



A Small Livable Home Using Primary Modular Furniture in Indonesia

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Abstract. Rapid population growth and urbanization in Indonesia have created significant challenges in providing adequate and affordable housing, particularly in urban areas. The Indonesian housing sector is presently grappling with a profound crisis, marked by a significant proportion of low-income residents inhabiting substandard dwellings and a mounting housing backlog that exacerbates the existing shortage of adequate housing. Despite the government's efforts to address these challenges, existing housing programs often fall short of meeting the needs and preferences of low-income communities, particularly in terms of architectural quality, infrastructure efficiency, and flexibility of housing adaptation. In response to this pressing issue, this study seeks to explore the concept of a simple yet habitable house that incorporates the principle of modularity, specifically through the strategic adaptation of primary furniture sizes, to optimize space utilization and reduce construction costs. By applying modular design principles, this research aims to enhance program efficiency in housing projects, ensuring that each area is optimized for functionality and supports an improvement in the quality of life of residents, particularly those from low-income backgrounds. This approach has the potential to significantly enhance the quality of life of low-income communities by providing dwellings that meet livable standards. This study focuses on the development of a simple house prototype that integrates primary furniture-sized modules, with the objective of optimizing space utilization and reducing construction costs. Utilizing a descriptive qualitative and quantitative approach, complemented by design experiments based on existing primary furniture sizes for lower-middle-class houses, this research seeks to generate valuable insights and findings that can inform the design of simple houses in Indonesia. Ultimately, the conclusions and findings of this study are expected to provide critical design input for policymakers and stakeholders, potentially informing the development of standardized housing designs that cater to the needs of low-income communities.

Keywords: Small, Livable, home, primary, modular furniture, Indonesia

1 Introduction

Indonesia's rapid population growth and urbanization have led to a severe housing crisis, particularly in urban areas, where most low-income residents live in substandard housing and the housing backlog continues to grow annually. Despite government efforts, existing housing programs often fail to meet the needs and preferences of low-income communities, neglecting key aspects such as architectural quality, infrastructure efficiency, and adaptability. This study addresses this gap by exploring the concept of simple, habitable houses that incorporate primary modular furniture design principles, specifically by adapting the size of essential furnishings to optimize space utilization and reduce construction costs. By applying modular design, this research aims to enhance program efficiency in housing projects, ensuring that each area serves its optimal function and ultimately improves the quality of life for low-income residents.

The intervention by the government to meet housing demand has not adequately addressed the concomitant issues of urban sprawl, traffic congestion, fragmented infrastructure, and environmental degradation (Werdiningtyas, 2021). The persistent challenges necessitate a re-evaluation of current housing policies and the exploration of novel design paradigms that prioritize livability, affordability, and environmental sustainability for low-income communities (Indrianingrum, 2017). This paper proposes the integration of primary modular furniture within small-scale housing units as a strategic solution to address these multifaceted challenges, offering flexibility and cost-efficiency while optimizing space utilization in the dense urban landscapes of Indonesia. This approach aims to enhance the quality of life for urban dwellers by providing functional and aesthetically pleasing living spaces that are both economically viable and adaptable to evolving needs. This paper posits that modular furniture, characterized by its reconfigurable and multi-functional nature, can significantly contribute to optimizing limited living spaces within small homes, thereby enhancing their overall habitability and utility. Furthermore, this investigation explores how integrating such modular components can mitigate the constraints imposed by standardized housing units, which often neglect residents' evolving needs and hinder personalization (Valadão & Villa, 2025). By enabling flexible spatial reconfigurations, this design strategy can empower occupants to customize their environments, fostering a stronger sense of ownership and satisfaction within government-subsidized housing programs (Simbolon et al., 2021). This method not only addresses the immediate need for affordable housing but also aligns with principles of sustainable urban development by promoting efficient resource utilization and reducing construction waste. It also opens avenues for self-help housing schemes, where residents can incrementally adapt and expand their living spaces based on their financial capacity and evolving requirements, thereby fostering community engagement and long-term residential satisfaction (Bunster & Bustamante, 2019). The study therefore investigates the potential of modular furniture systems as a key component in the design and implementation of small, livable homes, focusing on their adaptability, cost-effectiveness, and capacity to address the unique socio-economic and environmental contexts of Indonesian urban environments. Specifically, this research will delve into how modular furniture can facilitate the transformation of compact residential units into versatile and dynamic spaces that cater to the diverse needs

of Indonesian families, promoting both functionality and aesthetic appeal. Moreover, this paper will analyze the potential of modular construction techniques to overcome the challenges associated with conventional building methods in dense urban settings, offering insights into their scalability and broader applicability in addressing housing shortages (Choi et al., 2017).

The existing literature on modular buildings and homes predominantly focuses on sectional prefabricated structures composed of multiple modules. These modules, typically six-sided volumetric units, are constructed in a controlled factory environment and subsequently transported to the site, where they are assembled using a crane and integrated into a single building entity. The modular units can be arranged in various configurations, including side-by-side, end-to-end, or stacked up to four stories, allowing for flexibility in building design. However, a notable gap exists in the literature regarding the application of modular design principles to primary modular furniture that can form a simple, functional dwelling that meets the fundamental needs of its occupants. This study seeks to address this knowledge gap by investigating two key research questions: (1) What are the optimal dimensions of primary modular furniture in a residential setting? and (2) What house typology is most suitable for the arrangement of primary modular furniture?

1.1 Literature Study

The literature review will synthesize existing research on small-scale housing, modular construction, and the application of adaptable furniture systems, particularly within Asian contexts. This review will critically examine the socio-economic and cultural implications of these design strategies, drawing comparisons between successful implementations in other rapidly urbanizing regions and their potential applicability in Indonesia. Furthermore, it will explore the critical success factors for sustainable affordable housing schemes, emphasizing aspects such as design efficiency, occupant satisfaction, and the socio-economic stability enabled by effective housing provisions (Hamid et al., 2018). This synthesis will also highlight the deficiencies in current affordable housing provisions in Indonesia, which often prioritize physical shelter over socio-cultural appropriateness and resident participation (Dwijendra, 2014). It will also address the emerging housing affordability crisis among the urban middle class in Indonesia, which is increasingly impacted by escalating property values and stagnant wages, demonstrating a broader need for innovative housing solutions beyond the low-income demographic (Tafriidj, 2021). Additionally, the review will consider the role of governmental policies and community engagement in facilitating the adoption of innovative housing models, especially those incorporating modularity and adaptability, within the Indonesian context. This includes an examination of current regulations and potential policy adjustments required to support the widespread adoption of modular housing solutions (Xu et al., 2019). It will also investigate existing precedents of modular design, both in residential and commercial applications, to extrapolate best practices and identify potential pitfalls in their implementation within a high-density urban environment.

1.2 Regulatory and Standards Review

The concept of livable small houses incorporating primary modular furniture represents a pertinent and innovative approach to architectural and spatial planning, addressing the pressing challenges of land scarcity, affordable housing shortages, and the imperative for space efficiency in densely populated urban areas, where the demand for effective and sustainable living solutions is increasingly paramount. From a legal perspective, the management of housing and settlement areas in Indonesia is underpinned by a robust regulatory framework, notably Law UU No. 1 of 2011 concerning Housing and Settlement Areas and Government Regulation PP No. 12 of 2021 concerning the Implementation of Housing and Settlement Areas, which collectively affirm the state's obligation to ensure the provision of adequate housing for all citizens, with a particular emphasis on the needs of low-income families (MBR), while simultaneously prioritizing aspects of safety, health, comfort, and environmental sustainability, thereby underscoring the government's commitment to creating inclusive, resilient, and sustainable housing solutions.

Furthermore, the Ministerial Decree of Housing and Settlement (Kimpraswil) No. 403/KPTS/M/2002 concerning Technical Guidelines for the Construction of Healthy Simple Houses (RSH- Rumah Sehat Sederhana) provides a comprehensive framework for ensuring the minimum technical requirements for healthy and sustainable housing, encompassing critical aspects such as building area, ventilation, sanitation, and lighting, which are essential for promoting the health and well-being of occupants. In the specific context of small houses, the strategic incorporation of modular furniture serves as a vital adaptive strategy, enabling homeowners to maximize space efficiency and functionality without necessitating an increase in the physical building area, thereby optimizing the use of limited space while maintaining a decent standard of living.

Moreover, other technical regulations, including Government Regulation No. PP No. 16 of 2021 concerning Building Implementation Regulations and Regulation of the Minister of Public Works and Public Housing (PUPR) Permen PUPR No. 14 of 2017 concerning Building Ease Requirements, underscore the paramount importance of prioritizing safety, comfort, accessibility, and inclusivity in building design and construction, with particular emphasis on the needs of vulnerable populations, such as the elderly and people with disabilities. In alignment with these regulatory requirements, various Indonesian National Standards (SNI), including SNI 6572:2024, 03-2396-2001, 6197:2020, and 6386:2000, provide detailed guidance on critical aspects of building design and performance, such as ventilation, lighting, energy efficiency, and acoustic comfort, thereby ensuring that buildings are designed and constructed to meet the needs of occupants while minimizing their impact on the environment.

Thus, the concept of small modular houses is considered legal and technically feasible, provided it meets all health, safety, comfort, and accessibility requirements stipulated by national regulations and standards and those based on Simple Healthy Homes (RSH- Rumah Sehat Sederhana). The concept of RSH emerged from the need to provide adequate housing for low-income people (MBR) after independence, particularly during the New Order era. A key milestone was Decree of the Minister of Kimpraswil

No. 403/KPTS/M/2002, which established the Technical Guidelines for the Construction of RSH, replaced the previous regulation and aligned with Law No. 4 of 1992 and Minister of Health Decree No. 829/MENKES/SK/VII/1999. This document serves as a technical reference for the construction of simple houses while still meeting health, safety, and comfort standards.

The implementation of the RSH program witnessed rapid expansion from 2004 to 2009, facilitated by collaborative efforts between developers and REI, resulting in the construction of over 100,000 housing units. The program's subsequent integration into national initiatives, such as the One Million Houses Program and BSPS, further solidified its impact, with housing units ranging in size from 21 to 45 m². From a philosophical standpoint, the RSH program is underpinned by the principle of "simple yet healthy," which prioritizes the design and construction of simple houses that adhere to minimum standards for ventilation, lighting, sanitation, and structural safety. Moreover, the program promotes the concept of incremental housing, or "growing houses," which enables residents to incrementally expand their dwellings in accordance with their economic capabilities, thereby fostering a sense of ownership and community.

In the context of this research, the historical development of RSH provides a robust theoretical foundation for exploring innovative approaches to affordable housing. The program's emphasis on meeting minimum technical standards demonstrates that small dwellings can be designed to be habitable and sustainable, even in resource-constrained environments. The integration of primary modular furniture with the principles of RSH serves to reinforce the importance of space efficiency, functional flexibility, and improved quality of life for residents, thereby contributing to the development of sustainable and resilient housing solutions.

2 Methodology

This section outlines the comprehensive research methodology employed to investigate the integration of modular furniture in small, livable homes in Indonesia, with a particular focus on understanding the complex relationships between spatial constraints, user needs, and furniture design. A mixed-methods approach is adopted to comprehensively explore the practical implications and user perceptions of modular furniture in spatially constrained residential environments, thereby providing a rich and nuanced understanding of the challenges and opportunities associated with small-space living in Indonesia.

The study combines qualitative insights garnered from a range of sources, including field observations of existing small-home typologies in urban and peri-urban Indonesia, which will provide valuable contextual information on the ways in which residents currently utilize and interact with their living spaces, as well as in-depth user interviews designed to gather experiential data and gain a deeper understanding of the needs, preferences, and pain points of individuals living in small homes.

In addition to these qualitative insights, the study will also draw on quantitative data derived from a range of sources, including spatial analyses of compact living spaces, which will provide a detailed understanding of the physical constraints and opportunities associated with small-space design, functional assessments of modular furniture

systems, which will evaluate the effectiveness of different design solutions in meeting user needs, and anthropometric data analysis, which will inform the design of ergonomic furniture that is tailored to the specific needs of Indonesian users.

A thorough review of existing modular furniture solutions is also conducted to assess their adaptability to diverse spatial configurations and user needs in Indonesian housing, thereby identifying best practices and areas for improvement in the design of modular furniture for small homes. By integrating both qualitative and quantitative methods, this study aims to develop a nuanced and comprehensive understanding of how modular furniture can enhance adaptability, efficiency, and user satisfaction in small homes, ultimately informing the design of contextually relevant and effective solutions that meet the unique needs of Indonesian residents.

3 Content

The concept of modularity implies the existence of standardized modules that must be adhered to, characterized by unity of size and pre-planned configurations. In the context of housing, modularity is often associated with prefabricated wall modules that facilitate faster and more efficient construction. However, in this particular context, modularity refers to the strategic use of modular furniture, designed to optimize space utilization according to the specific dimensions of each furniture piece. This approach is particularly relevant in mid-range housing complexes, typically ranging in size from 36 to 72 m², where houses are often designed with standardized layouts featuring two bedrooms, a dining area, and a living room. Nevertheless, the rigidity of these designs often prompts homeowners to undertake renovations and modifications, with nearly 95 percent of respondents to a questionnaire indicating that they had made changes to their homes, including adding additional floors and creating garden spaces to accommodate their evolving needs.

The primary of these modifications is the need for space, which is often constrained by the presence of multiple occupants, typically consisting of two parents and two children, plus a maid, exceeding the standard spatial allocation of 36 m² per person. As a result, homeowners often find it necessary to create additional spaces, such as a maid's room and laundry area, which were not accounted for in the original design, thereby rendering the house not immediately habitable upon purchase. This spatial constraint is further exacerbated by the accumulation of furniture, particularly primary furnishings, which, while intended to meet the occupants' needs, ultimately compromises the available space for movement, relaxation, and socialization.

The fundamental essence of a home as a sanctuary and resting space is undergoing a significant transformation, rendering it increasingly challenging for individuals to feel a sense of comfort and belonging within their own dwellings, primarily due to the pervasive issue of spatial constraints and cramped living conditions. At the heart of this problem lies the inefficient organization of space, which is often exacerbated by poorly arranged furniture, resulting in a lack of fluidity and functionality within the living environment. To effectively address this issue, a holistic home design solution is necessitated, one that seamlessly integrates with the primary furniture modules to optimize

spatial utilization, enhance livability, and ultimately restore the home to its role as a tranquil and rejuvenating sanctuary.

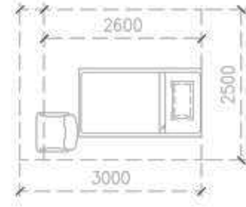
The classification of primary furniture is categorized into several distinct spaces that cater to various aspects of domestic life, including: firstly, the family room, which serves as a communal area for relaxation and socialization; secondly, the kitchen, which is a vital space for food preparation and culinary activities; thirdly, the service room, which accommodates essential household functions; fourthly, the bedroom, specifically the primary sleeping area designated for rest and rejuvenation; and fifthly, the day room, which provides a versatile space for various daytime activities. Additionally, supplementary spaces such as a garage for vehicular storage, a parking area for cars and motorcycles, and a garden, which not only serves as a recreational area for family leisure but also facilitates ventilation, are essential prerequisites for creating a healthy and sustainable home environment.

Table 1. Rooms and the name of the furniture. Digitalization by Author : Yanita Mila Ardiani

Name of the room		
1. Family Room	<ul style="list-style-type: none"> – sofa – table – TV stand and small shelf 	<p style="text-align: center;">2. RUANG KELUARGA</p>
2. Dining Room	<ul style="list-style-type: none"> – sofa – table – TV stand and small shelf 	
3. Servis room	<ul style="list-style-type: none"> – Ironing area – Laundry area – Drying area – Warehouse area 	
4. Bedroom 1	<ul style="list-style-type: none"> – Bedroom – Nightstand – Wardrobe – Study table – Dressing table 	

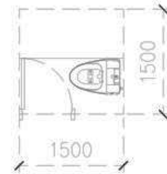
5. Bedroom 2

- Bedroom
- Nightstand
- Wardrobe
- Study table
- Dressing table



6. Bathroom

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It is hoped that when a house meets and aligns with the organization's spatial needs, it will create comfort and ensure the occupants are healthy and satisfied. Houses are purchased without waiting for renovations to suit needs, but can be moved in immediately. This is also influenced by the owner's culture and mindset.

The 1944 Housing Manual outlines the minimum required room areas in square meters for different house types, reflecting post-war housing standards in Britain.

The kitchen-living room house:

Kitchen-living room must have a minimum area of 16.7 square meters.

- Sitting room requires 10.2 square meters.
- Scullery, a small kitchen area for washing and cleaning, must be at least 4.7 square meters.

The working kitchen house:

- Living room with separate dining space should be 16.7 square meters.
- Living room combined with dining space is larger, at 21.0 square meters.
- The working kitchen needs at least 8.4 square meters.

The dining-kitchen house:

- Living room is slightly smaller at 14.9 square meters.
- The dining kitchen, which combines cooking and eating areas, must be 10.2 square meters.

Bedrooms:

- The first bedroom must have a minimum of 12.5 square meters.
- Other double bedrooms should each be at least 10.2 square meters.
- A single bedroom must have a minimum area of 6.5 square meters

Table 2. Minimum room areas. Source : Ministry of Health. (1944). Housing manual 1944. London: His Majesty's Stationery Office.

House Type / Room	Minimum room area (square metres)
The kitchen-living room house	
Kitchen-living room	16.7
Sitting room	10.2
Scullery	4.7
The working kitchen house	
Living room separate dining space	16.7
Living room plus dining space	21.0
Working kitchen	8.4
The dining-kitchen house	
Living room	14.9
Dining kitchen	10.2
Bedrooms	
First bedroom	12.5
Other double bedrooms	10.2
Single bedroom	6.5

That Housing Manual 1944 was Published by the Ministry of Health (UK) and. Issued by His Majesty's Stationery Office (HMSO). It was a post-war guide that set minimum space standards and design principles for housing reconstruction after World War II. It strongly influenced social housing design in Britain in the mid-20th century. Then there also another standard that world needs for small dwelling is The Parker Morris Report. The Parker Morris Report of 1961 established minimum dwelling size standards in square metres for different household sizes in the UK, aiming to ensure adequate living conditions across various housing types. The table differentiates between flats and single-storey houses and two-storey houses or maisonettes.

Flats and Single-Storey Houses:

- A 1-person household requires a minimum of 30.0 m².
- For 2 persons, the minimum is 44.5 m².
- A 3-person dwelling should be at least 57.0 m².
- For 4 persons, the space must be 67.0 m².
- 5-person households need 75.5 m².
- A 6-person dwelling must have 84.0 m².
- 7-person households require 97.5 m².

Two-Storey Houses and Maisonettes:

- The minimum area for 4 persons increases to 72.0 m².
- 5 persons require 82.0 m².
- 6 persons must have at least 92.5 m².
- 7-person homes require a more generous 108.0 m².

Additional Provision:

From that standard, the Housing Manual 1944 and the Parker Morris Report of 1961 were two pivotal documents that established minimum space standards and design principles for housing in the UK, significantly influencing social housing design and dwelling size requirements in Britain during the mid-20th century. The Parker Morris Report, in particular, provided a comprehensive framework for determining minimum dwelling sizes based on household size, differentiating between flats, single-storey houses, and two-storey houses or maisonettes, and specifying precise spatial requirements to ensure adequate living conditions across various housing types. These standards, which range from 30.0 m² for a 1-person household to 108.0 m² for a 7-person household in two-storey houses, underscore the importance of providing sufficient space for occupants to live comfortably and healthily. As the world continues to urbanize, the principles and standards outlined in these documents remain relevant, informing the design of small dwellings and social housing projects that prioritize occupant well-being, dignity, and quality of life. By drawing on these historical precedents, policymakers and designers can create more effective and sustainable housing solutions that meet the needs of diverse populations.

All dwelling types are also entitled to additional storage space ranging between 3.0 and 6.5 square metres, recognizing the practical needs of households beyond just habitable rooms. It explains in the table below.

Table 3. Parker Morris Report 1961. Minimum dwelling areas. Source : Ministry of Housing and Local Government. (1961). *Homes for today and tomorrow: Report of a Sub-Committee of the Central Housing Advisory Committee, chaired by Sir Parker Morris.* London: Her Majesty's Stationery Office.

	Flats and single-storey houses	Two-storey houses and maisonettes
1 person	30.0	
2 person	44.5	
3 person	57.0	
4 person	67.0	72.0
5 person	75.5	82.0
6 person	84.0	92.5
7 person		108.0

In addition, all types are entitled to storage space of 3.0–6.5 square metres.

The Parker Morris Report's table of standards established a seminal framework for minimum space and design requirements for new public housing in the UK, underscoring the imperative of creating dwellings that cater to the evolving needs of modern families, with sufficient space allocated for furniture, storage, and various household activities. Building upon these foundational principles, this study seeks to adapt and apply analogous standards to the Indonesian context, where the imperative of providing affordable and efficient housing solutions is particularly pressing, thereby necessitating innovative approaches to land utilization and housing design that prioritize optimal use of limited land resources.

This isometric illustration presents a compact two-bedroom residential unit designed with functionality and space efficiency in mind.

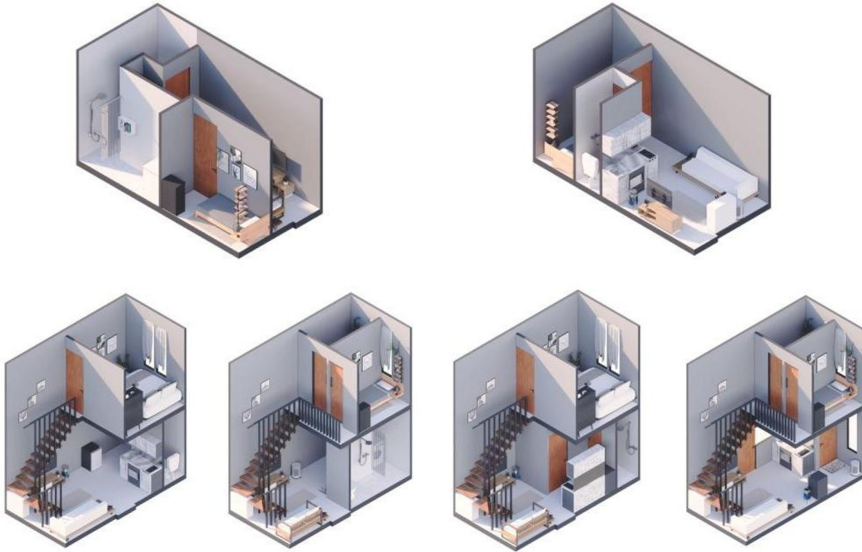


Fig. 1. Isometric Breakdown 1. Source Author's digitalization : Yanita Mila Ardiani

This isometric illustration showcases a thoughtfully designed compact two-bedroom residential unit, meticulously planned to optimize functionality and space efficiency. The layout is strategically organized into three primary zones: the private sleeping area, the shared living space, and the bathroom facilities, each carefully crafted to cater to the diverse needs of its occupants.

The private sleeping areas are comprised of two distinct bedrooms, strategically situated along one side of the structure to ensure optimal privacy and seclusion from the rest of the dwelling. The master bedroom is lavishly appointed with a double bed and essential furnishings, including a spacious wardrobe that provides ample storage for personal belongings, and a bedside table, collectively creating a serene retreat that fosters relaxation and rejuvenation. In contrast, the second bedroom is slightly smaller in scale, rendering it an ideal space for a guest or single occupant, and is thoughtfully furnished with a single bed and a compact desk, thereby facilitating its adaptability to various purposes, such as study, work-from-home, or relaxation, with a high degree of flexibility and functionality.

The shared living space serves as the central hub of the house, functioning as the main living area where occupants can unwind, socialize, and engage in various activities. This versatile space is carefully designed to accommodate a range of functions, featuring a small sofa and TV setup that is perfectly suited for casual lounging and relaxation, as well as a compact dining table or work surface that can be utilized for multiple purposes, including dining, working, or studying, given the limited spatial constraints that often characterize compact dwellings. The thoughtful layout of this space

enables occupants to seamlessly transition between different activities, fostering a sense of fluidity and dynamism.

The bathroom facilities are conveniently located adjacent to the living area, ensuring easy access while maintaining a clear distinction between the private and shared spaces of the dwelling. The bathroom is fully enclosed and efficiently designed, comprising a toilet, a sink with a mirror, and a walk-in shower area, all carefully arranged to maximize functionality within a compact footprint, thereby optimizing the use of available space while minimizing waste. The design of the bathroom facilities reflects a deep understanding of the importance of functionality, hygiene, and comfort in residential design, and demonstrates a commitment to creating a safe, practical, and aesthetically pleasing environment for occupants.

The design intent behind this compact home is to provide an ideal living solution for urban dwellers, students, or small families, offering a perfect blend of privacy, practicality, and comfort within a minimal spatial footprint, thereby catering to the diverse needs of its occupants while minimizing its impact on the environment. The clear layout and compact zoning of this dwelling, which seamlessly integrate various functional spaces and amenities, make it an attractive option for affordable housing or modular residential developments, where efficient use of space, cost-effectiveness, and sustainability are paramount considerations.

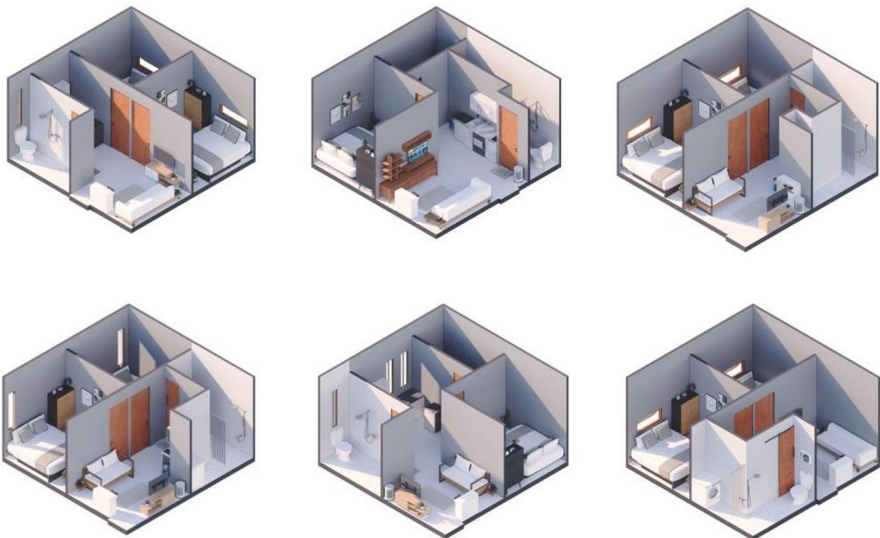




Fig. 2. Isometric Breakdown 2. Source Author's digitalization : Yanita Mila Ardiani

4 Conclusion

In response to the burgeoning demand for affordable, efficient, and adaptable housing solutions in Indonesia, the concept of compact, liveable dwellings incorporating primary modular furniture presents a pragmatic and sustainable paradigm. By integrating multifunctional and space-saving furniture systems, even spatially constrained environments can be transformed into fully functional living spaces that cater to the fundamental needs of individuals and small families, thereby enhancing their overall quality of life.

The utilization of modular furniture facilitates flexibility, customization, and ease of reconfiguration, attributes that are particularly pertinent in Indonesia's densely populated urban areas and rapidly evolving socio-economic contexts. Moreover, the modular approach exhibits a high degree of compatibility with local materials and construction techniques, thereby offering opportunities for cost-efficiency and cultural adaptability. This housing strategy not only prioritizes spatial efficiency but also promotes dignified living, emphasizing comfort, accessibility, and quality of life within compact dwellings. As Indonesia continues to undergo rapid urbanization, the deployment of small modular homes could play a pivotal role in shaping the future of inclusive and resilient urban housing, ultimately contributing to the creation of sustainable and liveable cities.

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