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HOUSING AS A PROCESS: TRANSFORMATIONS OF INCREMENTAL HOUSES IN INFORMAL SETTLEMENTS

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ABSTRACT
Incremental housing emerges as one of the strategies adopted by communities in informal settlements. Incremental housing develops gradually over time, influenced by increasing household needs and adjusted to residents' capacity to access adequate housing. This study examines incremental housing from a housing-as-a-process perspective within an informal settlement located in Sleman, Yogyakarta. A qualitative research approach is employed by analyzing physical transformations occurring in dwellings and examining the relationship between spatial aspects and economic capacity, which emerges as a key factor in informal settlements. Out of 36 buildings identified within the study area, five incremental housing units were selected as case studies. The analysis refers to the concept of housing as a process proposed by Turner and the theory of housing transformation articulated by Habraken. The findings indicate that the housing process is predominantly characterized by transformational forms in the form of horizontal and vertical additions, along with elimination in certain cases. The study also reveals the integration of economic activities within residential spaces. Overall, economic capacity is found to be the primary factor controlling the housing process in the cases examined.

KEYWORDS: housing as a process, housing transformation, incremental housing, informal settlement

Incremental housing *hadir sebagai salah satu strategi yang digunakan oleh masyarakat permukiman informal. Pada prinsipnya,* incremental housing *berkembang secara bertahap dari waktu ke waktu, dipengaruhi oleh kebutuhan penghuni yang bertambah dan disesuaikan dengan kemampuan penghuni dalam mengakses hunian berkualitas. Penelitian ini mengkaji* incremental housing *dengan sudut pandang* housing as a process *pada permukiman informal yang terletak di Sleman, Yogyakarta. Pendekatan penelitian kualitatif diterapkan dengan menganlisis transformasi fisik yang terjadi pada hunian, serta melihat hubungan keterkaitan antara aspek ruang dan kapasitas ekonomi yang muncul sebagai faktor penting dalam permukiman informal. Dari 36 bangunan yang diidentifikasi pada lokasi penelitian, diambil lima hunian* incremental *yang digunakan sebagai studi kasus. Proses analisis merujuk pada konsep* housing as a process *yang dikemukakan oleh Turner dan teori* housing transformation *yang disampaikan Habraken. Hasil penelitian menunjukkan bahwa* housing process *terjadi dengan didominasi transformasi bentuk berupa penambahan massa bangunan secara horizontal dan vertikal, serta proses pengurangan massa pada kasus tertentu. Ditemukan pula penambahan fungsi komersial pada area hunian. Aspek yang mengendalikan* housing process *pada kasus ini adalah kapasitas ekonomi penghuni.*

***KATA KUNCI**: housing as a process, transformasi hunian, incremental housing, permukiman informal*

INTRODUCTION

Dwelling is a basic human need that must be fulfilled to support everyday life (McLeod, 2025). Dwelling as an object is considered a dynamic entity that continuously shapes its meaning by the occupants' experiences. Turner (1976) emphasizes that the significance of a house lies not only in its physical existence but also in the way it accommodates users' daily activities and enhances their lives. This perspective expands the definition of housing, indicating that a dwelling can represent social, experiential, and symbolic meanings beyond its physical structure (Iqbal, 2021). Leupen & Mooij (2011) explain in "Housing Design: A Manual" that dwelling as a concept has a comprehensive framework, about the living process and the experience of inhabiting. It refers to the strong relation between human interaction within a space over time through daily activities. The transformation of a space into a residence offers individuals' identities, serving as a manifestation of their self-actualization.

Turner (1976) opposed a discourse that highlights housing is perceived as a fixed entity by

introducing the concept of "Housing by People". This concept emphasizes housing as a process. Housing is understood not as a noun, representing a product or commodity, but as a verb that reflects a process of inhabitation to enhance a better life quality. Consequently, each house develops unique characters that change and evolve. These characters are shaped by various interactions as individuals progress through different life stages, and their needs change. (Lozar, 1974). This concept also applies to housing needs, as individuals or households prioritize different aspects of their dwelling based on their life circumstances. (Ahmad Dar & Sakthivel, 2022). The fulfilment of housing needs is a significant factor that drives change within a house. These changes include technical and physical adjustments as well as direct interventions by occupants. This involvement allows individuals to reflect on their living environment and enhance their experience of inhabitation.

Habraken (1998) Identified three patterns of housing transformation physically. The patterns described how dwellings evolve over time in response to the needs and interventions of their occupants. The first pattern is addition. This refers to the process of adding new elements to a building, resulting in spatial transformation. For instance, insert partitions to create additional rooms or functions within a dwelling. The second pattern is elimination. This involves changes by removing existing elements. This type of transformation may be observed when a space needs to expand through demolishing walls or other structural components, allowing for a more flexible or open spatial configuration. The third pattern is movement. This pattern allows spatial change by relocating building elements. This process includes shifting walls or spatial boundaries within a room, altering the spatial arrangement without necessarily increasing or reducing the overall building mass.

Housing transformation is influenced by two factors. The first factor is caused by internal factors. For example, changes in the number of family members, changes in the user's needs, and shifts in lifestyle patterns. The second factor is the external factors, which involve the cultural background and educational level of the occupants. (Hutoyo & Nareswari, 2021). These factors collectively influence how homes are adapted and modified over time. The gradual process of spatial transformation in housing is known as incremental housing. (Turner, 1972 dalam Aldilla & Dinapradipta, 2017). Incremental housing has a key principle on the involvement of the occupants in the housing process and decision on doing housing transformation. These transformations are carried out based on the personal needs of the occupants.

Incremental housing can be found across various types of settlements, including in formal and informal settlements. A settlement consists of content and a container. Content represented by the people who inhabit within, and the container referred to the physical environments (Jencks & Kropf, 1981 dalam Fairuzahira et al., 2020). These two terms, content and container, highlight the inseparable interaction between user activities and the space that accommodates them. In informal settlements, the physical conditions of the dwellings are commonly heterogeneous. This reflects the difference in the growth process that is shaped by different needs, resources, and decisions of the individuals. (Dovey, 2015). Informal settlements are not always present in chaotic and degraded areas. Mostly, these informal settlements have been established for long periods and have become integrated into the urban environment through economic, spatial, and social aspects. Therefore, the presence of informal settlements plays a crucial role in urban development. (Dovey & King, 2011).

Examining the phenomenon of incremental housing within informal settlements reveals a distinctive spatial dynamic. Unlike formal housing areas, where spatial development generally follows predefined planning stages, the growth and spatial transformation in informal settlements were developed through spontaneous and unregulated processes over uneven periods of time. These transformations are closely related to differing motives of dwelling, which distinguish informal settlements from formal settlements. This phenomenon makes the discussion of incremental housing in informal settlements interesting, as spatial changes are shaped by everyday practices, individual decisions, and localized socio-cultural conditions. Consequently, the transformation pattern observed in one settlement may differ significantly from those found in another.

However, research on housing often treats residential buildings as finished products, resulting in a lack of visible evidence regarding the evolution of spaces within informal settlements. This study aims to explore incremental housing as a strategy employed by communities in informal settlements during their settlement process. Spatial transformation approaches by communities in informal settlements were examined to reveal how they enhance their quality of life and improve their housing conditions.

METHODS

Research Location

This study was executed in a settlement that is located on the west-north side of Jl. Selokan Mataram, in Mlati subdistrict, Sleman, D.I.Yogyakarta (Figure 1). The area features varied terrains. Some residential buildings are located at lower elevations, below the main road. On the east side, there is a creek of Selokan Mataram.

While on the west side, there is an apartment complex, Taman Melati Apartment. This location was selected based on a thorough analysis of the settlement histories and the overall development within the area.

Figure 1. Research Location
(Source: Author's Document, 2022)

Data Collection

This study conducted qualitative methods both in data collection and data analysis. Data collections are divided into three phases. The first phase started by doing a grand tour in the locus areas. This phase was focused on mapping the study area and identifying all the buildings in the settlement. At the end of this phase, it was discovered that there are 32 incremental houses from 36 buildings in the area. Incremental houses in the locus study were identified by the house facade characteristics. It was indicated by the differences in structure, style, and material of some parts.

By the second phase, from 32 incremental houses, 5 houses were chosen as case studies (Figure 2). The sample selections were carried out based on differences in materials that were shown on building facades and the variance of building areas. The 5 case studies consisted of three two-story buildings and two one-story buildings.

In the third phase, data collection was concentrated on physical measurement of 5 house case studies (Figure 3) and interviews with the house owner. Interviews were conducted to gather information from the owner about housing profiles, how they live within the house, and their house transformation over time.

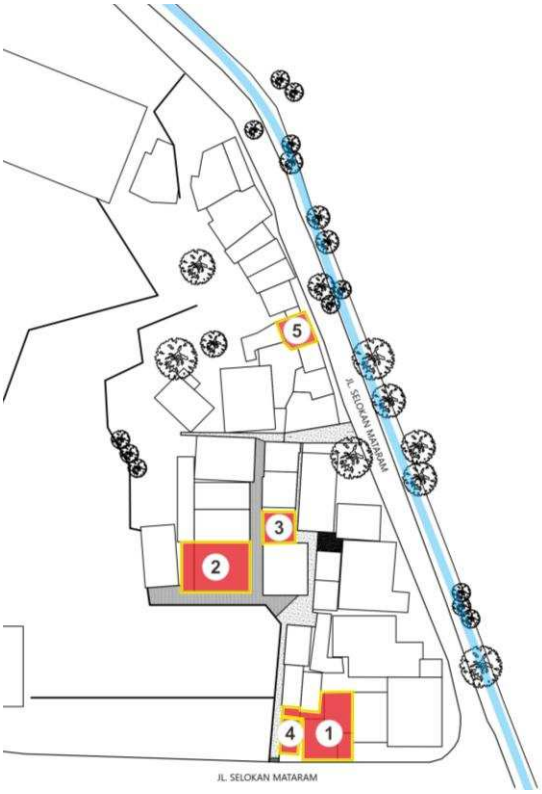


Figure 2. Map location of case studies in Sleman, Yogyakarta
(Source: Author's Document, 2022)

Alongside primary data collection through field observation, secondary data was also gathered regarding Habraken (1998) theory of building transformation and Turner's (1972) theory of the Housing Process. The focus of this study was on building mass transformation, related to Habraken's theory and Turner's theory, specifically the addition or elimination of building mass and the process of housing transformation. Those theories are the main references that were used in data analysis.

Data were analyzed using descriptive methods. This research used an inductive approach for the data analysis. This approach allows define meaning from the data, develop and identify data to support findings, and explain findings using theory and literature. (Bingham and Witkowsky, 2022, dalam Bingham, 2023). Each house was classified based on the complexity of the house transformation over time. It described how the house changes, what the differences are before and after, and why it happened. Then, it shows the patterns of the incremental houses in this settlement.

Figure 3. Buildings Facade Of Case Studies, Left To Right, Up to Down in Sequence Case 1 - Case 5
(Source: Author's Document, 2022)

RESULTS AND DISCUSSION

Household Characteristics and Spatial Capacity

Based on field observations, the five case studies that were selected according to building size demonstrate substantial variation in both physical and non-physical aspects. One of the most notable findings concerns the incorporation of additional functions within existing dwellings, although this transformation does not consistently occur across all cases.

The interaction between physical attributes and non-physical characteristics reveals a dialogue that reflects each household's differentiated capacity to access adequate housing. Variables such as number of occupants, occupation, land & building area, number of storeys, year of occupancy, and land tenure status collectively influence the direction and intensity of housing transformation (Table 1).

Table 1. Findings of Housing Profiles

Case Study	Number of Occupants	Additional Functions*	Occupation	Building Area (m^2)	Land Area (m^2)	Floors	Year of Occupancy**	Tenure Status
Case 1	7 persons	Kiosk, rental space	Formal to Informal sector (Retired private-sector employee, now owner of small grocery store***)	± 186	± 150	2	1983	Freehold (SHM)
Case 2	7 persons	5 boarding rooms	Formal sector (Civil servant)	± 200	± 120	2	2005	Leasehold
Case 3	5 persons	1 boarding room	Formal sector (Private-sector employee)	± 60	± 100	1	2006	Leasehold
Case 4	4 persons	-	Informal sector (truck driver)	± 36	± 36	1	1975	Leasehold
Case 5	5 persons	-	Informal sector (online motorcycle driver)	± 40	± 40	2	1988	Leasehold

*: Additional functions refer to non-residential uses of the building intended to support household economic activities.
**: Year of occupancy indicates the estimated time when the household began inhabiting the building, not the year of construction.
***: In Indonesian, it is called *toko kelontong* or *toko madura*

Table 1 reveals clear socio-economic differentiation that shapes housing transformation patterns. Households engaged in the formal sector, as shown in cases 1, 2, and 3, tend to occupy dwellings with larger building areas. In contrast, households relying on informal-sector employment, as shown in

cases 4 and 5, occupy significantly smaller dwellings with limited land and building areas. It is reflecting constrained economic capacity and restricted transformation potential.

The table indicated that 3 of 5 case studies have developed additional non-residential functions, particularly income-generating activities, alongside their primary residential use. It shows in cases 1, 2, and 3 where the housing included additional functions, such as a kiosk, rental spaces, or boarding rooms. This evidence revealed that in these cases, the users' occupations were in the formal sector. Whereas cases 4 and 5 only provide spaces for residential functions.

The presence of additional non-residential functions appeared predominantly in households with either stable formal employment. This finding indicated that economic stability plays a crucial role in enabling spatial expansion beyond basic residential needs. This pattern suggests that housing transformation in informal settlements is not solely driven by household size, but by the interaction between economic capacity and employment stability.

Incremental Housing Transformation as a Process

The existing buildings represent the outcome of a long-term process undertaken by the households themselves. During field observations, supported by in-depth interviews, residents described the gradual sequence of spatial additions and functional changes implemented over time. These transformations were consistently adjusted to the occupants' activity needs at specific moments. However, financial availability remained the primary consideration guiding decision-making. Even when additional space was required due to growing household size or changing activities, transformations were postponed if economic resources were insufficient. In such situations, residents tended to adopt alternative strategies, such as utilizing spaces in a multifunctional manner rather than undertaking physical modifications.

The systematic organization of field data reveals that each dwelling passes through distinct phases of development. These phases are summarized in Table 2 and consist of three main stages: initial occupation, which describes the condition of the dwelling at the time it was first inhabited; early incremental expansion, referring to the initial phase of mass addition to the building; and continued incremental phase, representing subsequent stages of physical expansion. This latter phase may continue over time, depending on the evolving needs and economic capacity of the household.

Based on the interview results, most cases did not plan changes in the future. In only case study 2 has a building transformation been planned. These processes occurred over many years. There is no specific time frame between change periods. Some houses require a 1-2 year gap between change periods to accommodate increased activity, while others require more than 10 years.

The passage of time was the main indicator in viewing a person's housing career. The conditions are divided into: (1) past; (2) present; and (3) future. (Rosa, 2024). As presented in Table 2, the past condition is captured in Phase 1, Sub-phase 1, and Phase 2, while Phase 3 reflects the present condition. Meanwhile, future conditions remain uncertain, since building transformations in the studied cases are not guided by formal planning processes but emerge spontaneously in response to immediate needs and constraints.

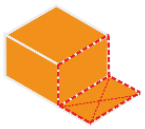
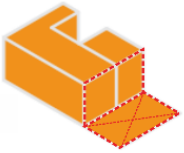
In most cases, the buildings were initially constructed without long-term planning, with the exception of Case Study 2. Based on the results of the interview, since the beginning of occupying the building, the owner of case study 2 had considered developing spaces as a boarding house on the 2nd floor, so the foundation was prepared with the strength for two floors.

Incremental housing transformation unfolds as a process in which houses evolve gradually through successive additions, movements, and occasional eliminations. The diagram in Table 2 shows that no transformations in the form of movement were found. Building mass transformation includes addition and elimination. Two cases went through an elimination process, which was categorized as a transitional sub-phase, namely cases 4 and 5. The elimination in case 4 occurred due to external factors, which were road widening. Meanwhile, in case 5, it was caused by internal factors such as economic needs, resulting in the sale of some space.

Spatial transformations through additions were found in all case studies. Additions are divided into two types, which are vertical additions and horizontal additions. Vertical additions were carried out because of limited land availability. This condition often occurs in informal settlements, where limited land is a major obstacle to improving housing quality. Furthermore, the areas of mass addition were varied. In cases 1 and 2, transformations went through phases 2 and 3 by adding relatively large room areas compared to cases 3, 4, and 5. Although cases 1 and 2 have gone through phases 2 and 3 equally, their quality and material selections differ. In case 1, the owner chose wood as the material for their room expansion, specifically for the walls and stairs. In case 2, the owner chose brick and concrete for the building expansion for the second floor. The owner of case 3 also used brick for their addition wall, but in a much smaller area than case 2. It is just a wall partition.

Meanwhile, from all case studies, only case 5 did not enter phase 3. Based on the results of field observations and interviews, it was found that case 5 has below-average economic capability. These differences in decision-making were consequent upon the economic stability.

Table 2. Phases of Incremental Housing Transformation

	PHASE 1 Initial Occupation	PHASE 1a Transitional Sub-Phase	PHASE 2 Early Incremental Expansion	PHASE 3 Continued Incremental Phase
CASE 1	 Existing Mass	Direct transition to phase 2	 Horizontal Addition	 Horizontal-Vertical Addition
CASE 2	 Existing Mass	Direct transition to phase 2	 Vertical Addition	 Horizontal Addition
CASE 3	 Existing Mass	Direct transition to phase 2	 Horizontal Addition	 Horizontal Addition
CASE 4	 Existing Mass	 Elimination	 Horizontal Addition	 Horizontal Addition
CASE 5	 Existing Mass	 Elimination	 Vertical Addition	Did not progress to phase 3

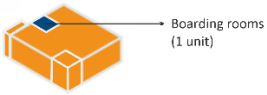
Functional Changes in Incremental Housing

The housing process involved not only the physical changes to the dwelling, but also how residents strive to meet changing activity needs over time. These needs can be fulfilled by providing new functions to the dwelling. As seen in Table 3, in its early days, the building served only as a residence, providing shelter and a place for residents' daily activities, such as eating, sleeping, chatting, and so on. However, the current condition of the building has additional commercial functions, with the aim of improving the economic standard of the residents. This occurred in case studies 1, 2, and 3. Even in case 2, interviews revealed that from the beginning of occupying the building, the building owner had planned to add boarding rooms to the second floor. Meanwhile, in cases 1 and 3, the addition of commercial functions was not planned from the beginning, but rather incidental due to economic pressures. Cases 4 and 5 did not show adding a commercial function and remained as residences.

Referring to these conditions, the housing process in this incremental housing study showed three types of houses:

1. houses with additional building mass, followed by the addition of commercial functions (cases 1 & 2);
2. houses without additional building mass, followed by the addition of commercial functions in the existing space (case 3);
3. houses with additional building mass, without any additional commercial functions (cases 4 & 5).

Table 3. Functional changes in building

Case Study	Initial Building Condition	Current Building Condition
CASE 1		
CASE 2		
CASE 3		
CASE 4		
CASE 5		
Notes:	Residential	Commercial

Residences with additional commercial functions, such as rental spaces, boarding rooms, and kiosks, tend to have more complex form transformations, both vertically and horizontally. Meanwhile, residences without additional productive functions show limited forms of transformation. This confirmed that the incremental process was not only driven by domestic needs, but also as a strategy for residents to improve their well-being. Residences are no longer just a place of shelter, but also an instrument to support family economic stability.

Economic Capacity as a Driving Force of Incremental Housing Transformation

Incremental housing in informal settlements followed a pattern of interactions between occupants, the needs of required space to accommodate activities, and the improvements in quality of life. Tables 1, 2, and 3 demonstrate that the quantity and quality of housing transformation create a pattern, where families with better economic capability have a greater ability to improve their quality of life through housing.

Santoso et al. (2022) noted that formal sector employment offers greater economic stability compared to informal sector employment. This condition influenced residents' ability to transform buildings. Similar findings were also found in previous studies related to incremental housing in informal settlements. (Wakely & Riley, 2011; Van Noorloos et al., 2020; Marinovic, 2021). Incremental housing processes provide solutions for families with limited economic resources.

In family dynamics, economic needs were categorized into various priority levels. For people in informal settlements, housing quality was not a top priority. As long as the dwelling provided basic protection, with a floor, walls, and a roof that could protect people from the weather and external threats, it was considered sufficient by lower-middle-income families. In this study, it is shown in case 5.

Table 4. Spatial Priorities Based on Economic Capacity

Economic Capacity	Housing Transformation	Prioritized Spaces
Low	Basic dwelling, minimal transformation	Bedrooms, bathroom, kitchen, multi-purpose living
Medium	Gradual spatial expansion	Additional bedrooms, improved kitchen
High	Complex & multifunctional transformation	Commercial space (kiosk), rental units, boarding room units, separation of public & private space

Table 4 illustrates that economic capacity influences not only the scale of physical housing transformation but also the types of spaces prioritized in the incremental housing process.

Figure 4. (1) Vertical addition above the existing mass in case 2; (2) Proper staircase connecting the first and second floors; (3) Interior space constructed with appropriate dimensions and materials
(Source: Author's Document, 2025)

Figure 4, which is case 2, represents a household with relatively stable economic conditions, supported by formal-sector employment as a civil servant. Since the dwelling's early stage of occupancy, it was

intentionally planned for vertical expansion, with the second floor envisioned as rental rooms. The current spatial configuration reflects the realization of this long-term aspiration. This can be observed through the presence of a proper staircase with adequate slope and riser dimensions, the use of durable building materials for doors and structural elements, sufficient room dimensions, and circulation spaces that support safe and comfortable movement. The transformation process in this case demonstrates a planned and gradual approach, enabled by stable economic capacity and clear functional objectives.

In contrast, case 5 in Figure 5 illustrates housing transformation under limited economic capacity. Although an additional building mass has been constructed, the resulting spatial quality remains basic and provisional. The transformation primarily responds to immediate needs rather than long-term planning considerations. This condition is evident in the non-standard staircase, characterized by steep inclination and disproportionate step height, reflecting severe spatial and financial constraints. Furthermore, the circulation space leading to the bedroom is less than one meter wide and directly adjacent to a height difference without protective barriers, indicating compromises in safety and comfort. This case highlights how limited socio-economic capacity influences the prioritization of space over spatial quality in incremental housing within informal settlements.

Figure 5. (1) Limited vertical addition & partial elimination of existing mass in case 5; (2) Non-standard staircase with steep inclination due to spatial constraints; (3) Narrow circulation leading to the bedroom, lacking safety barriers despite level differences
(Source: Author's Document, 2025)

From the perspective of Maslow's hierarchy of needs, communities in informal settlements remained at the bottom of the hierarchy because they focused on meeting their basic needs. This situation has persisted for decades, from the 1970s to the present. These families did not aim for self-actualization but settled for survival by fulfilling the fundamental needs of a house. At this point, the essence of housing returns to its basic meaning: a place to live. This is where the incremental housing process comes into play as a response from informal settlement communities, helping to improve the quality of housing according to each family's financial capabilities.

CONCLUSION

Based on field observations and data synthesis, this study concludes that incremental housing in informal settlements represents a dynamic, gradual, and continuous process of dwelling rather than a final housing product. Housing transformation varies between dwellings and does not progress through a fixed or linear sequence. It develops through sustained interactions involving occupants as the primary actors, space as the object of transformation, and daily activities that continuously change over time.

The primary factor that encourages housing transformation is the increasing demand for space, coming from the development of users' activities. Economic capacity plays a key role in determining the extent and complexity of physical transformation, both in qualitative and quantitative terms. Households with greater economic stability tend to pursue more complex transformations that combine residential and economic functions, while households with limited resources tend to experience slower and simpler changes focused mainly on meeting basic residential requirements.

These findings suggest that incremental housing is not merely a process of physical alteration but also reflects household priorities and adaptive strategies in responding to changing housing demands. The diagram in Figure represents a synthesized model that encapsulates the relationship between socio-economic conditions, housing processes, and the perceived quality of life in informal settlements (Figure 6)

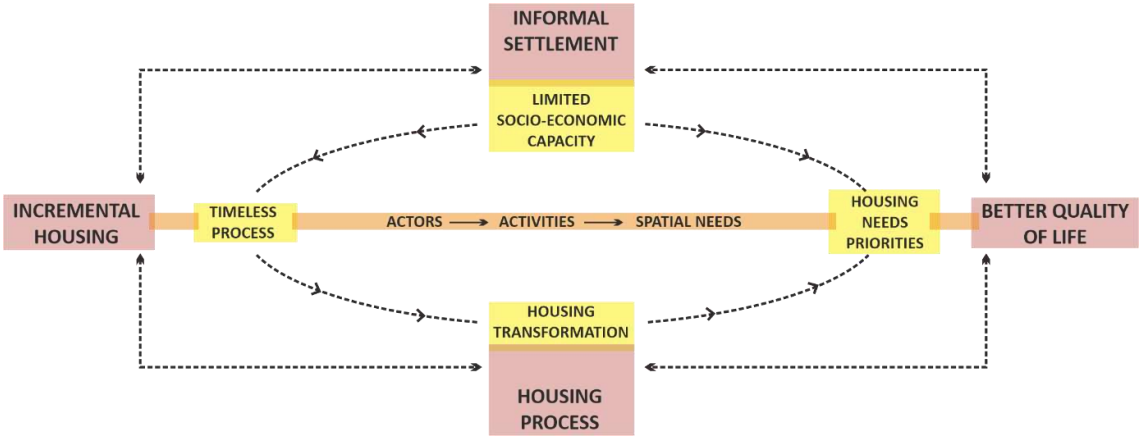


Figure 6. Synthesized Model of Incremental Housing as a Process in Informal Settlements (Source: Author's Document, 2025)

The findings further highlight that improvements in housing quality and quality of life in informal settlements carry meanings that differ from those in formal settlements. Housing quality is primarily perceived through basic shelter functions, safety, and functional habitability rather than aesthetic or symbolic architectural achievements. Accordingly, approaches to housing in informal settlements should shift from outcome-based evaluations toward an understanding of housing as a continuous and adaptive process, offering a more context-sensitive perspective on informal housing practices.

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