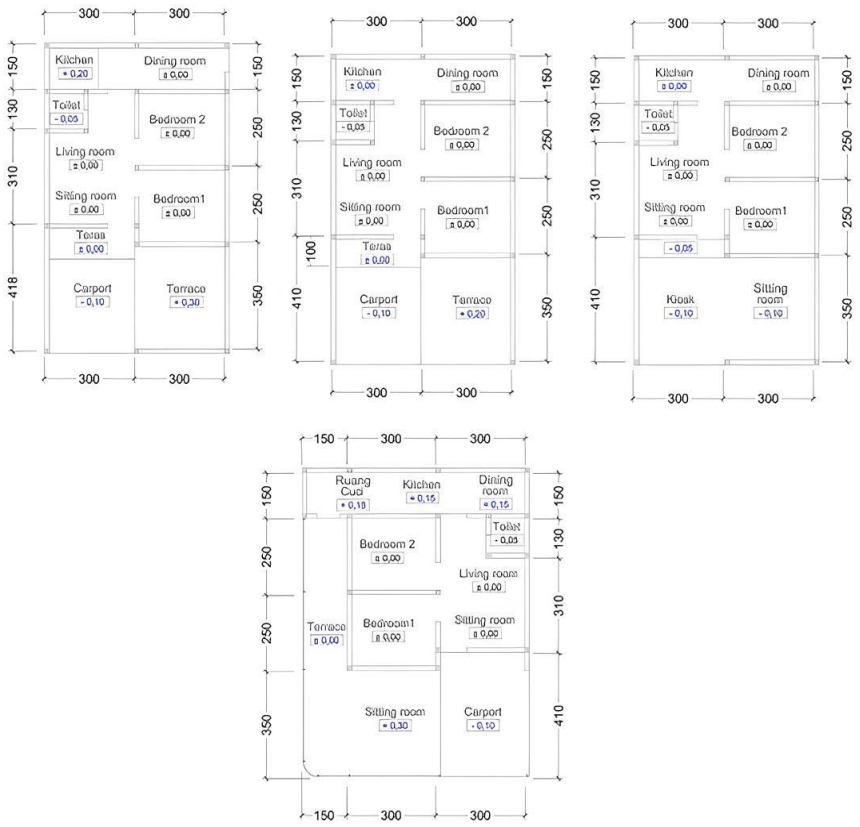

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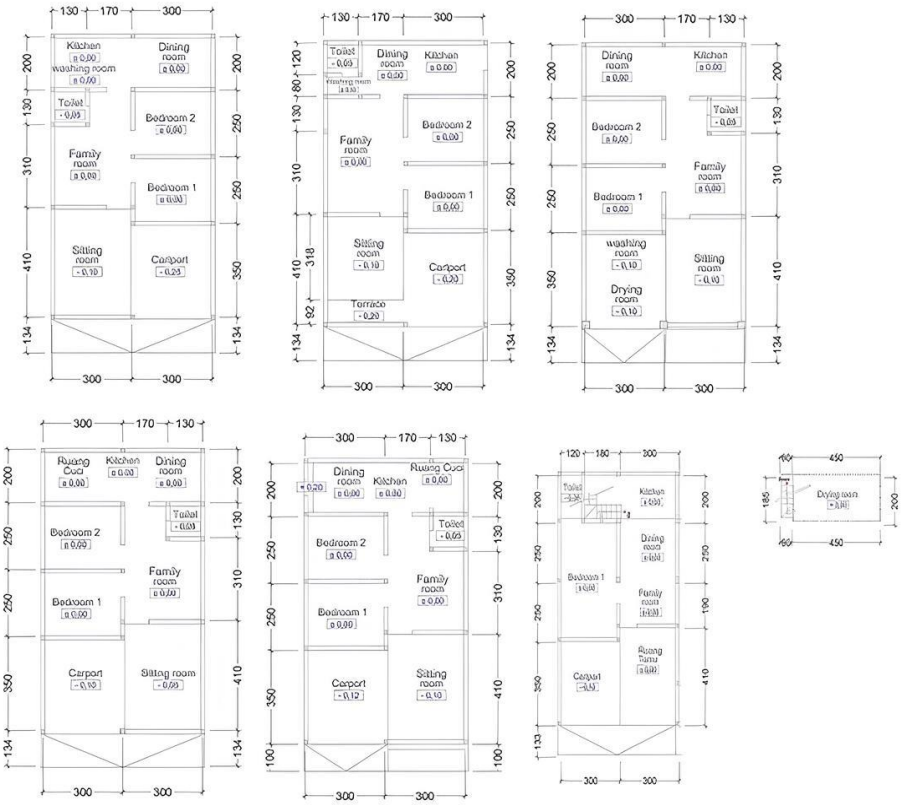
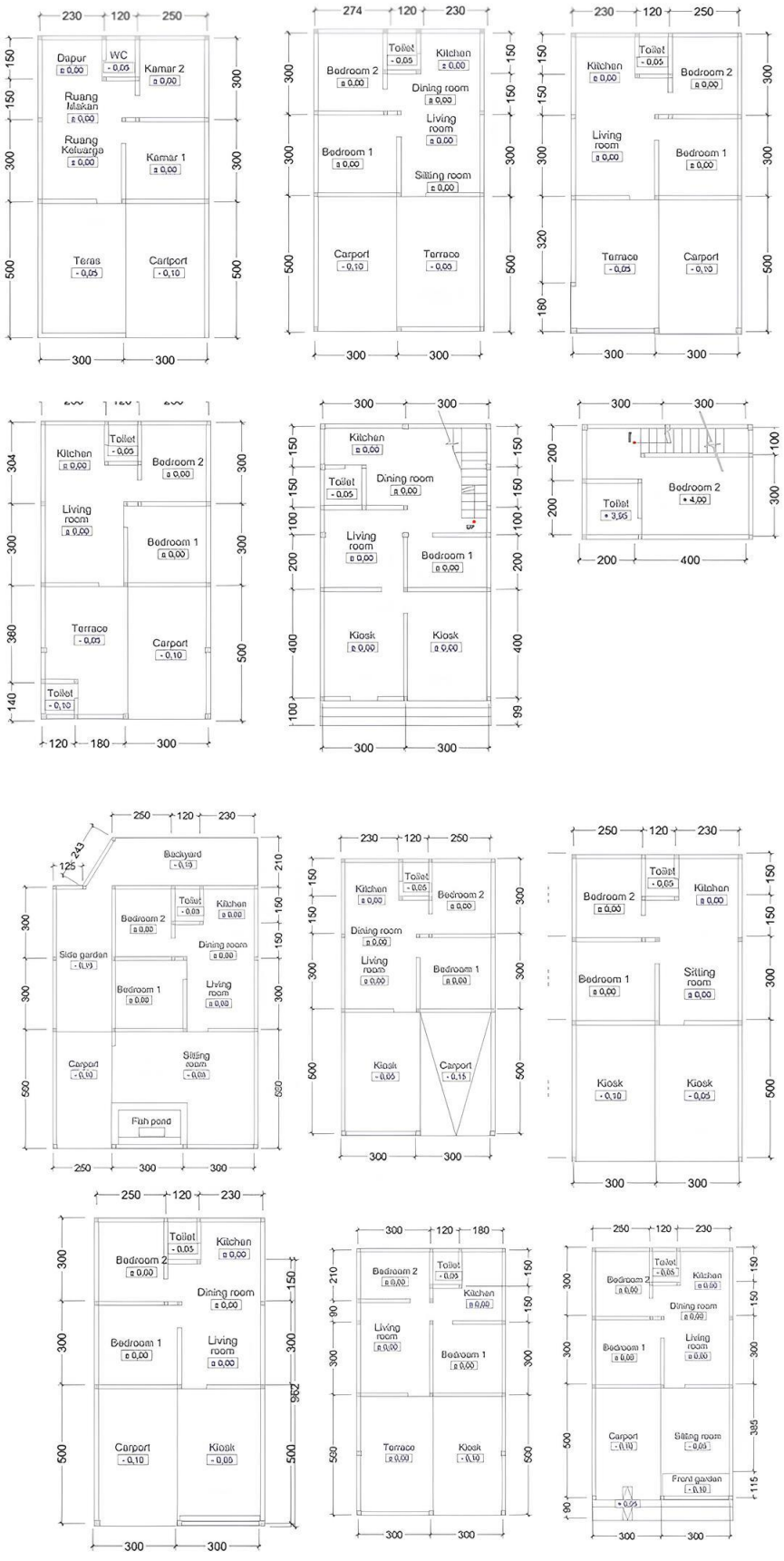
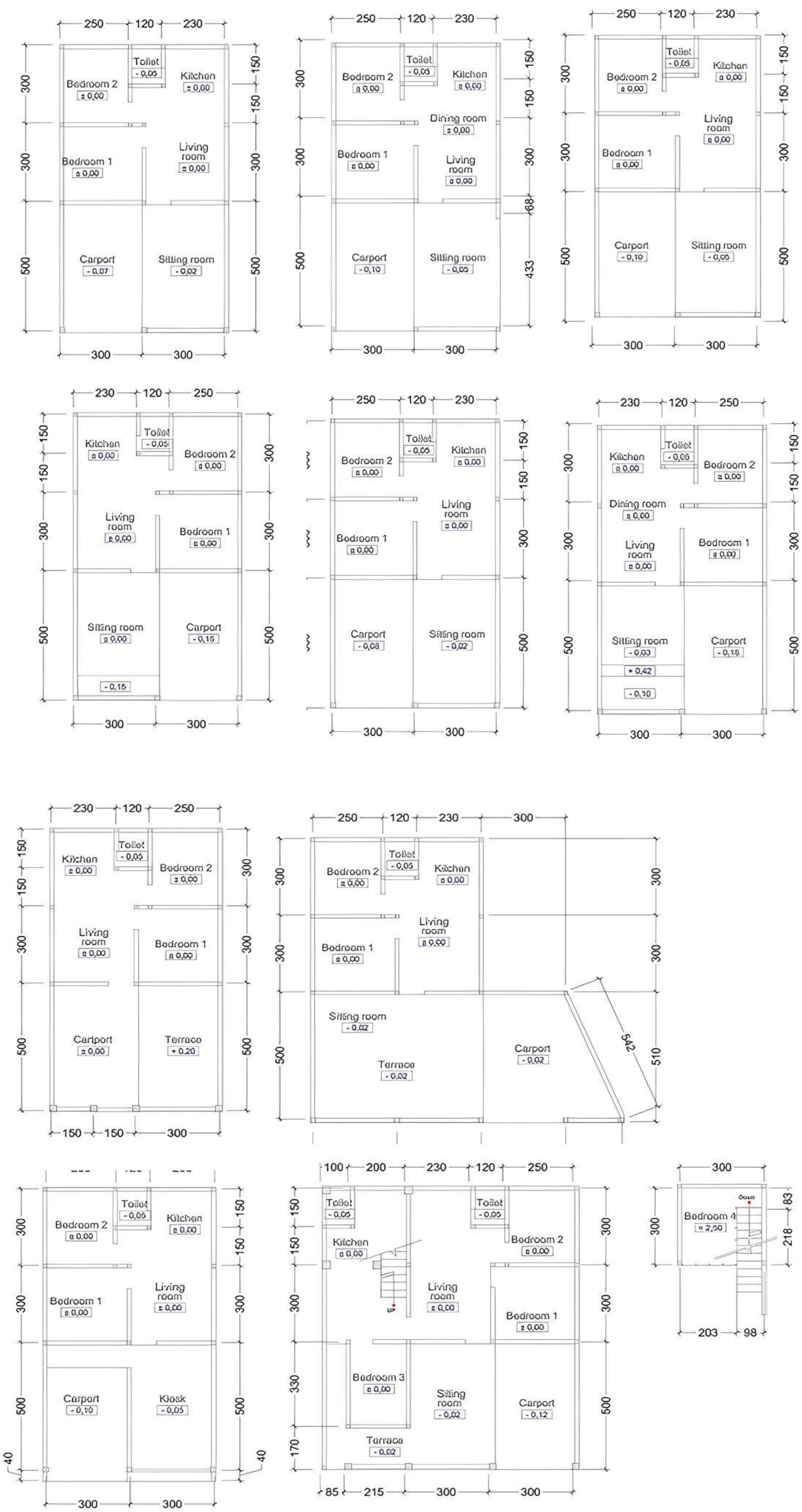


Appendix 5 Space Changes in the Findaria Mas 1 housing sample


Dapur
WC
Kamar 2
Ruang Makan
Ruang Keluarga
Kamar 1
Teras
Carport
Bedroom 2
Toilet
Kitchen
Dining room
Living room
Bedroom 1
Sitting room
Carport
Terrace
Kitchen
Toilet
Bedroom 2
Living room
Bedroom 1
Terrace
Carport
Kitchen
Toilet
Bedroom 2
Living room
Bedroom 1
Terrace
Carport
Toilet
Kitchen
Dining room
Living room
Bedroom 1
Kiosk
Kiosk
Bedroom 2
Toilet
Backyard
Side garden
Fish pond
Carport
Sitting room
Kiosk
Carport
Bedroom 2
Sitting room
Kiosk
Kiosk
Bedroom 2
Dining room
Bedroom 1
Living room
Carport
Kiosk
Bedroom 2
Living room
Bedroom 1
Terrace
Kiosk
Bedroom 2
Dining room
Bedroom 1
Living room
Carport
Sitting room
Front garden



Bedroom 2 ± 0,00
Toilet - 0,05
Kitchen ± 0,00
Bedroom 1 ± 0,00
Living room ± 0,00
Dining room ± 0,00
Carport - 0,07
Sitting room - 0,02
Bedroom 3 ± 0,00
Bedroom 4 ± 2,50
Terrace - 0,02
Kiosk - 0,05