

SOCIO-TECHNICAL TRANSITIONS AND URBAN INFORMALITY: A MULTI-LEVEL ANALYSIS OF THE TAMANSARI ROW HOUSING PROJECT IN INDONESIA

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Abstract

This article examines the socio-technical transition associated with the Tamansari Row Housing redevelopment project in Bandung, Indonesia, through the lens of the Multi-Level Perspective (MLP). While the MLP has been widely used to analyze sustainability transitions, its application in contexts characterized by urban informality remains limited. This study addresses this gap by examining how landscape pressures, regime interventions, and niche practices interact in the transformation of an informal settlement. Drawing on a qualitative case study based on document analysis and empirical field data, the study reveals that strong landscape pressures—rooted in historical urban development, housing crises, and contemporary sustainability agendas—have driven regime-level interventions focused on formalization and vertical densification. However, these interventions encounter deeply embedded niche practices shaped by self-built housing, informal economies, and community-based social systems. The findings show that the transition does not result in a coherent socio-technical reconfiguration but rather in a partial and contested transition, characterized by persistent misalignment between formal redevelopment policies and locally embedded socio-technical practices, ongoing resistance, and limited adaptation. This article contributes to the MLP literature by demonstrating that socio-technical transitions in postcolonial urban contexts may follow partial and contested pathways while challenging the assumption that niches primarily function as spaces for emerging innovations. Instead, the findings highlight niches as mature socio-technical systems embedded in historically evolved forms of urban informality.

Keywords: Urban Transformation; Multi-Level Perspective; Informal Settlement; Socio-Technical Transition; Postcolonial Urbanism

1. INTRODUCTION

The rapid pace of global urbanization has driven increasing pressure on urban housing systems, particularly in developing countries. In this context, the disparity between formal housing provision and the needs of low-income communities often results in the emergence of informal housing practices as an adaptive mechanism to limited access (Smolka & Biderman, 2012). This phenomenon not only reflects the failure of the formal housing market but also demonstrates the complex interaction between regulation, economics, and social practices that shape the contemporary urban landscape. Furthermore, recent studies indicate that housing informality is not merely a form of deviance, but an integral part of an urban system that is adaptive, flexible, and responsive to residents' needs (Dovey & Recio, 2024).

In Indonesia, this dynamic is clearly visible in various informal settlement upgrading projects, including the row housing development program aimed at improving housing quality while integrating informal areas into the formal planning system. However, such interventions often face social resistance and produce misalignments between policy design and the everyday practices of the community. This shows that housing transformation is not solely a technical or physical issue, but a socio-technical process involving interactions between technology, actors, institutions, and social values.

To understand these dynamics, the socio-technical transitions approach becomes relevant, particularly through the Multi-Level Perspective (MLP) framework. The MLP offers an analytical approach that views system change as the result of interactions among three main levels: landscape, regime, and niche (Geels, 2002, 2011). From this perspective, change does not occur linearly, but through a co-evolutionary process between technology, policy, markets, and social practices that influence each other (Geels, 2012). This approach is crucial to avoid reducing housing issues to mere infrastructure matters and enables a more comprehensive analysis of the dynamics of change taking place.

Although the MLP has been widely used in studies of energy and transport transitions, its application in the context of urban housing remains relatively limited. Yet, this context presents additional complexities in the form of informality, unequal access, and more fluid power relations that are often not formally institutionalized. Studies on informality show a paradox in housing policies, where practices legally considered illegal turn out to be the primary solution for specific community groups (van Gelder, 2013). Furthermore, the formal and informal sectors do not stand in isolation; instead, they are interdependent and form an integrated system within the urban space (Heikkila & Lin, 2014).

In this context, the row housing development in the Tamansari area of Bandung can be understood as an effort toward socio-technical transformation aimed at replacing the informal housing system with a more standardized formal housing model. Nevertheless, this process involves not only physical changes to

buildings but also the restructuring of social practices, community relations, and community economic adaptation patterns. The mismatch between the logic of formal development and the daily practices of residents frequently gives rise to conflict, resistance, and even implementation failure.

Furthermore, literature indicates that policies failing to consider the social and cultural dimensions of informality tend to produce unsustainable interventions. Informality is not merely a consequence of regulatory deficits, but is also the result of interactions between community needs, economic limitations, and the rigidity of the formal system (Dovey & King, 2012; Roy, 2005). Therefore, an approach that focuses solely on physical formalization without understanding the underlying socio-technical system has the potential to deepen inequalities instead of resolving them.

Based on this background, this study aims to analyze the dynamics of housing transformation in the Tamansari area through the Multi-Level Perspective approach. Specifically, this research seeks to identify how pressures at the landscape level (such as urbanization and city policies), regime dynamics (formal housing policies), and niche practices (residents' adaptation strategies) interact to shape the ongoing transition process. Thus, this study not only provides an empirical contribution to the understanding of the Tamansari case but also offers a theoretical contribution to the development of socio-technical transition studies in postcolonial urban context across the global south.

Additionally, this research contributes to the discourse regarding the relationship between technology, policy, and sustainability in the context of urban development. Within a socio-technical framework, technology is not understood merely as a physical artifact, but as part of a system that encompasses social practices, institutions, and their accompanying values. Therefore, an analysis of row housing as a form of 'housing technology' needs to consider how this technology is adopted, negotiated, and adapted by various actors within a specific social context.

By integrating the MLP approach and the Tamansari case study, this article attempts to bridge the gap between socio-technical transition theory and housing development practices in developing countries. The research findings are expected to provide insights for formulating more inclusive, adaptive, and sustainable policies in facing future urbanization challenges.

2. LITERATURE REVIEW

2.1. *Socio-technical transitions and urban transformation*

The transformation of urban systems is increasingly understood as a process of socio-technical change involving interactions among material artifacts, institutional structures, social practices, and power

relations. In the sustainability transitions literature, change is not viewed merely as the adoption of technological innovations, but as a systemic reconfiguration process involving simultaneous changes in technical, regulatory, economic, cultural, and actor behavioral dimensions (Geels, 2004; Markard et al., 2012). This perspective emphasizes that technology never stands autonomously, but is always embedded in social networks, formal rules, and the daily practices of society.

In the context of urban development, the socio-technical transitions approach becomes relevant because cities serve as arenas where various systems—housing, transport, infrastructure, governance, and social relations—interact in complex ways. Development interventions seeking to transform urban space often introduce new material configurations, such as vertical housing, integrated utility systems, or formal spatial designs. However, the success of such transformations depends heavily on the ability of the new system to interact compatibly with existing social practices (Hodson & Marvin, 2010).

In the case of housing transformation, physical buildings cannot be understood merely as material objects, but as part of a socio-technical system that encompasses social interaction patterns, access to resources, collective management mechanisms, and the practices of reproducing daily life. Therefore, altering housing forms from horizontal informal settlements to formal row housing or vertical housing represents a systemic transition involving negotiations between the technocratic logic of development and the social practices of the local community.

This transition perspective is critical for avoiding technical reductionism in understanding urban development. Many area rejuvenation policies assume that physical improvements will automatically lead to enhanced well-being and sustainability. In reality, various studies show that technical interventions that do not account for social dimensions can result in dislocation, resistance, and adaptation failures (Bulkeley, 2013; Smith et al., 2005).

2.2. Multi-Level Perspective (MLP)

The Multi-Level Perspective (MLP) framework is one of the primary approaches in socio-technical transitions studies. Developed by Geels (2002, 2004, 2005), the MLP explains that transitions occur through dynamic interactions among three analytical levels: landscape, regime, and niche.

The landscape level represents the macro-structural context that exerts external pressures on the system, such as demographic shifts, urbanization, economic dynamics, political pressures, and national development agendas. These factors are generally beyond the direct control of local actors but shape the broader direction of system change. In the Indonesian urban context, landscape pressures can take the form of rapid urbanization, land scarcity, city modernization agendas, and demands for spatial efficiency.

The regime level refers to the dominant structure that governs system stability, including formal institutions, regulations, policies, professional practices, technical standards, and established actor configurations. Regimes tend to maintain stability through institutional reproduction mechanisms and resistance to radical change (Rip & Kemp, 1998). In the urban housing system, the regime can encompass spatial planning policies, technical development standards, licensing bureaucracies, and settlement formalization paradigms.

Meanwhile, the niche level represents an experimental space where alternative practices, local innovations, and new social configurations can develop. Niches enable actors to develop solutions that diverge from the dominant logic of the regime. In the context of informal settlements, adaptive community practices can be understood as a niche representing local knowledge and collective strategies for managing living spaces.

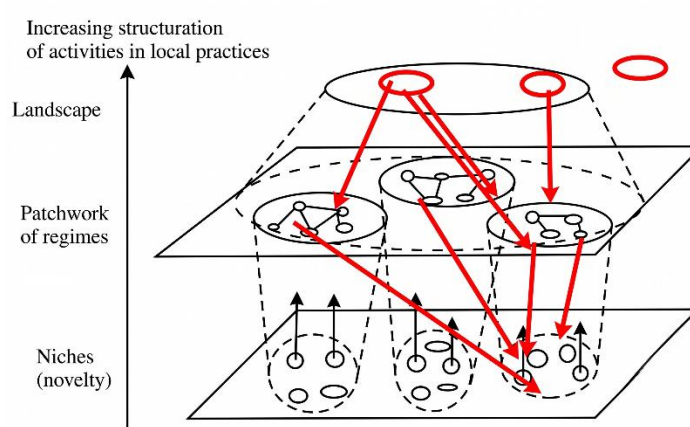


Figure 1 – Nested Hierarchy of the Multi-Level Perspective
Source: (Geels, 2005)

According to the MLP, transitions occur when pressures from the landscape create instability within the regime, thereby opening windows of opportunity for niche innovations to gain legitimacy and influence system reconfiguration (Geels & Schot, 2007). However, this process does not always unfold linearly. In many cases, especially in developing countries, transitions progress through conflict, negotiation, and contestation among actors.

Although the Multi-Level Perspective (MLP) has been extensively applied to sectors such as energy, transportation, and environmental governance, its application to housing transitions remains relatively limited. Existing studies have primarily examined housing in relation to energy efficiency, low-carbon building technologies, and sustainable housing systems rather than broader processes of urban redevelopment and socio-spatial transformation. For example, MLP has been used to analyze the development of sustainable housing niches and eco-housing initiatives (Lovell, 2004; Smith, 2007). These

studies demonstrate the usefulness of the MLP for understanding housing-related change but tend to focus on technological innovation and environmental performance.

Comparatively less attention has been given to housing transformation in contexts characterized by urban informality, contested redevelopment, and complex socio-spatial relations. This limitation is particularly evident in postcolonial urban contexts, where housing transitions involve not only technological change but also negotiations between formal institutions and historically embedded community practices. Consequently, extending the MLP to informal settlement redevelopment provides an opportunity to broaden its analytical scope beyond technology-centered housing transitions.

2.3. *Urban Informality, Postcolonial Urbanism, and Housing Transformation*

Contemporary debates on urban informality increasingly draw on the perspective of postcolonial urbanism, which argues that cities in Asia, Africa, and Latin America should not be understood merely as incomplete versions of Western urban development. Instead, they represent historically specific urban formations shaped by colonial legacies, uneven state formation, and locally embedded socio-spatial practices (Robinson, 2006; Roy, 2003). From this perspective, informality is not an exception to urban development but an ordinary condition through which cities are produced, governed, and transformed. This perspective provides an important conceptual foundation for examining housing transformation in Indonesia, where contemporary redevelopment policies continue to interact with institutional and spatial arrangements inherited from colonial and postcolonial trajectories.

Applying the Multi-Level Perspective (MLP) within postcolonial urban contexts requires conceptual adjustments, since the framework was largely developed from experiences in industrialized countries characterized by relatively stable institutions and dominant formal systems (Lawhon & Murphy, 2012). In the urban context of developing countries, informality is a structural characteristic that cannot be positioned merely as a deviation from the formal system. In contrast, many postcolonial cities are shaped by historically embedded forms of urban informality, fragmented governance, and hybrid institutional arrangements that challenge the assumptions underlying conventional transition theories.

Roy (2005) explains that informality is a mode of urbanization actively produced through relations among the state, markets, and society. Consequently, informal settlements are not simply spaces lacking regulation, but rather arenas of spatial production that possess their own distinct social, economic, and political logics. This perspective is critical because many housing transformation policies tend to view informality as a technical issue that must be 'corrected' through formalization interventions.

In practice, housing transformation in informal areas frequently involves asymmetric power relations. The state and formal development actors usually hold the authority to define the form of 'progress,' while local communities face constraints in influencing policy design and implementation. This situation can produce forms of resistance that are not always explicit but manifest through rejection, selective adaptation, or the reproduction of informal practices within new formal (Miraftab, 2009).

Studies of urban transformation in postcolonial cities across the Global South consistently show that the success of redevelopment interventions depends on their ability to engage with locally embedded knowledge, informal institutions, and everyday social practices (Watson, 2009). A failure to understand this dimension can lead to misalignments between the constructed infrastructure and the actual needs of users.

In this study, the concept of informality is utilized to complement the MLP framework by positioning residents' everyday practices as an integral part of niche dynamics. Thus, the analysis focuses not only on structural formal changes but also on how the community negotiates, adjusts to, or rejects new socio-technical configurations introduced through row housing development.

2.4. Analytical positioning of this study

Based on the theoretical framework above, this study positions the Tamansari row housing development as an arena of socio-technical transition that brings together landscape pressures in the form of urban modernization, a formal housing regime articulated through government policies, and a niche comprising residents' social practices in maintaining and reproducing their living spaces.

The analysis focuses on how interactions among these levels generate transition dynamics that are not entirely linear or harmonious. By utilizing the MLP enriched with an urban informality perspective, this study endeavors to demonstrate that housing transformation in postcolonial urban contexts is more accurately understood as a process of contestation and negotiation rather than a linear diffusion of technical innovations. While comparable dynamics have been observed across many rapidly urbanizing postcolonial cities, their manifestation remains historically contingent and shaped by specific institutional and spatial trajectories.

Through this analytical positioning, the research contributes to expanding the application of the MLP in urban transformation studies while offering a more contextual understanding of social sustainability in housing development.

3. RESEARCH METHOD

3.1. *Research design*

This study employs a qualitative approach with a case study design to analyze the dynamics of socio-technical transitions in the Tamansari row housing development. This approach was chosen due to its capability to capture the complexity of interactions between actors, institutions, and social practices within a specific context that cannot be reduced to quantitative variables alone (Yin & Campbell, 2018). Furthermore, a case study allows for an in-depth exploration of the processes, conflicts, and negotiations that occur while the transformation is taking place.

Within the Multi-Level Perspective (MLP) framework, a qualitative approach is highly relevant since the analysis focuses not only on the final outcomes but on the interaction dynamics among the levels (landscape, regime, and niche). Consequently, this study treats the Tamansari row housing development as a critical case that can provide a broader theoretical understanding of housing transitions in the rapidly urbanizing cities.

3.2. *Case selection*

The Tamansari area was selected as the study location because it represents the convergence between long-established informal settlements and top-down formal development interventions. The row housing project in this area is not merely a physical effort to reorganize space, but also reflects a housing system transformation involving various actors, including local government, developers, and the local community.

The selection of this case is also based on its characteristics as a contested development project, where the development process is characterized by conflict, resident resistance, and debates regarding the project's legitimacy and sustainability. Thus, this case provides a rich context for analyzing how socio-technical transitions do not always proceed linearly, but rather through processes of negotiation and contestation (Flyvbjerg, 2006).

3.3. *Data collection*

Data in this study were collected through three main techniques, namely:

1. In-depth interviews, conducted with residents affected by the development and representatives of the Bandung City Government. The interviews aimed to explore the perceptions, experiences, and adaptive strategies of actors in facing the changes taking place. This approach enables the researcher to understand how the meaning of development is socially constructed (Kvale, 2007).

Interview participants were selected through purposive sampling based on their direct involvement in the Tamansari redevelopment process. The selection prioritized actors who played significant roles and possessed first-hand experience of the transition process. This approach enabled the study to capture diverse perspectives from actors occupying different positions within the socio-technical transition process.

Table 1 - List of Interview Participants

Category	Description
Relocated residents	Residents relocated to temporary housing
Displaced residents	Residents continuing livelihood activities near Tamansari
Residents opposing redevelopment	Residents involved in advocacy and resistance activities
Housing Management Personnel	Personnel responsible for the daily operation of the Row Housing facility
Government officials	Representatives from Bandung Housing and Settlement Agency

Source: Own Processing

Interviews were conducted using a flexible semi-structured approach, discussions evolved according to the experiences and roles of individual participants. The interviews focused on themes relevant to the research objectives, including perceptions of the Row Housing Project, experiences of relocation and redevelopment, participation in decision-making processes, changes in livelihood and social relations, and perspectives on the transformation of the settlement. This flexible approach allowed participants to elaborate issues they considered significant while ensuring consistency with the analytical dimensions of the Multi-Level Perspective (Kallio et al., 2016).

2. Field observations. Observations were carried out to directly observe physical environmental conditions, social interaction patterns, and spatial utilization by the community before and/or after the development intervention. This technique is vital for capturing the dimension of daily practices that are often not fully articulated in interviews.
3. Document analysis, which includes government policies related to housing and spatial management in Bandung City and West Java Province, project planning documents, as well as official reports and media coverage. Document analysis was used to comprehend the formal logic underlying the development interventions and the narratives constructed by institutional actors (Bowen, 2009).

Triangulation of these three data sources was performed to increase the validity of the findings and ensure that the analysis reflects the diverse perspectives involved in the transformation process.

3.4. *Analytical framework*

MLP-based thematic coding. Data were classified into three main categories:

- Landscape: macro pressures such as urbanization, national policies, and modernization agendas
- Regime: dominant structures such as housing policies, technical standards, and formal institutions
- Niche: local practices, community adaptation strategies, and forms of social innovation

Identification of cross-level interactions. After the initial coding, the analysis focused on how these three levels interact with one another. This encompasses how landscape pressures affect policies, how the regime responds to or resists change, and how the niche adapts, negotiates, or experiences marginalization.

Analysis of transition dynamics. In many cases, the transition process does not always proceed linearly or result in stabilization, but is often marked by conflict, mismatches, and partial outcomes (Lawhon & Murphy, 2012; Smith et al., 2005). Therefore, categories such as alignment, conflict, partial transition, and stagnation are used in this study as analytical devices to interpret the variations in cross-level interaction outcomes within the socio-technical transition process.

Qualitative data analysis and validation. Interview transcripts, field notes, and documentary sources were reviewed iteratively to identify recurring patterns, actor perspectives, and key events associated with the redevelopment process. Through constant comparison across different data sources, broader themes were identified and refined following the principles of thematic analysis (Braun & Clarke, 2006). To enhance analytical validity, findings were triangulated using multiple sources of evidence, including policy documents, media reports, project records, and interview narratives, consistent with established approaches to qualitative trustworthiness (Lincoln & Guba, 1986). This process enabled the study to examine how different actors interpreted and experienced socio-technical transition and how interactions between landscape pressures, regime interventions, and niche practices shaped transition outcomes.

This approach allows the research to not only describe the changes but also explain the underlying mechanisms within the socio-technical transition framework (Geels, 2002; Geels & Schot, 2007).

4. FINDINGS

The Tamansari area in Bandung represents the long dynamics of urban settlement development that cannot be separated from its historical context. Spatially, this area has its roots in the colonial period (before 1945), when Bandung was designed through a segregative planning logic separating formal and informal areas. This pattern reflects the formation of an urban system dualism that laid the foundation for the subsequent development of informality (Roy, 2005).

In the post-independence period (1945–1998), rapid urbanization pressure and limited state capacity in housing provision stimulated the growth of urban villages (*kampung kota*) as an adaptive solution. This approach created a housing system that was flexible, multifunctional, and integrated with informal economic activities and community-based social networks. In this context, the *kampung* was not merely a living space but a socio-technical system capable of effectively sustaining urban life (Simone, 2004).

Entering the post-reform era (after 1998), a significant shift occurred in urban policy approaches. Decentralization of governance and growing attention to sustainability issues prompted local governments to upgrade areas considered slums through more structured and formal interventions. These interventions advanced the logic of vertical densification and housing standardization, reflecting the dominance of technocratic approaches in contemporary housing policies.

This historical periodization is crucial because it demonstrates that the transformation in Tamansari did not occur in a vacuum; rather, it is the result of accumulated social, economic, and political processes spanning multiple periods. Each phase—colonial, post-independence, and post-reform—represents a shift in how urban space is produced, regulated, and meaning-attributed. As emphasized in the socio-technical transitions literature, historical dynamics establish the initial conditions (*path dependency*) that influence the direction and outcome of transformations (Geels, 2004).

In the Indonesian context, the colonial period often formed the bedrock of urban spatial and institutional structures through segregative planning, whereas the post-independence period was marked by rapid urbanization and the proliferation of informal settlements in response to constraints in formal housing provision (Firman, 2004; Simone, 2004). Subsequently, the post-reform era reflects a shift toward a more decentralized governance model with an emphasis on area upgrading and sustainability agendas (Silver, 2011). Therefore, understanding the historical background is key to explaining why contemporary interventions in Tamansari, Bandung City, yield complex dynamics, including tensions between the formal system and deeply rooted social practices.

4.1. Landscape Pressures

The dynamics of transformation in Tamansari cannot be decoupled from long-term structural pressures that shape the development of Bandung City as an urban system. Within the Multi-Level Perspective (MLP) framework, the landscape represents a macro context that is relatively difficult to change by individual actors, yet significantly influences the direction of change at the regime and niche levels (Geels, 2004). In this case, landscape pressures are formed through the interaction between historical legacy, urbanization dynamics, and shifts in urban development paradigms.

Since the colonial period, Bandung has developed as an economic and administrative center integrated into the Dutch East Indies colonial system (Reerink, 2015). The expansion of the plantation economy in the late 19th century, supported by infrastructure development such as the railway line in 1884, drove massive population mobility into the city. At the same time, colonial land ownership policies altered the agrarian structure in the Priangan region, causing many farmers to lose land access and migrate to the city in search of employment. This early urbanization established the foundation of demographic pressure that persisted into subsequent periods.

This growth intensified in the early 20th century when Bandung was projected as a center of governance and a modern colonial city. The city's population surged drastically—from around 10,000 to 200,000 inhabitants within a few decades—prompting urban expansion into peripheral areas, including the locality that later became Tamansari. However, this growth was not accompanied by adequate housing provision for indigenous residents, thereby creating structural pressure in the form of unequal access to urban space. This dualistic pattern became an early characteristic of Bandung's urban system.

Entering the post-independence period, landscape pressures experienced a significant escalation. Following the revolutionary period, migration flows rose again alongside political stabilization and the development of Bandung as a provincial capital, as well as an educational and industrial hub. Data indicate that up to the 1961 census, Bandung was one of the fastest-growing cities in terms of population in Indonesia (Hugo, 1981). This population surge caused an acute housing crisis, reflected in a house-to-population availability ratio of 1:12 in 1959.

This condition was exacerbated by rising labor migration driven by the expansion of the industrial and service sectors, including international momentum such as the 1955 Asian-African Conference, which strengthened Bandung's position as a hub of global economic and political activity (Weber & Winanti, 2016). Consequently, housing demand grew sharply without being met by state capacity in formal housing provision. In 1964, it was estimated that there were approximately 11,000 informal houses (*rumah liar*) in Bandung, demonstrating the scale of structural pressure on the city's housing system.

This pressure did not subside in the subsequent period, but rather underwent a transformation into a more complex form during the post-reform era. Government decentralization and the integration of global development agendas introduced a new paradigm in urban management, emphasizing sustainability, spatial efficiency, and environmental quality improvement. In the context of Bandung, urban development visions oriented toward concepts like *green city* and *eco-district* exerted additional pressure to redevelop residential areas deemed incompatible with such standards.

The Eco-District concept emerged as a strategic planning framework for the Tamansari–Cikapundung area. Envisioned as an integrated and environmentally sustainable urban district, the initiative promoted river revitalization, green open spaces, energy management, and the reconfiguration of high-density settlements into more organized forms of urban development. Within this framework, informal settlements along the Cikapundung River increasingly became targets of urban restructuring, as environmental sustainability objectives were linked to broader agendas of urban renewal and spatial transformation (Checker, 2011).

Moreover, the appreciation of land values in the city center due to economic growth and sustained urbanization further intensified pressure on areas like Tamansari. The strategic location of this area made it a target for development interventions aimed of optimizing land use. Thus, landscape pressures in the contemporary period are not only demographic but also economic and norm-based, related to efforts to align the city with global standards of sustainable development.

Overall, landscape pressures in Tamansari are the outcome of a long accumulation of historical processes, ranging from colonial agrarian restructuring and post-independence urbanization to the transformation of urban development paradigms in the post-reform era. This dynamic establishes the structural conditions that drive interventions at the regime level, while simultaneously shaping the context in which niche practices develop and persist. In other words, the landscape in this case acts not merely as a background but as a key factor determining the direction and intensity of the socio-technical transition process

4.2. Regime Dynamics

The regime dynamics in the development of the Tamansari Row Housing cannot be understood as a configuration of policies emerging out of nowhere; rather, it is the outcome of a long evolution of the housing management system formed since the colonial period, transformed during the post-independence era, and heavily consolidated in the post-reform era. Within the Multi-Level Perspective (MLP) framework, the regime represents the dominant structure that is relatively stable, yet historically continues to experience re-articulation in response to landscape pressures (Geels, 2004).

During the colonial period, the housing regime in Bandung was shaped through an exclusive and segregative planning system. The colonial government developed formal areas with high infrastructure standards for European groups, while local residents settlements grew outside official planning frameworks. In the context of Tamansari, in the early 20th century, this area was designed as part of the city's ecological and recreational landscape. It was planned as parks and botanical gardens integrated with the development of the Technische Hoogeschool (now ITB), with green spaces as a primary element of spatial planning (Candra & Widiastuti, 2019; Permana, 2020). The area was even projected as an elite residential environment and recreational space for Europeans, showing an exclusive and segmented colonial planning logic. However, the absence of formal intervention regarding local housing needs indirectly formed a dualistic regime—where formal and informal systems developed in parallel without integration.

Entering the post-independence period, the housing regime shifted significantly due to urbanization pressures and limited state capacity. The surge in population growth and the housing crisis forced the state to adopt a pragmatic approach toward informal settlements. Instead of radical restructuring, the government tended to tolerate and even accommodate urban villages (*kampung kota*) as part of the urban housing system. Interventions such as the Kampung Improvement Program (KIP) in the 1970s demonstrated that the regime during this period was oriented toward incremental upgrading rather than structural transformation. In the context of Tamansari, this enabled the development of a relatively stable housing system based on self-built housing, despite lacking full formal legitimacy.

However, since the post-reform period, a fundamental reorientation has occurred in the urban housing regime. Government decentralization granted greater authority to local governments to manage and plan their territories, which was followed by the emergence of slum upgrading agendas as a policy priority. In this context, the regime began shifting from a tolerant approach toward informality to spatial formalization and standardization. This transformation is clearly visible in the case of Tamansari, which was administratively designated as a slum area through Bandung Mayor Decree No. 648/Kep.455-DisTaRCip/2010—even though historically this area had long functioned as a vibrant and productive settlement.

This regime reorientation was further strengthened through the integration of national and local policies. The KOTAKU program from the Ministry of Public Works and Public Housing (PUPR) became a primary instrument in pushing slum handling through a more structured, target-based approach. At the city level, this direction was articulated in the 2009–2013 Bandung City Medium-Term Development Plan (RPJMD), which emphasized city planning toward an integrated metropolitan area with vertical housing development

strategies. Within this framework, the Tamansari Row Housing construction represents a concrete form of a regime shift toward vertical densification and housing formalization.

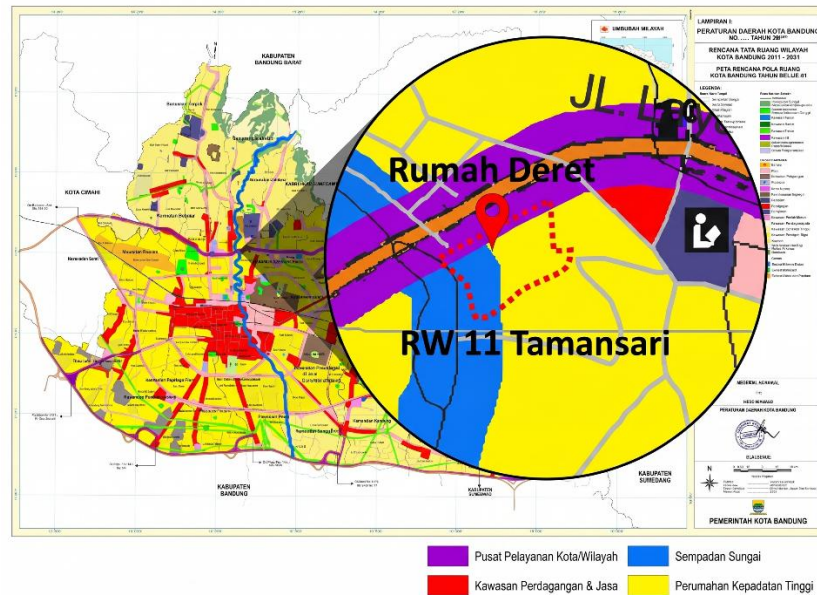


Figure 2 - Spatial planning designation of RW 11 Tamansari within the RTRW 2011–2031.
Source: Bandung City Spatial Plan (RTRW) 2011–2031

Operationally, the regime was manifested through a series of regulatory instruments detailing the transformation process. DPKP3 Decree No. 538.2/1325A/DPKP3/2017 and Bandung Mayor Regulation No. 665/2017 regulated the relocation mechanisms, compensation, and construction implementation. The Bandung City Spatial Plan (RTRW) 2011–2031 explicitly identifies Tamansari Subdistrict as one of the city's informal and deteriorated settlement areas requiring urban renewal and revitalization. The plan proposes the development of vertical housing as a redevelopment strategy, transforming the area into a high-density residential zone. These instruments show how the regime functions as a stabilizing mechanism attempting to control complexity through administrative procedures and formal standards. However, in practice, these mechanisms also restricted residents' negotiation space and reduced flexibility in accommodating local conditions.

In addition to regulatory aspects, the regime was also underpinned by a strong technocratic logic. The row housing development was positioned as a rational solution to spatial density and disorder, emphasizing land efficiency, spatial regularity, and the integration of modern infrastructure such as technology-based water treatment and sanitation systems. This approach reflects a tendency to reduce social issues to technical problems solvable through design (Scott, 2008). In a historical context, this marks a shift from the adaptive approach of the post-independence era to the more rigid technocratic approach of the contemporary era.

Nevertheless, the implementation of the regime in Tamansari showed a significant misalignment with social conditions at the local level. The lack of resident participation in the planning process—recorded in only one official forum in 2017—shows that the regime still operates within a top-down framework. The relocation process, which lasted from 2019 until at least 2024 with unstable temporary housing conditions, further illustrates the regime's limitations in providing certainty for residents. Furthermore, even as the row housing units began to be occupied, the unclear ownership status and temporary lease schemes created new forms of uncertainty.

This tension is also related to a legitimacy conflict between the formal system and long-developed semi-formal practices. Despite lacking official ownership certificates, Tamansari residents possessed other forms of legitimacy, such as tax payments and intergenerational space occupancy. However, within the formal regime framework, these forms of legitimacy were unrecognized, thereby weakening the residents' bargaining position in the transformation process. This indicates that the regime not only regulates space physically but also dictates who has the right to be recognized within the system.

Thus, when viewed historically, the regime dynamics in Tamansari reflect a shift from an exclusive colonial system, to a post-independence approach more adaptive to informality, to a post-reform regime consolidation emphasizing formalization and control. However, instead of producing stabilization, the contemporary regime configuration faces challenges in integrating the social complexity formed through that long history.

Within the MLP framework, this condition shows that changes at the regime level are not only triggered by landscape pressures but are also constrained by historical legacy and deeply rooted social practices. When the regime attempts transformation through the logic of standardization and technocracy, without accommodating historical and social dimensions, the result is not a smooth transition but a process fraught with tension and uncertainty. This serves as an important foundation for understanding how niche practices respond to and negotiate these interventions at the next level.

4.3. Niche Practices

Unlike the regime, which represents formal and institutional structures, niche practices in the Tamansari case reflect socio-economic practices that developed organically and are rooted in a long history of urban space production. Within the Multi-Level Perspective (MLP) framework, the niche is understood not only as a space for technological innovation but also as an arena where alternative practices, local knowledge, and survival strategies are formed outside the dominant logic of the regime (Geels, 2002; Smith et al., 2005).

Historically, niche practices in Tamansari can be traced back to the post-independence period, when constraints in formal housing provision prompted the community to build housing independently. Amid a housing crisis and rapid urbanization, urban villages developed as adaptive solutions based on self-built housing, where residents gradually constructed and modified homes according to their needs and economic capacities. This practice produced a flexible, non-standardized spatial configuration that paradoxically allowed a high level of adaptability to social and economic changes.

In its subsequent development, this practice consolidated into a relatively stable social system. In Tamansari, a house functioned not only as a place of residence but also as a space for economic production and social interaction. Many residential units were utilized for informal economic activities such as small shops (*warung*) or home industries, which depended heavily on the strategic location of the area in the city center. Thus, residential space possessed a dual function where social and economic dimensions were inseparable. This also explains why residents developed a strong attachment to the location, rather than to the physical building alone.

Additionally, niche practices were reflected in the use of communal spaces. Alleys (*gang*), yards, and spaces between buildings functioned as social spaces that enabled daily interactions, community solidarity, and social support mechanisms. This structure formed a close-knit social network, which became an important resource for residents facing economic uncertainty and external pressures. In this context, the physical space of the *kampung* functioned as an irreplaceable social infrastructure that could not be replicated by standardized formal designs.

However, when regime interventions commenced in the post-reform period, these niche practices began to confront significant transformational pressures. The Tamansari Row Housing development process since 2017, followed by evictions in 2019, triggered various forms of responses from the community. One of the most prominent responses was resistance to relocation (Abdullah et al., 2023; Ar-Ridho & Ishartono, 2019). Some residents refused to leave the area due to fears of losing access to livelihoods, social networks, and the living spaces they had built over decades.

In addition to open resistance, niche practices also emerged in the form of negotiation and adaptation. The Tamansari's residents were not entirely passive when facing interventions, but actively constructed strategies to sustain their livelihoods. For instance, some relocated residents still endeavored to maintain economic activities by seeking alternative locations or adjusting their business types. On the other hand, residents who returned to occupy the row housing units attempted to reproduce old practices within a confined space, despite frequently encountering constraints due to inflexible designs.

Be that as it may, there were significant limitations to the niche's capacity to adapt. The design of row housing, based on standardization and spatial efficiency, was not fully compatible with the needs of residents accustomed to multifunctional spaces. Restrictions on spatial usage, limited access for economic activities, and changes in social interaction patterns became major challenges in the adaptation process. This demonstrates a misalignment between the socio-technical configuration proposed by the regime and the daily practices of the community.



Figure 3 - (a) Tamansari Row Housing developed through the urban redevelopment program;
(b) Existing high-density kampung environment located around the Tamansari redevelopment area.
Source: Research documentation.

Furthermore, niche practices can be understood as a form of everyday resistance against regime dominance. This resistance was not always manifested as open conflict, but also through subtle actions such as refusing relocation, negotiating compensation, or reinterpreting spatial usage within the new housing. This phenomenon demonstrates that the community possesses agency in responding to development interventions, while confirming that the socio-technical transition is a highly contested process.

From a historical perspective, niche practices in Tamansari are not a new phenomenon, but the result of accumulated community experience in adapting to structural limitations since the post-independence period. However, unlike previous periods where the regime was relatively tolerant of informality, in the post-reform era, these practices have been increasingly squeezed by drives for formalization and standardization. This creates a condition where the niche no longer functions merely as a space for adaptation, but also as an arena of conflict and negotiation against changes imposed from above.

Niche practices in the Tamansari case possess a high adaptive capacity but also face structural limitations in the context of strong regime interventions. Instead of becoming a source of innovation easily integrated

into the formal system, the niche functions as an alternative system with its own logic, which in many ways contradicts the technocratic logic of the regime. The interaction between the two produces a non-linear transition dynamic filled with tension, negotiation, and partial outcomes.

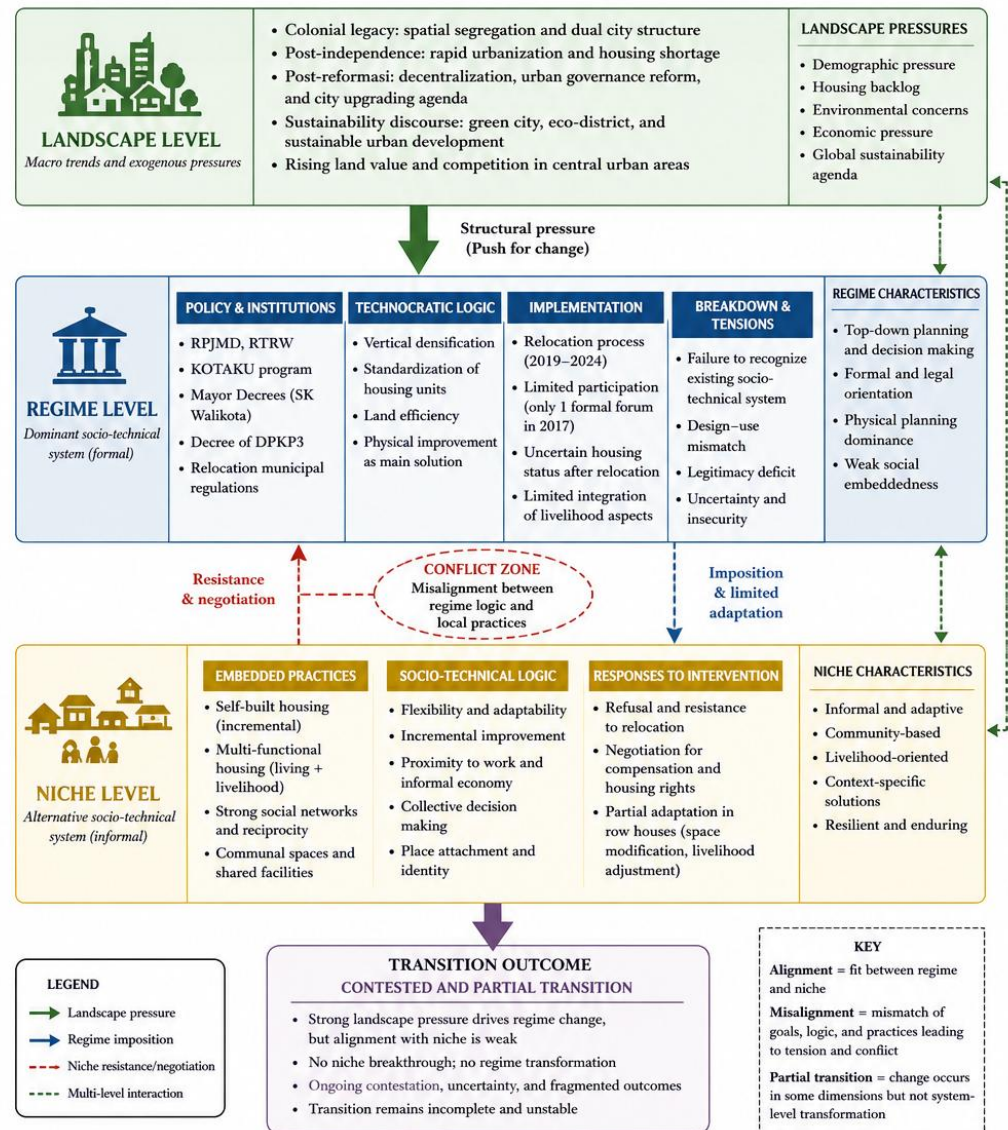


Figure 4 - Multi-Level Perspective Analysis of the Tamansari Redevelopment Transition.

5. DISCUSSIONS

5.1. Rethinking the Multi-Level Perspective in Urbanized Cities

The findings from the Tamansari case challenge basic assumptions within the Multi-Level Perspective (MLP) framework, particularly regarding the role of the niche and the dynamics of alignment. In classic MLP literature, the niche is often positioned as a relatively marginal space of innovation with the potential

to develop and replace the regime through diffusion and escalation processes (Geels, 2002; Geels & Schot, 2007). However, in the context of Tamansari, the niche did not emerge as a new or experimental entity, but as a socio-technical system that had long been formed and functioned effectively to meet community needs.

Self-built housing practices, household-based informal economies, and urban village social networks demonstrate that the niche in this context possesses a high level of maturity and resilience. This aligns with the argument that in the developing urban context, informality is frequently not merely a deviation from the formal system, but an alternative form of spatial production possessing its own internal logic (Roy, 2005; Simone, 2004). Thus, instead of being an "embryo of innovation," the niche in Tamansari is more accurately understood as an existing socio-technical system that has stabilized.

Consequently, the transition process does not follow a niche breakthrough pattern as assumed in the MLP, but instead displays a form of contestation between two equally established systems. This finding reinforces critiques against the universality of the MLP and emphasizes the importance of contextualizing the theory to comprehend transition dynamics in postcolonial urban development (Lawhon & Murphy, 2012).

5.2. *Technocratic Regime and the Limits of Alignment*

The findings also indicate that the regime in the Tamansari case was dominated by a technocratic logic that emphasizes standardization, efficiency, and control. Interventions through row housing development reflect an approach that views settlement issues as technical problems solvable through design and regulation. This approach is consistent with what is termed high modernist planning, where social complexity is reduced to variables that can be administratively regulated (Scott, 2008).

In practice, however, this approach resulted in limitations in building alignments with social practices at the niche level. The lack of resident participation, uncertainty in the relocation process, and the mismatch between housing design and the economic and social needs of the community demonstrate that the regime failed to integrate non-technical dimensions into the transformation process. This reveals that alignment depends not only on the strength of policies or external pressures but also on the regime's capacity to adapt institutionally and epistemically.

Within the MLP framework, this condition demonstrates that changes in the regime do not always produce system stabilization. Conversely, when a regime is overly rigid and control-oriented, the transition process can stagnate or even generate prolonged conflict. This finding expands the understanding of regime

dynamics by emphasizing that adaptive capacity is a key factor in the success of socio-technical transitions.

5.3. *Informality as a Socio-Technical System*

One of the primary contributions of this study is the reinterpretation of informality as a component of a socio-technical system, rather than a mere temporary condition to be overcome. In many urban policies, informal settlements are frequently positioned as "problems" to be addressed through formal interventions such as relocation or redevelopment. However, the findings in Tamansari demonstrate that the urban village possesses a complex internal structure, including integrated mechanisms of space production, economic systems, and social networks.

Beyond its physical characteristics, informality in Tamansari can be understood as a socio-technical system in which social practices, material infrastructures, and local institutions are mutually constituted. Housing construction, livelihood activities, and community networks evolved through long-term processes of adaptation, producing a relatively stable configuration that enabled residents to access resources, organize economic activities, and reproduce everyday urban life. In this sense, informality represents not merely the absence of formality but an alternative mode of socio-technical organization shaped by historical and contextual conditions (Roy, 2005; Lawhon & Murphy, 2012).

Viewing informality through a socio-technical lens also helps explain why redevelopment generated persistent tensions. The transition was not simply a replacement of inadequate housing with improved physical infrastructure, but an intervention into an existing system of relationships, practices, and institutional arrangements. As a result, regime-led efforts toward formalization encountered forms of resilience embedded within the niche, where social and economic functions had already become deeply integrated into everyday life. This suggests that urban redevelopment involves the reconfiguration of socio-technical systems rather than solely the transformation of the built environment, highlighting the importance of recognizing informality as a legitimate component of urban transition processes.

This approach aligns with literature that views informality as a form of urbanism from below, where society actively produces and manages urban space (Simone, 2004; Roy, 2005). In this context, transformation through row housing not only alters the physical form of the environment but also has the potential to disrupt a social system that had been functioning effectively. Standardized housing units and formally regulated spatial arrangements may improve certain physical indicators, but they may also limit the flexibility that previously allowed residents to adapt their homes to changing family and economic needs.

Furthermore, the failure to recognize informality as a legitimate socio-technical system contributes to the emergence of conflict and resistance. When the regime ignores the internal logic of the niche, what occurs is not integration but the displacement of socio-technical practices. This reinforces the argument that sustainability cannot be achieved solely through physical improvements, but must consider social sustainability as a core component (Watson, 2009).

Overall, the Tamansari case exhibits a pattern of a "contested and partial transition": strong landscape pressures successfully drove changes in the regime but failed to integrate with deeply rooted niche practices. Instead of a coherent system reconfiguration, the interactions across levels generated repetitive misalignments.

Thus, these findings demonstrate that the transition in Tamansari did not follow the classic pattern of a niche breakthrough or a regime shift often assumed in the MLP literature. Instead, this case is more accurately understood as a contested partial transition where:

- landscape pressures successfully drove change,
- the regime was capable of initiating interventions,
- but the niche was not fully integrated.

The findings in this case expand the understanding that the niche is not always a "weak" space of innovation, but can be a mature social system with high resilience (Lawhon & Murphy, 2012). When the regime fails to accommodate this complexity, the unfolding transition tends to produce conflict and instability rather than sustainable transformation.

Furthermore, these findings challenge the assumption that formalization and standardization are always pathways to sustainability. In the Tamansari case, this approach instead created new tensions and disrupted a previously adaptive social system. Therefore, the success of a socio-technical transition depends not only on the strength of a policy or technology but also on the capacity to build alignments that are sensitive to historical and social contexts.

6. CONCLUSIONS

This article analyzes the dynamics of socio-technical transformation in the Tamansari Row Housing redevelopment using the Multi-Level Perspective (MLP). By examining interactions across the landscape, regime, and niche levels, the study demonstrates that the transformation process did not produce a coordinated and stable transition; instead, it resulted in a partial and contested socio-technical transition.

The findings show that landscape pressures—shaped by colonial urban development, the post-independence housing crisis, and post-reform redevelopment policies—created strong momentum for institutional change at the regime level. Through formal planning instruments, redevelopment programs, and regulatory interventions, the state sought to reorganize informal settlements into standardized and formally governed housing. However, these regime changes were not accompanied by meaningful alignment with the socio-technical practices embedded within the Tamansari community. Long-established practices of self-built housing, informal economic activities, and community-based social networks proved highly resilient, generating resistance, negotiation, and only limited forms of adaptation throughout the redevelopment process.

These findings contribute to the MLP literature in two important ways. First, they challenge the conventional assumption that niches primarily function as protected spaces for emerging innovations. In the Tamansari case, the niche represents a mature and historically embedded socio-technical system that has evolved through decades of collective adaptation and continues to operate effectively despite pressures for formal redevelopment. This suggests that, in postcolonial urban contexts, niches may function not as embryonic innovations but as well-established alternative socio-technical configurations.

Second, the study expands the understanding of regime dynamics by demonstrating that the effectiveness of regime transformation depends not only on institutional capacity or policy coherence, but also on its ability to engage with existing socio-technical practices. A regime dominated by technocratic planning and standardization, while overlooking socially embedded forms of organization, is more likely to produce conflict, resistance, and unstable transition outcomes than coordinated socio-technical change.

More broadly, this study argues that socio-technical transitions in postcolonial urban contexts should be understood not as linear processes of replacing informal systems with formal ones, but as negotiated transformations between historically embedded socio-technical configurations. Urban informality is therefore not merely a condition to be formalized, but a socio-technical order shaped through long-term interactions among communities, institutions, and the built environment. Consequently, urban redevelopment policies should move beyond technocratic interventions toward more adaptive and participatory governance approaches capable of integrating community-based practices into broader transformation processes.

Finally, while this study is based on a single case, it demonstrates the analytical value of extending the Multi-Level Perspective to historically layered postcolonial cities, where transition pathways are shaped not only by technological innovation but also by enduring institutional legacies, urban informality, and

contested forms of governance. Future comparative research across different postcolonial cities would further refine this conceptual understanding and contribute to a more context-sensitive theory of socio-technical transitions.

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