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User-Initiated Interventions in Rural Mass Housing: A Typological Study in Günyurdu Village

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Abstract

In rural contexts, mass housing projects implemented following disasters or infrastructural developments, such as dam construction, often fail to accommodate the socio-cultural and spatial dynamics of rural life. This study examines the current status of 2006 TOKİ mass housing located in Günyurdu Village, Pazaryeri District, Bilecik, Türkiye, aiming to explore user-driven spatial interventions in response to standardized housing. Utilizing a post-occupancy evaluation framework and a mixed-methods approach, the research conducted visual analyses and observations to identify user-led modifications. Findings reveal that 42 of the 45 units underwent 204 distinct interventions, classified as: façade modifications, structural additions, exterior space alterations, roof adjustments, and spatial-functional changes. These interventions reflect residents' efforts to align the built environment with their evolving needs, demonstrating the inadequacy of one-size-fits-all designs in rural settings. The study contributes to the discourse on sustainable rural development by offering insights into user-centered design and advocating for context-sensitive housing production strategies.

Keywords: *Rural mass housing, physical interventions, post occupancy evaluation, TOKİ, Türkiye.*

Kırsal Toplu Konutlarda Kullanıcı Kaynaklı Müdahaleler: Günyurdu Köyü'nde Tipolojik Bir Araştırma

Öz

Kırsal bağlamda, afetler ya da baraj yapımı gibi altyapı projeleri sonucunda gerçekleşen zorunlu yeniden yerleşimler, çoğu zaman toplu konut projelerinin uygulanmasını gerekli kılmaktadır. Ancak, standartlaştırılmış ya da tipleştirilmiş konut tasarımları, kırsal yaşamın özgün sosyo-kültürel ve mekânsal dinamiklerine yeterince karşılık verememektedir. Bu çalışma, Türkiye'de Bilecik ili Pazaryeri ilçesine bağlı *Günyurdu Köyü'nde 2006 yılında inşa edilen TOKİ toplu konut projesinin güncel halini inceleyerek, kullanıcı kaynaklı fiziksel müdahaleleri analiz etmeyi amaçlamaktadır. Araştırma yerinde gözlem ve görsel analiz temelli karma yöntemli bir yaklaşımla yürütülmüştür. Bulgular, incelenen 45 konuttan 42'sinde kullanıcılar tarafından toplam 204 farklı müdahalenin yapıldığını ortaya koymaktadır. Bu fiziksel müdahaleler; cephe değişiklikleri, yapısal eklemeler, dış mekân düzenlemeleri, çatıya yönelik müdahaleler ve mekânsal işlev değişiklikleri olmak üzere beş ana kategori altında sınıflandırılmıştır. Bulgular, zamanla kullanıcıların konutlara ihtiyaçlarına göre nasıl değişiklikler yaptığını ortaya koymakta ve kırsal alanlarda konut üretimi için kullanıcı merkezli tasarım anlayışının önemine dikkat çekmektedir.*

Anahtar kelimeler: *Kırsal toplu konut, fiziksel müdahaleler, kullanım sonrası değerlendirme, TOKİ, Türkiye.*

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1. Introduction

Mass housing projects play a critical role in swiftly addressing housing needs, particularly in metropolitan areas and in situations of compulsory resettlement such as natural disasters or relocation. In Turkey, these projects led primarily by the Housing Development Administration (TOKİ) along with public and private sector actors have been adopted as a key policy tool to address the urban housing deficit. Since the 1950s, rural-to-urban migration has gradually intensified. According to the Turkish Statistical Institute (TÜİK, 2022), only 17.3% of the total population resides in rural settlements, which make up 93.5% of Turkey's total land area. Consequently, from the 1980s onward, mass housing projects have largely accelerated in urban areas to meet increasing housing demands. However, in parallel with urban expansion, the continuing population decline in rural regions and the need for sustainable rural development have emerged as pressing issues (Gökçe & Kaya, 2020).

In rural areas, the number of mass housing developments often implemented as "standard-type projects" has recently increased in response to compulsory conditions such as disasters or dam-induced relocations, as well as sustainable development strategies. Yet, despite the homogenization of living practices and spatial organization in a globalized world, rural settlements remain distinct contexts where cultural identity continues to shape housing preferences, and where a strong sense of belonging and spatial attachment persists (Gökçe & Kaya, 2020). Therefore, mass housing projects in rural areas must be designed in harmony with local architecture and traditional lifestyles, in contrast to their urban counterparts (Özkuvancı & Alkışer Bregger, 2019).

As a form of rural settlement, the village is a unique social unit with its own geographic and ecological context, labor structure, social organization, cultural identity, name, and history typically with a smaller population than urban areas (Geray, 2011). The structures in these areas benefit from various elements, including belief systems, lifestyle preferences, climate data, and the use of traditional materials, and integrate with the social and physical environment (Arpacıoğlu, 2016). As described by Güğercin & Baytorun (2016), rural houses are characterized by distinctive features such as their geographical positioning, form, construction methods, and use of outdoor space. Compared to urban housing, rural dwellings must accommodate greater multifunctionality, consider limitations in local resources and intervention capacities, and provide solutions compatible with ongoing economic activities (Kahraman & Arpacıoğlu, 2022).

This study aims to evaluate how well rural mass housing projects adapt to their local contexts by analyzing user-initiated modifications over time in TOKİ-built housing constructed in 2006 in Günyurdu Village, Pazaryeri District, Bilecik, Türkiye. Adopting a Post-Occupancy Evaluation (POE) framework, the research involves observing and photographing alterations made by users, classifying these modifications, and discussing their implications. The study provides a visual analysis of user interventions as a means to assess initial performance, while also contributing qualitative data to the POE methodology.

Through on-site analyses and inventory documentation, the research identifies the spatial transformations initiated by users and infers the possible reasons behind these changes. Systematically recording these interventions provides valuable insights into the long-term sustainability and contextual adequacy of non-site-specific standardized housing designs. Based on the findings, the study proposes spatial, functional, and cultural factors that should guide future projects and presents recommendations that may contribute to the development of design guidelines. One of the main goals of the research is to raise awareness about the necessity of integrating place-specific design approaches into the planning and implementation of rural mass housing projects.

1.1. Approaches to Rural Planning and Housing Development in Türkiye

Planning approaches for rural areas in Türkiye have historically been shaped by a broad framework encompassing migration, resettlement policies, and rural development strategies. For decades, rural development policies were dominated by an agricultural production-oriented, centralized, and sectoral perspective, prioritizing economic transformation above the physical planning of rural spaces (Yenigül, 2017).

Post-1950s rural development programs, though aimed at economic efficiency, agricultural modernization, and migration mitigation, were implemented as fragmented interventions lacking spatial coherence (Duyguluer, 2012). The post-1980 neoliberal shift further transformed planning approaches, reducing direct state intervention in favor of private sector investments and local entrepreneurship incentives (Çiftçi, 2018).

By the 2000s, Türkiye's EU harmonization process reframed rural areas not merely as agricultural zones but as multifunctional spaces. Concepts like sustainable development, participatory planning, and cultural heritage preservation gained prominence (Demirtaş-Milz, 2013). However, the Metropolitan Municipality Law (No. 6360) abolished the legal status of villages, converting many rural settlements into urban "neighborhoods" (Partigöç, 2018). This blurred the definition of rurality, weakened rural identity, and shifted planning toward urban-centric models.

Recent years have seen new approaches to integrate rural spatial character into planning. Village Design Guides, introduced via 2013 legislation, aim to preserve spatial identity and traditional fabric, though their application remains optional and limited to settlements with distinctive characteristics (Öğdül, 2019). These guides offer recommendations for both rural housing and settlement planning. Another strategy is the Ministry of Environment, Urbanization, and Climate Change's Region-Specific Housing Projects, which promote typological designs aligned with local architectural heritage and cultural traditions (Oruç et al., 2017). These projects, accessible via the Ministry's website, provide regionally adapted design proposals tailored to the architectural and cultural context of different provinces (CSB, 2025).

Beyond planning, direct interventions in rural housing production include TOKİ's Agricultural Village Project, which targets economic improvement through value-added agricultural production. The project envisions organizational and technological infrastructure for production, storage, processing, and marketing, alongside housing upgrades, utilizing idle lands (TOKİ, 2025). Implemented in 41 provinces (e.g., Çankırı, Aydın, Şanlıurfa), these projects require applications from at least 50 villagers, with optional social facilities constructed at cost. While housing dominates these initiatives, as exemplified by the case of Günyurdu Village also demonstrate TOKİ's mass rural housing for displaced communities due to dam construction or disasters.

1.2. Qualitative Evaluation of New Housing Production in Rural Areas and POE

The production of rural housing should be evaluated not only through quantitative measures but also from a qualitative perspective. Such an evaluation is crucial to understand how well these dwellings integrate with local identity, the environment, culture, and social life. Rural areas possess unique cultural and social characteristics, and housing in these settings serves not only as physical shelter but also as a space for agricultural and livestock production, social interaction, and the preservation of cultural life. When these specificities are not sustained, there is a risk of disrupting the local fabric, weakening social relations, and creating unsustainable environments.

In recent years, mass housing developments in rural areas have increasingly reflected standardized, urban-oriented design approaches (Gökçe & Kaya, 2020). While traditional rural lifestyles are shaped by neighborhood relations, shared spaces, and collective production, contemporary housing in these contexts often leads to more individualistic, enclosed, and isolated living arrangements. This shift can undermine the structure of rural communities and result in social fragmentation. Additionally, insufficient attention to regional architectural characteristics often leads to the design of spatial schemes that are incompatible with the local climate and topography. Therefore, rural housing must be evaluated from a holistic perspective that includes material choices and construction systems, considering not only the quality of physical space but also the principles of social, cultural, and environmental sustainability.

Qualitative research on mass housing in rural settings remains relatively limited. A notable example is Bulut & Ceylan's (2017) study, which used a phenomenological approach to analyze the environmental, cultural, and economic factors influencing housing design in Misli Plain. The study employed descriptive analyses of building plans, photographs, and local governance data.

The qualitative evaluation of new housing production in rural areas involves site-based spatial analyses, semi-structured interviews and focus groups, examinations of morphological and landscape integrity, and assessments of architectural identity and aesthetic coherence. These methods enable the identification of the relationships between the built environment, social fabric, local lifestyles, and traditional knowledge. One of these methods, POE, aims to systematically and holistically assess the performance of buildings after they have been occupied (Oseland, 2023). POE not only reveals how well user needs are met but also provides valuable feedback for future projects (Watson, 2003).

In the context of rural housing, POE is particularly useful in understanding how users adapt and modify their living spaces over time (Elsayed et al., 2023). In the literature, POE applications in rural areas often involve user feedback on the physical condition of housing, the arrangement of outdoor spaces, and areas for social interaction. For example, a POE-based study conducted by Jiwane (2021). In the village of Kanhapur, India, showed that the ecological village model failed to meet residents' expectations, highlighting the project's overall lack of success.

1.3. History of Günyurdu Village and Characteristics of Old House Units

The settlement of Eski Günyurdu (Bakraz), located in the Pazaryeri district of Bilecik Province, represents the original village site prior to the relocation of its inhabitants to a new TOKİ housing development constructed in 2006 following the completion of a dam project. As a rural settlement, Eski Günyurdu constitutes a characteristic example of the spatial continuity embedded in traditional Yörük settlement culture, evident in its topography-responsive layout and organically evolved street fabric.

Situated on an eastward-sloping terrain, the village exhibits a curvilinear street pattern shaped directly by the natural landform. Residential buildings are positioned on terraced plots, establishing a harmonious relationship with the topography. While plot boundaries are not typically demarcated by solid masonry enclosures, spatial limits remain perceptible through low stone alignments, vegetation edges, or natural thresholds. This flexible and permeable configuration reflects, at the settlement scale, the spatial logic associated with Yörük cultural traditions. Low settlement density and the orientation of dwellings according to sunlight, prevailing winds, and landscape views further illustrate the formative influence of environmental conditions on the spatial layout.

Architecturally, the houses display a modest yet distinctive rural character shaped by the local synthesis of stone, adobe, and timber. Ground floors commonly feature rubble-stone masonry, while upper floors are constructed using half-timbered systems with adobe or bağdadi infill. The façades, characterized by small openings, simple proportions, and minimal ornamentation, respond to climatic factors; narrow multi-casement windows and wooden double-leaf doors are typical elements that reinforce this vernacular identity. Roofs are generally hipped and covered with locally produced clay tiles.

As animal husbandry historically constituted the primary livelihood of the village, the spatial organization of dwellings was directly structured around production needs. Ground floors accommodated functions such as storage areas, barns, and haylofts, whereas upper floors served as living quarters. Semi-open or enclosed annexes—including woodsheds, feed rooms, and stables—formed an integrated network of spaces closely associated with daily agricultural practices.

The arrangement of gardens and immediate outdoor spaces reflects a functional relationship between rural production methods and household needs. Vegetable gardens, informal pathways facilitating animal movement, and small-scale open spaces associated with domestic water use are among the characteristic elements of the plot layout. Privacy within the settlement was achieved not through tall boundary walls but through building orientation, room and sofa configurations, and the careful positioning of semi-private transitional zones. The enclosed sofa, in particular, represents a spatial response both to harsh climatic conditions and to the introverted privacy concept characteristic of traditional rural life.

Collectively shaped by topography, production practices, vernacular housing typology, and landscape relationships, the spatial structure of Eski Günyurdu embodies a coherent and culturally grounded

rural architectural fabric. As such, the village constitutes a noteworthy example of rural heritage with significant cultural landscape value.

2. Material and Method

2.1. Material

The primary material examined in this study is TOKİ housing units in the new settlement area of Günyurdu Village, located in the Pazaryeri District of Bilecik, Türkiye. These houses were built in 2006, following the completion of a dam project that led to the flooding of the original village site (Figure 1).

Figure 1. Günyurdu Village TOKI house units' site plan (Baran Ergül, 2022)

The study area lies at 40,01°N latitude and 29,51°E longitude, approximately 36 kilometers from Bilecik city center, 8 kilometers from the Pazaryeri district center, and just 2 kilometers from the original settlement. Although it is geographically situated within the Marmara Region in Türkiye, the area displays continental climate characteristics. With an elevation of 810 meters, it receives significant snowfall in winter and features a sloping topography that descends gradually toward the east. The new settlement layout is organized along a northeast–southwest axis.

The houses in the new settlement were constructed as two-story buildings with reinforced concrete structural systems. In the original design, the ground floor was designated as a livestock shelter. This level includes two entrance doors of standard width on the front façade. The living spaces are situated on the upper floor and are accessed via an open staircase located outside the building. Importantly, there is no internal staircase connecting the ground and upper floors (Figure 2).

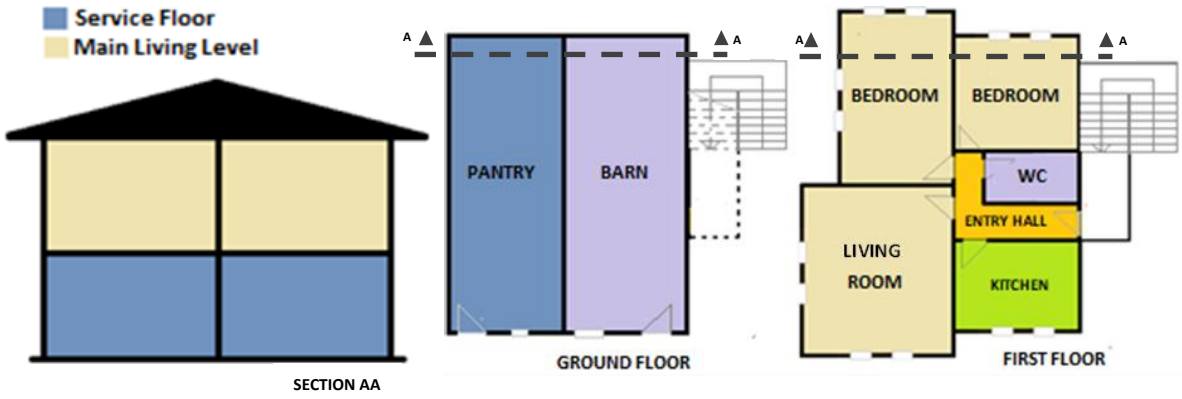

Figure 2. Diagramatic Drawings of Floor Plans and Section AA of Günyurdu Village TOKİ House Unit (Created by the authors)

The original design did not include any thermal insulation on the exterior façades. The roofs are pitched with a 33% slope and were initially constructed without solar energy systems.

After construction when the houses were delivered by TOKİ, there were no clearly defined plot boundaries on the site of the each unit. In other words, there were no garden walls or other elements to mark the edges of individual properties as seen in Figure 3.

Figure 3. One of the unaltered and not in use TOKİ House Unit in Günyurdu Village as part of the control group. (Baran Ergül, 2022)

2.2. Method

This study employed a POE based qualitative research approach structured around the three-phase analytical framework illustrated in Figure 4. The methodology integrates observational data, content analysis, and descriptive statistics to systematically examine how residents of TOKİ-built rural mass housing units physically modify their dwellings in response to contextual mismatches with local climatic, cultural, and functional needs (Figure 4).

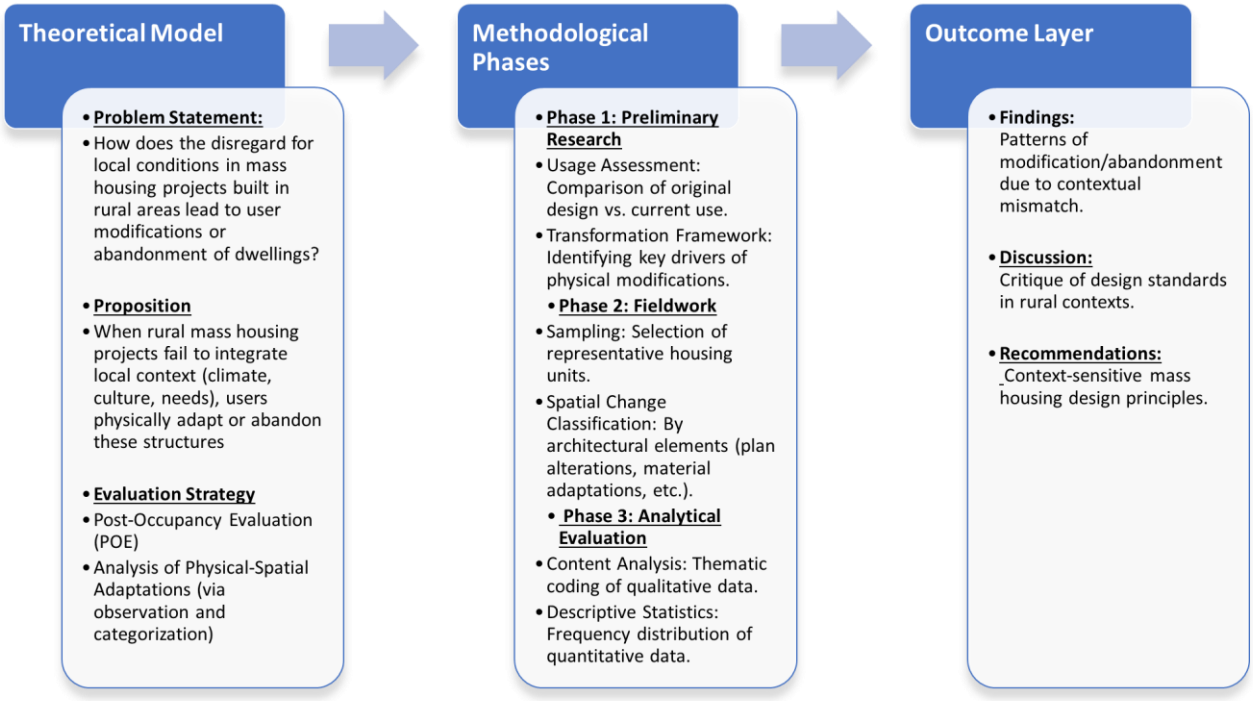

Figure 4. Research framework (Created by the authors)

The research was grounded in a fundamental question: does the disregard for local conditions in rural mass housing projects result in user interventions or, alternatively, in the abandonment of dwellings. Based on this inquiry, the core hypothesis suggested that when place-specific dynamics such as climatic factors, cultural practices, and subsistence patterns are overlooked in the design and implementation of rural housing, users are either compelled to transform their homes to meet their needs or to abandon the spaces altogether. Accordingly, the study assumed that sustainable rural housing can only be achieved through user-oriented approaches that are attuned to local requirements.

In this study, POE method was employed because it provides a systematic way to assess the actual performance of completed buildings through observable user behavior and physical adaptations. POE is widely recognized as one of the most effective approaches for understanding how occupants interact with built environments (Preiser & Vischer, 2006; Zimmerman & Martin, 2001), and it has been used in numerous housing studies to evaluate spatial functionality, environmental comfort, and user-driven modifications (Ibem & Alagbe, 2015). Although alternative methods such as household surveys, interviews, or participatory rural appraisal techniques could also be used, these approaches rely on subjective, self-reported data. In contrast, POE enables direct, unbiased documentation of physical changes, making it particularly suitable for examining the architectural consequences of contextual mismatch in standardized rural housing. The present study adapts the POE framework to focus specifically on exterior spatial transformations and incorporates a control group of unmodified units.This approach allows for an objective evaluation of how residents reshape their dwellings in response to climatic, cultural, and functional needs.

Among the techniques used in POE originally outlined by Duerk (1993) and later discussed by Dinç & Onat (1998) are literature reviews, observations, interviews, photography, group processes, scenario development, diaries, time-motion studies, case studies, simulations, surveys and questionnaires, experiments, full-scale mock-ups, design documentation, and semantic differential techniques (Göktekin, 2002). Within the scope of this study, observation and photographic documentation techniques were employed to identify changes made by users during their occupancy, aiming to understand their adaptation strategies and unmet needs.

The research process began with preliminary investigations aimed at understanding the extent of usage and transformation within the settlement. This included a comparative assessment of each dwelling's current condition relative to its original design. During this stage, a transformation framework was developed to identify the key drivers motivating user modifications, such as climatic requirements, agricultural activities, privacy expectations, and local cultural practices. These initial insights informed the analytical direction of the subsequent fieldwork phase.

Fieldwork was conducted through systematic on-site observation of all 123 units. Three patterns of occupancy were identified: permanently inhabited houses, seasonally used houses, and unoccupied houses. Long-term occupied dwellings, totaling 45 units, were selected for detailed analysis because they exhibit the most substantive interactions between users and spatial design. Unoccupied units were documented as a control group, providing a baseline reference for the original architectural configuration prior to user intervention.

As part of the documentation process, the TÜBA (Turkish Academy of Sciences) Architectural Heritage Documentation Cards were employed as the primary inventory tool. The use of TÜBA forms is well-established in rural architectural heritage research in Türkiye, offering a standardized, rigorous, and comparable framework for recording vernacular building characteristics (Yıldırım, 2023; Erdem, Özakın & Yergün, 2007; Oktaç, 2004). Their comprehensive structure enables the systematic documentation of construction techniques, material use, spatial organization, and critically for this study subsequent alterations, structural additions, and functional transformations. This feature was essential for identifying and classifying modifications made to the standardized TOKİ houses over time. Data fields related to annex constructions, enclosure of exterior spaces, changes in façade elements, and ground-floor functional adaptations were particularly instrumental in tracing patterns of socio-spatial adjustment by residents. Thus, the TÜBA forms functioned not merely as inventory sheets but as an analytical framework that facilitated the systematic identification of misalignments between the

standardized housing design and the lived needs of inhabitants, ensuring both methodological rigor and alignment with established scholarly documentation practices.

Following data collection, the study employed a structured analytical process. All documented changes were first examined through open coding, which produced a comprehensive list of modification types. These codes were then grouped through thematic consolidation, resulting in analytically derived categories of spatial transformation. This classification reflects recurrent patterns of user adaptation and forms the backbone of the analytical layer of the research.

The categorization of modifications served as the organizational foundation for presenting the findings, while the interpretive evaluation of why these changes occurred formed the basis of the discussion on contextual mismatch and design inadequacy. Finally, the synthesis of these outcomes enabled the formulation of recommendations for context-sensitive rural mass housing design that better aligns with the climatic, cultural, and functional realities of rural settlements.

3. Findings and Discussion

3.1. Findings

The findings of this study reveal that spatial modifications implemented within housing units serve as tangible indicators of residents' evolving lifestyles, preferences, and household structures over time. These transformations underscore the inherent adaptability of residential spaces, supporting the argument that housing is not a static product but rather a dynamic and modifiable environment responsive to social, cultural, and economic changes (Acre & Wyckmans, 2015).

The capacity of dwellings to accommodate such changes highlights the importance of designing flexible spatial configurations that respond to the diverse and shifting needs of inhabitants, whether individual or family-based (Acre & Wyckmans, 2014).

In this context, the documentation of spatial changes was approached systematically to ensure the reliability and consistency of the collected data. 45 units out of 123 house units were examined because their constant usage by the occupants. Each housing unit included in the study was assigned a unique identifier to facilitate comparative analysis and longitudinal tracking. Spatial modifications were recorded through standardized inventory forms developed by TÜBA, ensuring methodological rigor and alignment with national academic standards. These forms captured detailed information on the nature, extent, and functional implications of each modification (Table 1). The resulting dataset enables a comprehensive analysis of patterns in spatial transformation and their correlation with demographic or socio-economic factors, which are further elaborated in the following subsections.

Table1. TÜBA inventory form filling out example (TÜİK, 2001) for TOKİ Günyurdu Mass Housing by the authors

RURAL ARCHITECTURAL INVENTORY OF TÜRKİYE		**BUILDING**	**Inventory No:** 2021_11_02 **Geographical Location:** 40°01'46''N 29°51'30'' E
Settlement Name:	**Günyurdu Village**	Province:	Bilecik
Building Name:	K_A2	District:	Pazaryeri
Street and Door No:		Block/Parcel No:	
Structural System:	Reinforced Concrete	Building Type	Housing
Roof Type:	Gable Roof	Construction Year:	2006
Roofing Material:	Pantile	Structural Condition:	Good
Plan Type:		Occupancy Status:	In Use (active)
Number of Floors:	2	Infrastructure Availability:	Water Supply: Mains Heating : Stove
	Basement ■ Attic ■		Sewage System ■ Electricity ■ Teleph. Line ■

General Definition:	The stair landing has been enclosed to function as a wind shelter.		
Construction Technique and Material:	Reinforced Concrete		
Decoration:			
Glooming Material:			
Orginality and Robustness:	The building contains attached annexes. It is actively used and structurally sound.		
Observation and Evaluation:	The building contains attached annexes.		
Prepared by:	Didem Baran Ergül	s/b photo no:	A03_01
Archive:		dia no:	
Relevant Publication:		digital photo no:	
Relevant Location. Inventory:	2018_11_01_01	drawing no:	

Based on the data obtained from these forms, it was observed that at least one spatial modification had been made in all 45 continuously occupied units observed and examined within the scope of the study.While 9% of these units exhibited one or two modifications, 69% underwent three or four, and 15% had five or more interventions between the years 2006-2025 (Figure 5).

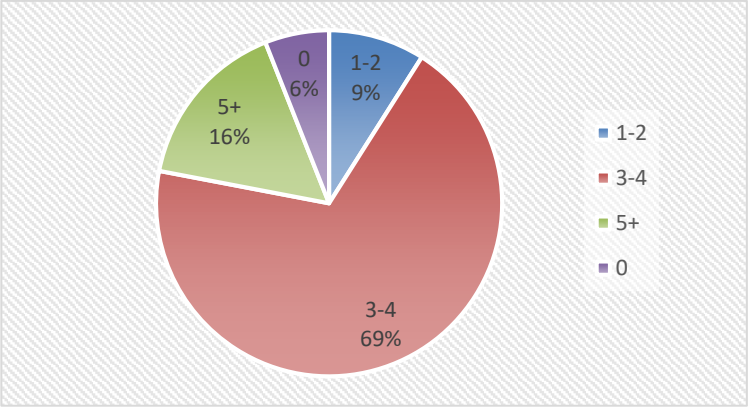

Figure 5. Frequency and distribution of user interventions in Günyurdu Village housing between 2006–2025 (Created by the authors)

When categorized, a total of 204 distinct interventions were identified across the 45 housing units through on-site observation (Table 2).

The 204 discrete interventions identified across 45 units were aggregated into the five categories described above. Table 2 lists each intervention type, a short description, and the total count observed in the 45-unit sample. These counts sum to 204, representing the distinct, documented interventions recorded between 2006 and data collection (2021–2025 period of observation).

Table 2. Categories and frequency of observed user interventions in the 45 continuously occupied units; N=45, total interventions=204 (created by the authors)

Interventions Category	Intervention Type	Description	Count
Façade Alterations	Creation of New Openings	Addition of window/door apertures	6
	Sealing of Existing Openings	Closure of window/door apertures	4
	Façade Color Change	Repainting/recoloring of façade	3
	Replacement of Façade Cladding	Application of insulation or cladding	4
Additions	Balcony Addition	Attached open spatial extension	3

	Terrace Construction	Creation of open terrace areas	3
	Lean-to Roof Installation	Attached roof annexes	14
	Freestanding Auxiliary Structures	Barns, storage units, garages	21
	Room Expansion/Extra Rooms	Enlargement or new room additions	6
	Staircase Enclosure	Creation of staircase vestibules	42
Peripheral Modifications	Garden Utilization & Landscaping	Barns, storage units, etc.	19
	Pathway Paving	Paved pathways from street to entrance	15
	Garden Wall Construction	Boundary demarcation	40
Roof Modifications	Roof System Replacement	Structural roof alterations	2
	Solar Panel Installation	Hot water system integration	11
	Roof Covering Material Change	Replacement of roofing materials	3
Functional Adaptations	Ground Floor Conversion to Living Space	Adaptive reuse of stables/barns as domestic areas	6
	Ground Floor Commercial/Storage Use	Conversion of stables for commercial/ storage	2

One of the most common alterations involved the partial or complete enclosure of the staircase leading to the upper living floor. These modifications were realized using different materials and systems depending on the residents' economic capacities (Figure 6), and were observed in 42 of the 45 dwellings.

Figure 6. Enclosure of staircase with various systems and materials (Baran Ergül, 2025)

Another significant intervention was the addition or elevation of garden boundary walls, which were not present in the original design (Figure 3). This type of change, implemented in 40 of the continuously used units, reflects the users' needs for increased privacy and enclosure (Figure 7).

Figure 7. Demarcation of plot boundaries with garden walls in residential areas (Baran Ergül, 2025)

In line with rural living practices, one of the most widespread types of spatial modification was the construction of independent annexes on the housing parcels to accommodate various functional needs. These additions, built to support local lifestyles, served purposes such as firewood storage, shelter for agricultural tools, and small-scale livestock activities. Standalone structures were found in 21 of the houses, indicating structural alterations in nearly half of the sample. These annexes varied functionally and included six tractor garages, seven barns, four chicken coops, and four storage units (Figure 8).

Figure 8. Ancillary structures adjoining the dwelling: animal shelters and garages (Baran Ergül, 2025)

Although the original housing design by TOKİ envisioned the ground floors to be used as livestock shelters, the limited spatial dimensions and use of reinforced concrete flooring rendered these spaces unsuitable for such functions. This condition appears to have led residents to construct new, more appropriate structures for animal husbandry.

Due to the village's high-altitude location and corresponding continental climate, the addition of semi-outdoor spaces such as balconies and porches was also a common practice. Traces of this type of spatial transformation were observed in 14 of the occupied dwellings (Figure 9).

Figure 9. Entrance-integrated balcony space with lean-to roof covering (Baran Ergül, 2025)

Another important modification was the installation of solar water heating systems on the roofs, a change identified in 11 units (Figure 10). This addition not only improved user comfort but also contributed to energy efficiency, and may be considered among the more sustainable interventions.

Figure 10. Installation of solar thermal collectors on roofs (Baran Ergül, 2025)

Additional changes included the conversion of ground floors—originally designed as animal shelters—into living spaces through the addition of windows or doors (Figure 11), roof restructuring, the construction of garden pergolas, and fenestration changes.

Figure 11. Conversion of stable-designed ground floor into residential space (Baran Ergül, 2025)

Figure 12 provides a bar chart visualization showing both the absolute frequency of each intervention type and the relative share of each of the five categories. A numerical summary of all detected interventions are provided in Figure 12 illustrating both the variety and frequency of the interventions as number of them.

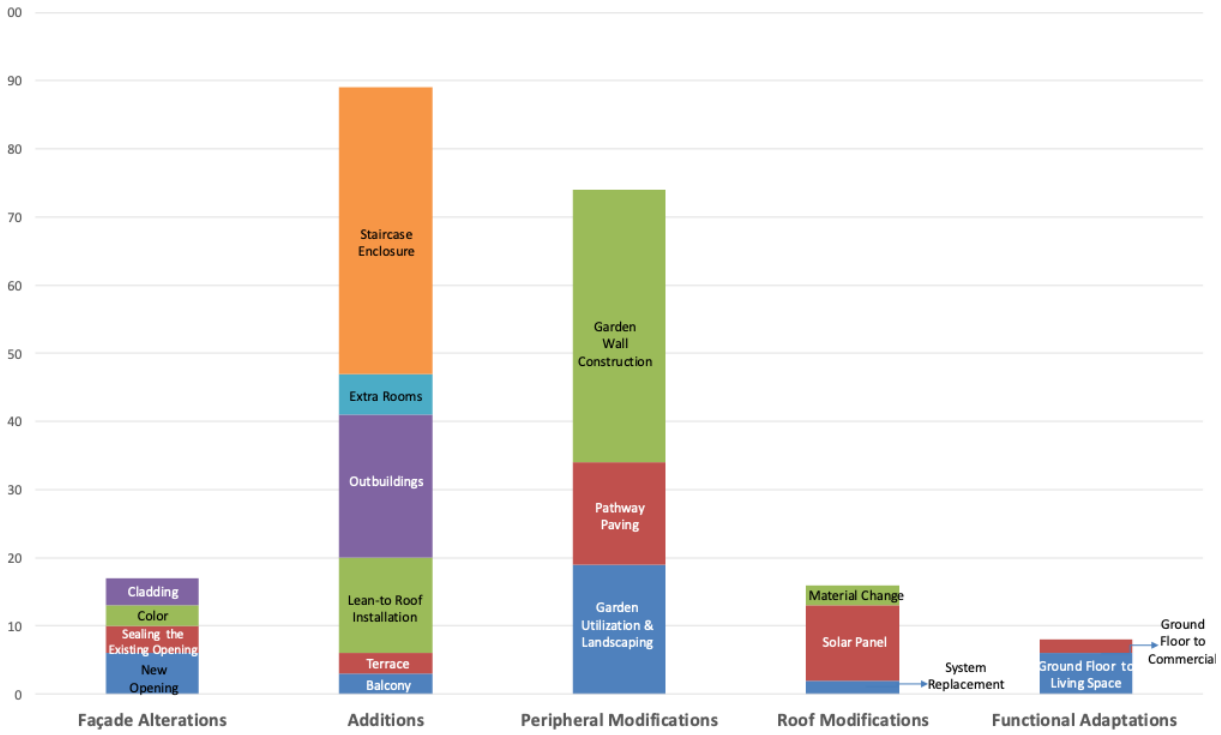

Figure 12. Number of Observed and Categorized Interventions in 45 Housing Units in Günyurdu Village (created by the authors)

3.2. Discussion

The POE results show that 93% of the 45 inhabited housing units in Günyurdu underwent at least one spatial or physical modification, producing 204 distinct interventions in total. The five-category typology as façade alterations, extensions, landscape modifications, roof changes, and spatial-functional transformations—demonstrates that these interventions were not arbitrary but systematic responses to spatial inadequacies and unmet cultural or economic needs. This pattern resonates with Salama and Gharib (2012), who showed that residents often reshape their environments to better support cultural practices and evolving technological capacities. More broadly, the findings affirm the literature on user agency in vernacular environments: as Rapoport (1990) and AlSayyad (2014) argue, built environments constitute a form of non-verbal communication, continually reinterpreted through everyday practices. Accordingly, the interventions observed in this study from structural additions to symbolic gestures—express users' social values, aspirations, and identities.

One prominent finding was the widespread enclosure of external staircases, indicating a misalignment between standardized TOKİ housing layouts and local privacy expectations. Prior research on Turkish housing confirms that façade and threshold elements significantly shape perceptions of privacy and identity; when these are insufficient, residents modify them (Arslan & Yıldırım, 2021). Similar trends were documented in earlier mass-housing estates, where façade-related alterations were among the earliest post-occupancy transformations (Akalın et al., 2007). In Günyurdu, stair enclosure also provides a climatic function by reducing winter heat loss, echoing adaptive strategies frequently observed in user-modified rural housing across Türkiye.

The frequent construction of garden walls, parcel boundaries, and landscape modifications reflects attempts to restore forms of territoriality typical of vernacular rural compounds. Ersoy (2023) highlights that locality and spatial continuity depend on the degree to which housing environments resonate with established territorial and social practices. This study supports that view: residents reintroduce boundaries and semi-private outdoor zones to recover domestic order and agricultural functionality lost in standardized plot designs. Similarly, the findings align with Sakıcı and Kendirci (2023), who demonstrate that boundary design strongly influences users' sense of enclosure and visual-comfort preferences.

A substantial portion of the interventions involved auxiliary structures such as barns, storage units, and garages. These additions reflect the continued centrality of agriculture-related household production in Günyurdu. Sürmeli Söğüt (2025) similarly reports that rigid, standardized TOKİ units often overlook the functional diversity of rural domestic economies, prompting residents to reconstruct missing workspaces. Thus, the extensions observed here should be understood not as non-compliant behaviors but as necessary spatial corrections that restore functional adequacy.

Roof alterations and solar energy installations constitute another adaptive category. According to IEA (2021), rural households in Türkiye increasingly adopt decentralized energy technologies, particularly solar water-heating systems, for cost and climatic reasons. The examples documented in this study illustrate residents' proactive integration of such technologies where state-provided housing lacks energy-efficient design features.

The spatial-functional transformations including converting interior rooms into storage, workshops, or production areas echo wider patterns in standardized housing environments. Hasgül (2016) emphasizes that inflexible housing layouts often lead residents to implement incremental, self-built modifications aligned with cultural and economic routines. The rigid configurations of the TOKİ units in Günyurdu appear to have prompted similar adaptive reprogramming to achieve functional fit.

Recent international and national studies further contextualize these findings within the broader movement toward participatory and user-centered design. Wacnik et al. (2025) note the growing adoption of Participatory Design across multiple fields, emphasizing users' involvement throughout design stages. Abbakyari et al. (2023) demonstrate that user-centered housing design improves cultural and functional compatibility, while Terdoo (2024) shows that meaningful community participation leads to more sustainable outcomes in informal settlement upgrading. In Türkiye, Gülen and İncedayı (2023) likewise argue that participatory models produce more contextually appropriate and socially resilient housing for low-income and rural communities. The extensive user-driven modifications in Günyurdu clearly illustrate the consequences of excluding such approaches: residents retrofit standardized dwellings through labor-intensive, informal efforts to restore cultural continuity, agricultural support spaces, privacy, and climatic appropriateness. The present study therefore reinforces the need for rural housing models that are flexible, participatory, and sensitive to local practices, aligning with broader calls for place-responsive housing policy in Türkiye.

Methodologically, the POE results correspond with previous POE-based research such as Topraklı (2019), who demonstrated that systematic post-occupancy evaluation reveals user dissatisfaction, spatial mismatches, and long-term adaptation patterns. The five-category typology developed here contributes to this literature by offering an analytically robust framework for understanding rural user modifications at the settlement scale.

4. Conclusion and Suggestions

This study is structured to examine the relationship between mass housing projects implemented as outcomes of compulsory resettlement policies in rural contexts and local user needs, and is framed within the POE method. Specifically, a comprehensive assessment based on qualitative and visual analysis of spatial transformation practices has been conducted through user interventions in the housing units built by TOKİ in the case of Günyurdu Village in Bilecik-Türkiye.

Holistic planning approaches in rural housing projects based on, spatial flexibility, sensitivity to local lifestyles, and user-oriented design principles, will support both the continuity of the physical environment and social sustainability. In this regard, the study points to a structural transformation that needs to be reconsidered at the level of policy and practice in rural housing production. It offers a significant reference framework that highlights the necessity of contextual and participatory approaches centered on user experience for future housing projects in order to reach culturally relevant, socially sustainable and responsive to the lived experiences of lived communities.

Since this study was conducted solely on the case of Günyurdu Village, the generalizability of the findings is limited. User interventions were analyzed through visual observation, and limited

qualitative data were included regarding the reasons behind these interventions. In addition, the impact of these modifications on structural safety was excluded from the scope.

Future studies are recommended to include comparative analyses across different rural contexts and to incorporate more in-depth user perspectives. Integrating quantitative datasets alongside qualitative analyses in such comparative approaches will increase the generalizability of the findings. Moreover, focusing on the monitoring and evaluation of pilot projects in which user participation is embedded into the early design stages will provide a valuable contribution to assessing the tangible impacts of user-centered housing policies. In the future, the development of rural planning with sustainable, resilient, and user-oriented solutions aligned with local architectural identity will foster the preservation of rural identity while supporting its development.

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The article complies with national and international research and publication ethics. Ethics committee approval was not required for the study.

Author Contribution and Conflict of Interest Declaration Information

All authors contributed equally to the article. There is no conflict of interest.

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