DESIGN ELEMENTS THAT QUALIFY HOUSING FOR SOCIAL INTEREST: CASE STUDY IN THE MUNICIPALITY OF CURIONÓPOLIS-PA

ELEMENTOS DE PROJETO QUE QUALIFICAM A HABITAÇÃO DE INTERESSE SOCIAL: UM ESTUDO DE CASO NO MUNICÍPIO DE CURIONÓPOLIS-PA

ELEMENTOS DE DISEÑO QUE CALIFICAN LA VIVIENDA DE INTERÉS SOCIAL: UN ESTUDIO DE CASO EN EL MUNICIPIO DE CURIONÓPOLIS-PA.

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ABSTRACT
This article presents a study about the design limitations regarding Social Housing, observing approaches of flexibility, functionality, and adaptability included in the context of project aspects for family residences. These project elements can expand the perspectives for proposals of adapting the residences according to real families' demands and needs. This way, this research aims to carry out an approach about the main project elements to potentialize the quality of social housing from a bibliographical review, which grounded analyses in case studies carried out in Curionópolis-PA. The results comprise a synthesis of the fundamental concepts for the proposition of an alternative that comprehends the performance of these residences directed to the low-income public.

KEYWORDS
Social Housing; Flexibility; Functionality; Adaptability.

RESUMO
Este artigo apresenta um estudo sobre as limitações projetuais no que se refere a Habitação de Interesse Social (HIS), observando as abordagens de flexibilidade, funcionalidade e adaptabilidade, inclusas no contexto dos aspectos projetuais para residências resilientes. Esses elementos projetuais podem ampliar as perspectivas para as propostas de adaptação das residências de acordo com as demandas e necessidades reais das famílias. Dessa maneira, a pesquisa tem como objetivo realizar uma abordagem sobre os principais elementos projetuais para potencializar a qualidade em habitações sociais, a partir de uma revisão bibliográfica, que fundamentou análises em estudos de caso realizado no município de Curionópolis-PA. Os resultados comportam uma síntese de conceitos fundamentais para proposição alternativa que contemplem o desempenho dessas residências direcionadas ao público de baixa renda.

PALAVRAS-CHAVE
Habitação de Interesse Social; Flexibilidade; Funcionalidade; Adaptabilidade.

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RESUMEN

Este artículo presenta un estudio sobre las limitaciones de diseño en lo que respecta a la Vivienda de Interés Social (VIS), observando los enfoques de flexibilidad, funcionalidad y adaptabilidad, incluidos en el contexto de los aspectos de diseño para viviendas resilientes. Estos elementos de diseño pueden ampliar las perspectivas para las propuestas de adaptación de las viviendas de acuerdo con las demandas y necesidades reales de las familias. De esta manera, la investigación tiene como objetivo abordar los principales elementos de diseño para mejorar la calidad de las viviendas sociales, a partir de una revisión bibliográfica que fundamentó los análisis en estudios de caso realizados en el municipio de Curionópolis-PA. Los resultados contienen una síntesis de conceptos fundamentales para la propuesta de alternativas que contemplen el rendimiento de estas viviendas dirigidas a la población de bajos ingresos.

PALABRAS CLAVE

Vivienda de Interés Social; Flexibilidad; Funcionalidad; Adaptabilidad.

1. INTRODUCTION

Housing is an essential right of the citizen, considering that it is indispensable for their human development. This development comprises the feeling of sheltering, security, and well-being, with a conscious approach regarding the design elements of flexibility and architectural functionality.

Neglecting the needs and particularities of the residents in order to obtain a higher percentage of housing units at a more affordable price, intended for groups mostly belonging to the economically underprivileged social class, makes inadequacies and the rigidity of the construction system, without the attribute of flexibility, which is determinant for the low performance of the building.

The Brazilian Association of Technical Standards (ABNT – Associação Brasileira de Normas Técnias) defines the necessary requirements for habitability, so it is important to mention the performance of the building provided for in ABNT NBR 15.575:2013. Durability refers to the ability of the building or its systems to perform their specific functions. Habitability includes functionality as a requirement restricted to its users to perform tasks and activities in their daily lives.

The residential unit, sometimes neglected, becomes synonymous with quantitative, being restricted to the meaning related to housing projects, in the macro sense, restricted to public policies, leaving the design quality in the background. ABNT NBR 9050:2020 is another standard with precarious service in projects aimed at the general mass, which deals with accessibility in buildings, furniture, spaces, and urban equipment.

In this sense, this article presents the main elements that contemplate the quality of a flexible residential project based on analyses of families' effective use of housing. This usability of the executed project allowed us to observe the application of the concepts of accessibility and performance of the building, according to the cataloging of the recurrent modifications that users make to meet their demands. The analysis also considered the essential concepts of habitability as strategies to evaluate performance so that the houses more efficiently contemplate the families' needs.

The state's function in its different spheres of government in producing houses aimed at the low-income population needs to respond to the growing construction demands to minimize the housing deficit. The time of this response still presents challenges, so the approach to Social Interest Housing (HIS) broadens the discussions, going from the strictly political sphere to the academic and social sphere.

2. DESIGN ASPECTS FOR RESILIENT HOMES

In a context of continuous change, the search for resilient homes emerges as an imminent need. The concept of a resilient social housing project goes beyond construction. It encompasses strategic investments in infrastructure and social programs. From this perspective, for Villa and Oliveira (2021), resilient social housing not only ensures a physical shelter, the house, but stands out for offering a safe, flexible, and healthy refuge for its occupants, a home.

2.1 Flexibility

Flexibility is a characteristic of spatial excellence that makes it possible to modify the physical space of the house according to the changes, requirements, and desires of its residents. For Logsdon et al. (2019), offering flexible residential units aims to meet the needs of a population with lower purchasing power, which often does not have access to appropriate and personalized residences, in addition to reducing expenses and the environmental effects of the building.

According to Costa, Logsdon, and Fabrício (2021), flexibility in social housing can be achieved through a critical analysis of existing projects and by proposing more flexible solutions that are compatible with users' actual needs.

For Celluci and Di Sivo (2015), the architectural concept of flexibility can also be characterized as a solution to obsolescence, ensuring the system's durability over time.

Costa, Logsdon, and Fabrício (2021) state that the mass production of popular or social housing can be used as a strategy to reduce the housing deficit in Brazil. In this scenario, the discussion about implementing criteria that improve housing plans puts architectural flexibility on the agenda, characterized by meeting the specific demands of its occupants, considering their different family nuclei and their specificities of conformation for the project's design.

Till and Schneider (2020), in turn, explored concepts of flexibility, highlighting the relevance of creating housing spaces that can grow with needs, that is, with elements or systems that residents can modify. This concern with the feasibility of flexible practices should be possible from the project's design phase to combat extra

expenses and difficulties of medium or high complexity of the constructive intervention. The maintenance and readaptation of the different types of future uses of houses should seek to make them more resilient and capable of supporting a more significant number of possible family configurations at different times throughout the life cycle.

2.2 Functionality

According to Marroquim and Barbirato (2023), the analysis of functionality must consider not only the technical aspects but also the users' needs and expectations, promoting an efficient and welcoming environment. Thus, integrating technological solutions with a user-centered design can result in more functional spaces that are adaptable to the various demands of everyday life.

Vasconcelos (2017) states that the idea of functionality goes beyond the sectorization of environments themselves, as the dynamics of using space or furniture can have more than one function, which comprises multifunctionality. This articulation of assuming different functions during family dynamics or domestic daily life can occur in a sequenced, simultaneous, or seasonal way. This attribute can favor residents' well-being, observing accessibility and environmental impact requirements.

Logsdon et al. (2019) emphasize the importance of functionality and flexibility in HIS design to ensure the satisfaction of current and future user needs. The authors indicate a set of design guidelines that can simplify and optimize the adaptation of the house throughout its life cycle. Figure 1 shows the three guidelines that contribute to the development of functional projects.

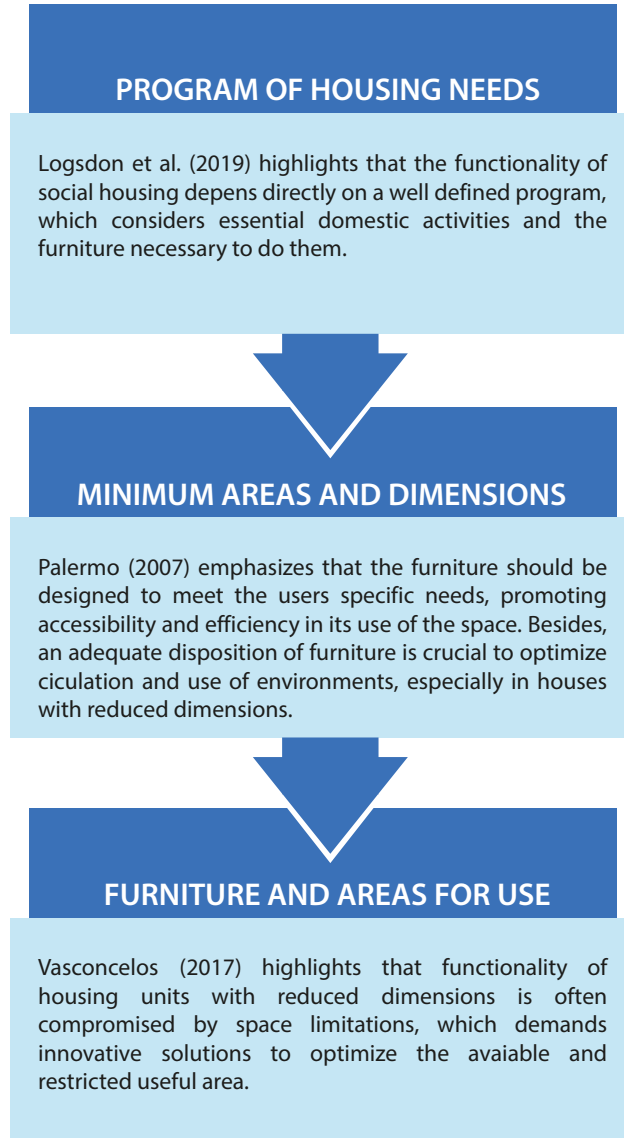

Figure 1 : Guidance of the project.
Source: Authors.

According to Palermo et al. (2007), HIS's dwelling is not merely a refuge but an environment that includes multifunctions, such as a space for rituals and lifestyles that go beyond the simplification of dwelling. Besides, the house must be considered in terms of durability, structure, space, functionality, and symbolism, particularly when intended for the low-income population, a category that earns from 0 to 5 minimum wages.

2.3 Adaptability

Larcher and Santos (2008) discuss the concepts of flexibility and adaptability as essential for the growth of HIS projects. These authors propose a data collection and analysis tool to define design guidelines that enable the

simplified and balanced adaptation of housing throughout its life cycle.

According to Fischer (2017), social housing in Brazil was designed and built in a standardized way, which makes it challenging to adapt it to changes in residents' spatial demands during the family life cycle. Thus, it is suggested that implementing adaptable social home projects can promote and prolong the functional durability of materials, optimizing use and reducing energy consumption throughout their useful life.

Adaptability includes a design element that is available both in terms of flexibility of use and multifunctionality. These concepts comprise factors that contradict the rigidity of the form itself and the projected usability since only the specificity of the family nucleus can attribute the actual use to it according to its effective needs and cultural baggage, not simply focused on theoretical generalities.

Brandão (2011) suggests a set of design guidelines that enable the simplified and balanced adaptation of the house throughout its life cycle. Adaptability can encompass the flexibility of spatial use, materials, and components to favor and facilitate possible changes, expansions, spatial junctions, subtractions, or replacements of the residential unit's environments, elements, or components, without harming structural safety, as shown in Table 1.

Principles	Description
1. Independence	Feature that allows removal and addition without affecting the efficiency of interconnected systems.
2. Upgradability (upgrade capacity)	Systems and components that allow additions, expansions, and upgrades for their own improvement and increase of efficiency.
3. Lifecycle compatibility	Prediction of systems and components with similar lifetimes, especially interconnected ones.
4. Information	Records of designs, specifications, and limitations of the projects in order to assist future cost analysis of adaptations and expansions.
5. Durability	Duration of materials, elements, and components concerning repairs, maintenance, and replacement. It also includes durable spaces.
6. Versatility	Form or arrangement of space that allows alternative uses.
7. Easy access to systems, components, and elements	Recessed technical ceilings, raised floors, shafts, and other solutions that allow easy access to pipes, ducts, wiring, and equipment.
8. Redundancy	Structures designed to receive larger loads, facilities sized for expansion, and additional elements (overprovision).
9. Simplicity	Absence of system complexity, rationalized designs, modular structures and components, and conventional materials.

Table 1 : Principles that facilitate adaptability.
Source: Canada Mortgage Housing Corporation (CMHC) and Canada Clean and Renewable Energy Research Centre (CANMET); Russell and Moffatt.

3. METHODOLOGICAL PROCEDURES

The research used the following methods: literature review, document review, and case study. The theoretical foundation was composed of analyses of current standards, ABNT NBR 9050:2020 and ABNT NBR 15.575:2013, as well as specialized literature, such as Palermo et al. (2007), Villa and Oliveira (2021), Logsdon et al. (2019), Costa, Logsdon and Fabrício (2021), Vasconcelos (2017), Larcher and Santos (2008), Fischer (2017).

The case study is in Curionópolis-PA. In this stage, we sought to evaluate the characteristic design elements of HIS in order to identify inconsistencies and modifications and suggest alternatives to enhance the quality of usability.

To develop the work, the following steps were adopted: (I) identification of the problem; (II) literature review on HIS and concepts of design aspects for resilient residences, such as flexibility, functionality, and adaptability; (III) field activity for data collection, interviews and survey of 10 residences in the housing complex (measurement both in the residence and in the lot), to evaluate the main changes; and (IV) analyses of the case study, from the evaluation of design instabilities in one of the houses to the changes made by the residents.

The field activity allowed the compilation of information and comparative analysis, showing the most recurrent changes and making it possible to understand the reality faced by the population benefiting from HIS. This synthesis of the study made it possible to technically

propose alternatives that enhance the housing quality in this social context.

4. GEOGRAPHICAL AND SOCIAL CONTEXT

Curionópolis-PA originated as a municipality from the unfolding of the municipality of Marabá, located in the southeast of Pará. The constitution of the city was triggered by a cluster of people who were attracted to the region with the expectation of work, caused, above all, by the implementation of the Carajás Iron Project, construction of the Carajás - Ponta Madeira railroad, and by the search for gold in the numerous mines that spread in the region.

According to the Brazilian Institute of Geography and Statistics (IBGE), in its last Census (2022), Curionópolis had a resident population of 19,950 inhabitants, with a demographic density of 8.42 inhabitants/km^2. Figure 2 shows the region, the object of study used to develop this work, and the outline of the Casa Nova Vida housing complex.

According to the IBGE, the heyday of gold in Serra Pelada occurred in the early 80s, and Curionópolis consolidated itself as a support center for mining activity and as a place of residence for the families of miners who, at the time, were prevented from entering the mining area. This village was developed as an area to support the demands of family members, with shops and service sectors such as pensions, bars, and snack bars. However, only on May 10, 1988, it was elevated to municipality status through State Law No. 5,444 (1988), even after mining activities dropped.

4.1 HIS in the Brazilian context

Article 6º of the Brazilian Federal Constitution guarantees the right to housing, which emphasizes the social rights to education, health, food, work, housing, leisure, security, social security, protection of maternity and childhood, and assistance to the destitute. However, despite being provided for by law, with the problem of housing deficit in Brazil, a significant number of people still face situations of housing vulnerability, either living on the streets or in inadequate housing.

In this context, the HIS programs aim to make it viable for the low-income population to access housing. According to CAIXA (2021), the housing unit must be adequate and planned and an instrument that reduces social disparity and inconsistencies in the housing deficit.

According to data from the João Pinheiro Foundation (FJP) on the housing deficit in Brazil (2022) an average of 6.2 million homes were estimated, representing 8.3% of the total occupied housing in the country. In absolute numbers, the indicator that seeks to estimate the absence of housing and/or the presence of housing in unstable conditions pointed to an increase in this impasse of 4.2% compared to 2019.

Analogous to this, it is important to mention the unbridled, intense urbanization process and real estate speculation linked to the context of the low-income population. Fully contemplating housing policies for this public still presents some weaknesses, either due to the lack of broad applicability of essential rights to citizens or due to the dominance that the socially underprivileged class still exercises over the urban scenario.

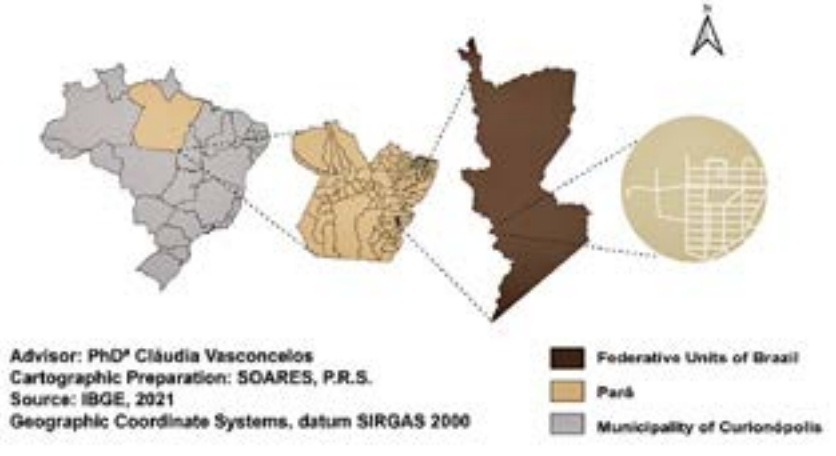

Figure 2 : Location map of the case study: Curionópolis-PA, Brazil.
Source: Authors.

Thus, despite the numerous impasses regarding the integral contemplation of housing guarantees, different social programs were implemented in Brazil, with the purpose of enabling the population to acquire their first property. That is the case of Curionópolis - Pará, through the Casa Nova, Vida Nova Project, whose purpose was to solve the problems of lack of housing, granting residences essentially to the people with disabilities (PwD) population and the low-income public.

4.2 Case studies: good practices in HIS projects

The Quinta Monroy Housing Complex, located in Iquique, Chile, is an example of innovation in HIS, designed by Alejandro Aravena and his team at ELEMENTAL. The project was designed to relocate 100 families who were illegally occupying a plot of land in the center of the city. According to Aravena et al. (2003), the project's main innovation was creating a basic structure that allowed residents to expand their houses according to their needs and as their financial resources increased. This flexible approach was essential to ensure that homes could evolve over time, meeting the changing life cycle of households, as shown in Figure 3.

Figure 3 : Quinta Monroy housing complex, Chile.
Source: Archdaily (2019). Available at:
<https://www.archdaily.com/10775/quinta-monroy-elemental> Access on: Sept. 01. 2024.

Sustainability and the efficient use of space were crucial aspects of the Quinta Monroy project. For Millones Segovia (2017), the use of local materials and efficient construction techniques has not only reduced costs but also minimized environmental impact. In addition, the design allowed for efficient natural ventilation, reducing the need for HVAC systems and, consequently, for operating costs for residents. This sustainable approach created a healthy and economically viable living environment.

Another important aspect of the project was community participation in the design process. As described by Aravena et al. (2003), the inclusion of future residents in design decisions ensured that the houses met the families' actual needs. This active participation fostered a sense of belonging and responsibility among residents, which was crucial to the project's long-term success. Figure 4 shows how collaboration between architects and residents resulted in more appropriate and personalized design solutions.

Figure 4 : Internal view of one of the residences in the housing complex.
Source: Archdaily (2019).Available at:
<https://www.archdaily.com/10775/quinta-monroy-elemental> Access on: Sept. 01. 2024.

For Millones Segovia (2017), innovative solutions, such as using local materials and efficient construction techniques, have been implemented to keep costs low without compromising quality. This approach allowed Quinta Monroy to become a model of HIS, inspiring other initiatives in different parts of the world. It shows that it is possible to produce decent and sustainable housing even with limited resources.

According to Figure 5, the Jardim Edith Housing Complex, designed by MMBB Arquitetos and H+F Arquitetos in São Paulo, is an example of another innovative and effective approach to HIS, overcoming several design limitations. For Franco et al. (2013), integrating the

project with the local community is crucial to promoting social inclusion and improving residents' quality of life.

Figure 5: Jardim Edith housing complex, São Paulo.
Source: Archdaily (2019)]. Available at:
<https://www.archdaily.com.br/br/01-134091/conjunto-habitacional-do-jardim-edite-slash-mmbb-arquitetos-plus-h-plus-f-arquitetos> Access on: Sept. 1. 2024.

As pointed out by Moreira et al. (2013), the emphasis on architectural quality and durability of materials ensured that the dwellings were robust and required little maintenance. This choice was essential to ensure the longevity of the housing units, reducing maintenance costs for both residents and the public administration.

Besides, the organization of the housing units, described by Vada (2019), was planned to maximize the efficiency of the space and provide privacy to the residents, as shown in Figure 6.

Optimizing ventilation and natural lighting not only improved the comfort of the residents but also contributed to the sustainability of the housing complex by reducing the need for artificial lighting and air conditioning systems.

In short, the Jardim Edith Housing Complex demonstrates how successful planning and execution can transform an HIS project into a model of inclusion, durability, and Sustainability.

Figure 6: External view of the housing complex.
Source: Archdaily (2019). Available at:
<https://www.archdaily.com.br/br/01-134091/conjunto-habitacional-do-jardim-edite-slash-mmbb-arquitetos-plus-h-plus-f-arquitetos>. Access on: Sept. 1. 2024.

5. ANALYSIS OF THE CASA NOVA, VIDA NOVA PROJECT – CURIONÓPOLIS/PA

The Casa Nova, Vida Nova project, in Curionópolis-PA, in the country's northern region, was implemented in 2013 by the municipal executive power based on an amendment approved by the legislative power. The residential development was developed with the city's own resources.

The program provided for a minimum of 10% of houses for low-income people with disabilities (PwD), as provided for in Bill 4775/2012. The other houses were intended for the population that proved to earn a minimum income of less than three minimum wages and who did not own any property. This proof occurred through a registration carried out by the Social Assistance Reference Center (CRAS) in Curionópolis-PA.

The project description was based on a current analysis carried out in loco in one of the residential units. Figure 7 shows the project of this isolated single-family unit on the lot, with dimensions of 47.36 m^2, in masonry,

implanted in a lot of 200 m². The floor plan is characterized by the distribution of the following environments: two bedrooms of 8.85 m² (each), bathroom of 2.50 m², circulation of 2.65 m², kitchen of 10.85 m² and living room of 13.66 m², which includes the functions of living and dining. Gables, wooden structures, and ceramic tile characterize the residence's roof.

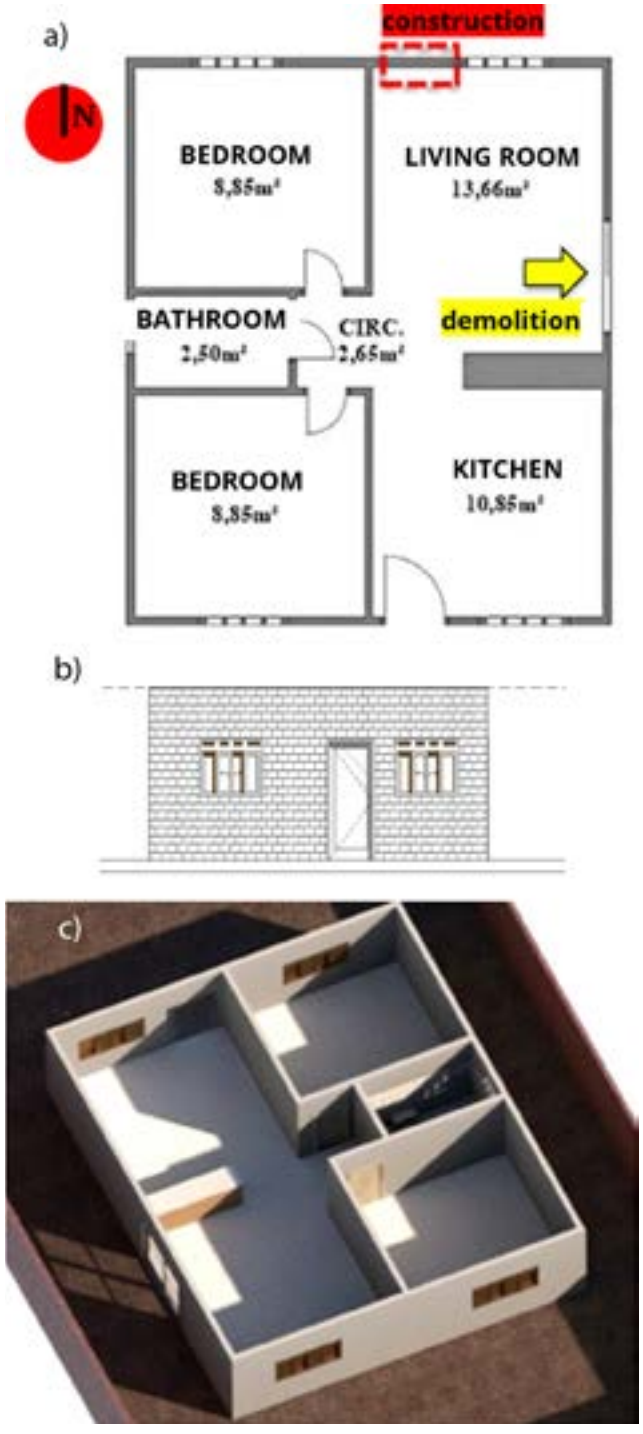

Figure 7: Housing project: (a) Floor plan adapted according to the modifications of new openings made by the resident. In the original plan, the main access was 0.60 m, as delimited with a dashed red marking, being replaced by larger spans, highlighted with a yellow arrow; (b) Elevation; (c) Interior top view.
Source: Authors.

The standard project served 400 families who faced the daily problem of homelessness. In practice, this offer had some characteristics that diverged from the condition of full scope, considering the security and restrictive form of reduced spaces common in HIS projects.

The dimensional constraints of the environments limit use, which is strictly necessary, and sometimes do not include the basic functions and minimum furniture for essential activities and tasks in the family's daily life. In this way, concepts of flexibility and functionality are necessary to understand the effective habitability and well-being of residents and how they could be practically implemented in more efficient projects.

The standard of the houses in this housing complex has narrow openings of only 0.60 m in the bedrooms and bathroom, making it difficult for PwD or people with reduced mobility to walk freely so that it does not meet the fundamental requirements of ABNT NBR 9050:20. It was also observed the recurrent modification of the house main access, as throughout the residents routine, they feel the need to expand the opening and change circulation, to make the social sector more flexible, to improve the habitat's performance.

Replacing the original access allowed the provision of a free span of greater capacity in the new opening. The original span was restrictive and located on the north façade. Modifying the new access from the north façade to the east one increased the free span of this frame, but it caused infrastructure interferences, especially in hydraulic maintenance and sewage.

The renovations proposed by the residents made it possible to adapt the requirements for the sizing of the openings, according to ABNT NBR 9050:2020 and ABNT NBR 15.575:2013. These two norms provide for the building capacity or its systems to adequately perform their functions autonomously to its users. Figure 8 shows that the openings of the bathroom and bedroom doors have spans of 0.60 m, which does not meet accessibility requirements, since ABNT NBR 9050:2020 recommends that the free spans of the doors be at least 0.80 m.

The original main access to the building was modified to facilitate families' daily use. However, some residents did this renovation without proper technical assistance, as shown in Figure 9. The ABNT NBR 15575:2013 standard, which deals with the building's durability, establishes that both the building and its systems must be able to perform their functions in the long term. Furthermore, the standard reinforces the importance of adequately guiding residents through a manual, specifying the

correct conditions of use and maintenance to ensure the structure's longevity, performance of the building, and useful life.

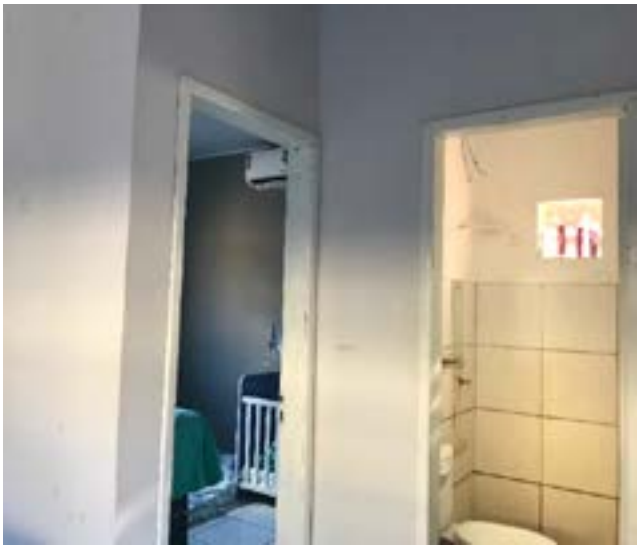

Figure 8: Recurring changes in the use of residences.
Source: Authors.

Figure 9: Recurring changes in the use of residences.
Source: Authors.

Figure 10 shows this new main access, which was arranged by the resident in order to improve circulation in the environment and expand the opening size to more efficiently meet the needs of use. The adjustment guaranteed a more adequate frame dimension, promoting greater comfort and accessibility to residents. Expanding the opening of the free passage allowed to fulfill accessibility requirements, facilitating the transit of people, including those with reduced mobility, according to the ABNT NBR 9050:2020 standard. This norm recommends that doors with free spans be equal to or greater than 0.80 meters—emphasizing that this resolution caused incompatibility with the house's hydraulic and sewage system.

Figure 10: Recurring changes in the use of residences.
Source: Authors.

During the field activity, interventions carried out by residents in 10 residences without technical assistance were identified. These small and medium-sized renovations include expanding environments, adapting door openings, and providing the main access to the house, among other adjustments made to meet the residents' needs.

The adjustments in the design or execution of the work reflect a collective effort to improve the houses' functionality and comfort based on the families' specificities of use. The construction of sidewalks and ramps was the most recurrent modification among the ten houses analyzed, aiming to improve access. Figure 11 shows the most recurrent renovations, modifications, and expansions in the analyzed housing complex, which were carried out by the residents themselves to adapt the spaces to the effective needs of the family nucleus.

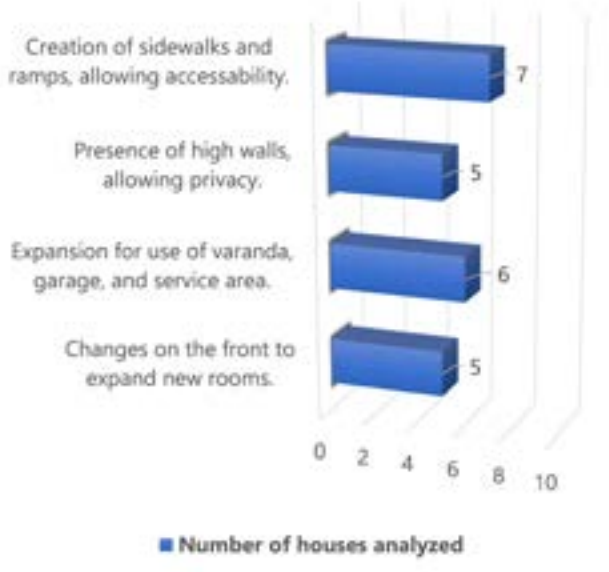

Figure 11: Survey of HIS in the Casa Nova complex, Vila Nova in Curionópolis-PA.
Source: Authors.

The result of the study found that the use of domestic spaces in restrictive areas is directly correlated with the low performance of the environments, considering their respective sectors, functions, activities, and tasks of the house's daily life as a function of the profile of the family nucleus. Thus, it is considered that the perceptions of housing occupation, the identity of the place, and the privacy and territoriality of the environments can accommodate different sociocultural contexts. This appropriation of the housing unit will always be a particular process with specificities specific to the residents.

Architectural strategies for project design must consider the flexible attributes of the building, observing the fulfillment of planned categories that support the predictability of the user's appropriation and the particularities of his family nucleus. In other words, the flexibility parameter must be in accordance with the program of needs, which meets the demands of the effective residents, allowing the construction of a housing unit with a resilient aspect and in accordance with current standards. This concern of those who design to meet the real need must have, from the design phase, the following premises: habitability, functionality, durability, and accessibility, as provided for in the Brazilian standards ABNT NBR 15.575:2013 and ABNT NBR 9050:2020.

6. CONCLUSION

This research sought to analyze scientific productions and apply this knowledge as a basis for the data collection protocol and evaluation of the case study directed to the HIS enterprise. This database enabled a systematization and planning of the field activity to characterize the changes in the project to meet the residents' actual needs.

The case study consisted only of single-family residential units isolated on the lot, with a high rate of standardization and repetition. Characterizing the development with dimensional restriction of the environments compromised the house's performance regarding the use and maintenance of its components by its residents.

The recurrent failure of the enterprises built en masse persists in the generalization of the family nucleus or the standard user. That is, in the recurrent standardization of the housing unit, with a high repetition rate of the composition of the form, which does not contribute to housing performance. This duality of physical space and actual demand generates a consequence regarding need in the short term, or immediately after the property is delivered, due to renovation to adapt it to the tasks and activities of the routine and the family profile.

The results of the research showed that the interventions that residents themselves carried out in the houses, without technical assistance, managed to mitigate the immediate need of the specific family context, but sometimes in an unpretentious attempt to adapt some requirements of the current standards, both performance, ABNT NBR 15.575:2013, and accessibility, ABNT NBR 9050:2020. In terms of performance, the aim was to improve the requirements of habitability, flexibility, and functionality. As for accessibility, the aim was to meet the residents' actual needs, with their specificities and particular profiles, observing the construction of ramps, and intervention in the access to housing, either without obstruction or by widening doors.

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PRSS: conceptualization, data curation, formal analysis, acquisition of financing,investigation, methodology, supervision, visualization, writing – original draft and writing – review & editing.

LELL: conceptualization, data curation, formal analysis, investigation, visualization, writing – original draft and writing – review & editing.

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