

Application of the Fit-for-Purpose Land Administration related to the concepts of the Social Tenure Domain Model in irregular urban areas in Brazilian Municipalities

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SUMMARY

The Multipurpose Land Cadastre (MLC) is an essential instrument for territorial management. However, traditional methods of managing cadastre data often do not cover areas of irregular occupation, hindering urban planning and the implementation of public policy instruments that are essential for promoting territorial justice. In this context, the fit-for-purpose (FFP) approach and the Social Tenure Domain Model (STDM) emerge as viable, flexible, and socially inclusive alternatives. Thus, the main objective of this study is to analyze the efficiency and applicability of FFP in relation to the concepts of STDM in irregular occupations in Brazilian municipalities, using as a case study an irregular occupation in the Municipality of Criciúma - SC. The methodology adopted involved a literature review and the analysis of a practical application. The information from the project carried out by the municipality was obtained from the specific sector of municipal administration, allowing a comparison between the configuration before and after the intervention. As a result, it was found that the initiative covered an area of 29,443.61 m² (29.44 ha), where 94 lots were recorded, of which 77, approximately 81.9%, presented data from their respective occupants. It was also found that 129 buildings were registered, totaling a built-up area of 8,149.72 m². These data highlight the existing informality and reinforce the importance of more accessible methodologies to ensure an updated cadastre consistent with reality. Therefore, it was verified that the combination of STDM, FFP, and the Multipurpose Land Cadastre (MLC) is effective in promoting more inclusive and democratic territorial management, aligned with the principles of the right to the city, contributing to more effective public policies, especially in contexts of social vulnerability.

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1. INTRODUCTION

The Multipurpose Land Cadastre (MLC) has been consolidated as an indispensable instrument for territorial management, given the relevance of its information for actions at the municipal level, covering both urban and rural areas, as well as at the regional scale. This expansion of the applicability of the MLC has been made possible, to a large extent, by technological advances that have enabled greater interoperability between systems. However, it is important to highlight that technology is only one of the necessary elements for its effectiveness. The technical training of the professionals involved and cooperation between different public and private agents are equally fundamental for the successful implementation of the MLC in municipal administrations (Silva *et al.*, 2023).

Furthermore, having a detailed database on urban parcels allows for a clear reflection of the organization of urban space. The quality of life in cities is closely related to the proper use of property and collective well-being. For this to be achieved, it is essential to have regulations that serve the public interest and promote the common good, ensuring, above all, the fundamental rights of every citizen in a sustainable city. Among these rights, access to adequate housing, basic sanitation, urban infrastructure, public services, transportation, employment, and leisure stand out (Silva *et al.*, 2023).

However, most small and medium-sized Brazilian cities, approximately 88%, face challenges arising from disorderly urban growth and irregular land occupation. This reality directly impacts environmental preservation and, consequently, compromises the population's quality of life. In this context, the Multipurpose Land Cadastre (MLC) plays a strategic role in urban planning and decision-making processes and, therefore, must be permanently updated and structured to provide accurate information to professionals responsible for various areas of territorial management (Silva *et al.*, 2023).

In addition, the guarantee of property rights must be ensured by a legal framework that, while protecting this right, also provides flexible alternatives capable of encompassing informal realities, particularly in developing countries. In these regions, millions of people live in properties without legal registration, preventing them from fully exercising their rights to possession and access to property. This situation reveals limitations in traditional territorial management systems, which fail to include such properties in official cadastres, even preliminarily. In this context, the Social Tenure Domain Model (STDM) emerges as an inclusive solution, allowing for the representation of relationships between people and land regardless of the degree of formality, legality, or technical precision. Especially aimed at urban areas with irregular occupations, traditional rural zones, and post-conflict regions, STDM seeks to promote a more equitable land administration, expanding access to tenure security for historically marginalized populations (Lemmen, 2010).

In the same vein, it is evident that territorial management still relies on traditional technical methodologies, mainly in the areas of land registration, property valuation, and land cadastre. Although this approach is well-established, it often proves rigid and resistant to change, hindering the adoption of more participatory and flexible models. Even with technological advances that have broadened the possibilities of managing territory, in many developing countries, access to formal land administration systems is still restricted to a portion of the population. This reveals the existence of structural barriers and a slow adoption of more inclusive and innovative ideas (Njogu & Gitau, 2023).

Therefore, given the challenges currently faced, the Fit-For-Purpose (FFP) approach emerges as an effective alternative for updating multipurpose land cadastres in irregular occupations. This model proposes that the spatial framework underlying large-scale mapping be developed with a focus on addressing the concrete land demands of a country or specific region, prioritizing functionality and practical applicability instead of merely adhering to advanced technical standards that are often inaccessible (Enemark *et al.*, 2014).

It is an inclusive and participatory approach, based on human rights principles. Among its main advantages is the possibility of implementing efficient territorial management systems within shorter timeframes and with reduced and feasible costs. By adopting this methodology, governments and professionals are provided with a concrete opportunity to promote significant progress in land administration, especially in contexts where resources are limited, and the demand for regularization is urgent. The fit-for-purpose proposal, therefore, proves to be an adaptable solution to different realities and scalable in both technical and institutional terms, capable of generating significant medium-term impacts and contributing to the effective improvement of land administration at the global level (Enemark *et al.*, 2014).

It is noteworthy that studies carried out in Itaji-Ekiti indicate that the Social Tenure Domain Model (STDM) has proven to be an effective instrument in documenting land rights of vulnerable rural communities. The application of the model highlighted its potential as a territorial management tool aimed at low-income populations, standing out for its participatory approach in which the involvement of the local community was fundamental to the success of the data collection and recording process. The use of aerial and satellite imagery also proved to be a practical strategy for mapping. The results showed that STDM meets the needs of small landowners in the region, offering a viable alternative for the land inclusion of populations historically excluded from formal systems (Babalola & Hull, 2022).

In view of this, given the reality in which several municipalities face difficulties with irregular occupation, the present study has as its main objective to analyze the efficiency and applicability of the Fit-For-Purpose cadastre in relation to the concepts of the Social Tenure Domain Model in irregular occupations in Brazilian municipalities, using as a case study an irregular occupation in the Municipality of Criciúma - SC.

2. MATERIAL AND METHOD

For the preparation of this article, a literature review was initially carried out focusing on the Multipurpose Land Cadastre (MLC), the Social Tenure Domain Model (STDM), as well as the Fit-For-Purpose (FFP) approach, with the aim of understanding their characteristics, applications, and how this method can be incorporated into the principles of the MLC.

Subsequently, an area characterized by irregular occupation was selected, which did not have individualized parcel cadastre and was subjected to a cadastre process conducted by the municipality using the fit-for-purpose approach.

With the support of the Municipality of Criciúma, an aerial image of the area in question, obtained by the municipality through an unmanned aerial vehicle (UAV), was made available and served as the basis for the development of the cadastre project. In addition, information was provided on the configuration of lots before and after the cadastre update, as well as data from the municipal database regarding the irregular occupation.

Based on this investigation and the information provided, graphic representations were produced with the purpose of deepening the data analysis and assessing the impact of adopting a flexible cadastre method in a socially vulnerable region marked by irregular occupations.

3. RESULTS AND DISCUSSION

Criciúma is a Brazilian municipality located in the southern part of the state of Santa Catarina, with a territorial area of 234.794 km². It is situated approximately 195 km from the state capital, Florianópolis. Criciúma is the main city of the Coal Metropolitan Region and the most populous city in southern Santa Catarina. With a population of 214,493 inhabitants in 2022, Criciúma ranks as the eighth most populous municipality in the state (IBGE, 2022).

The area selected for the present study, outlined in red in Figure 01, partially covers the neighborhoods of São Defende and São Sebastião, located within the municipality of Criciúma, totaling an area of approximately 29,443.61 m². The irregular occupation identified in this region affects both public land, registered under the Municipality of Criciúma, and properties belonging to private owners.



Figure 1. Delimitation of the Study Area

It can be observed from the image in Figure 2, referring to the year 2001, that the occupation of the site has been taking place for over 20 years. Some buildings were already present at that time, and they still remain, with their respective expansions and renovations.



Figure 2. Study Area Delimitation in 2001

For a better understanding of the results obtained, it is necessary to describe the procedure adopted by the municipality in the cadastre update process. The first step consisted of obtaining an aerial image through a UAV. The image was subsequently processed and used as a basis for mapping the existing buildings, as well as for delineating the lots, since many of them presented visible physical divisions.

Next, on-site visits were conducted with the aim of photographing all the buildings and collecting data on their construction characteristics. During this stage, the lot boundaries were verified with the collaboration of the residents, which added greater legitimacy to the process and encouraged community participation. In parallel, teams from the Department of Social Assistance and Housing accompanied the fieldwork, collecting socioeconomic information about the occupants and their family units.

Once the field data collection phase was completed, the information obtained was consolidated and entered into the cadastre system. This phase included the registration of buildings, linking the corresponding photographic images, adjusting lot boundaries, and adding data regarding the occupants of each unit.

As a result of this process, Figures 03 and 04 show a clear discrepancy between the previous and the current configuration of the municipality's territorial cadastre. In the original situation, represented by Figure 03, large lots were identified, many of which contained unregistered informal occupations. In Figure 04, produced after the cadastre update, it is possible to visualize the new delineation of the lots, reflecting more accurately the actual occupation of the territory, as effectively used by the residents.



Figure 3 and 4. Before and After the Update

From the development of the project, it was possible to extract relevant information regarding the results obtained in the cadastre process. One of the main findings refers to the number of parcels incorporated or updated in the municipality's Multipurpose Land Cadastre, totaling 94 lots. This number reveals a significant volume of irregularly occupied areas that, until then, had no formal cadastre registration. Such absence compromised the ability of the public administration to fulfill its legal duties and implement effective public policies based on reliable, accessible, and transparent data for society.

Additionally, it was found that among the 94 identified lots, 77 have complete information regarding their respective occupants, corresponding to approximately 81.9% of the total. Although not all residents participated in the cadastre update process, it is noteworthy that the inclusion of this information remains open to the community. Occupants who have not yet been registered may approach the competent municipal agencies to carry out the proper cadastre registration, as well as those seeking to update their data. This reinforces the importance of continuous and participatory maintenance of the land cadastre, aiming for data accuracy in relation to the urban reality.

Another relevant aspect concerns the number and built-up area of the identified buildings. A total of 129 constructions were registered, amounting to a built area of 8,149.72 m². This information highlights the spatial dimension of the occupation and underscores the urgency for public authorities to have precise information to support urban planning, the formulation of housing policies, and the control of land use and occupation.

4. CONCLUSIONS

The present study demonstrated that the application of the Fit-For-Purpose (FFP) approach combined with the Social Tenure Domain Model (STDM) represents a viable, effective, and socially inclusive alternative for updating the Multipurpose Land Cadastre (MLC) in areas characterized by irregular occupations. Through the case study conducted in the municipality of Criciúma – SC, it was possible to verify that the adoption of flexible methodologies, based on the reality of the territory and community participation, allows not only the technical mapping of parcels but also the incorporation of essential information about the occupants and their buildings, significantly contributing to the strengthening of local land governance.

The inclusion of 94 previously unregistered lots, of which 77 now have complete occupant data, and the registration of 129 buildings with a total built-up area exceeding 8,000 m², highlight the importance of an accessible and continuous cadastre system capable of accurately reflecting the real occupation of urban land. These results reinforce the strategic role of the MLC as a foundation for urban planning, the formulation of public policies, and the promotion of sustainable development, especially in contexts of social vulnerability.

Furthermore, the study confirms that the effectiveness of the MLC does not rely solely on the adoption of advanced technologies but also on institutional engagement, the qualification of the professionals involved, and the adoption of legal guidelines that prioritize the common good, access to adequate housing, and the promotion of social justice.

It can be concluded, therefore, that the integration of the STDM, the fit-for-purpose approach, and the Multipurpose Land Cadastre can significantly contribute to addressing the challenges of urban informality, promoting more inclusive and democratic territorial management aligned with the principles of the right to the city.

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BIOGRAPHICAL NOTES

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