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Mapping of Brazilian social housing studies: state of the art

Mapeamento de pesquisas brasileiras sobre habitação social: estado da arte

Elisa A. D. Muianga
Universidade Estadual de Campinas | Campinas | Brasil | elisa.atalia@gmail.com
Doris C. C. K. Kowaltowski
Universidade Estadual de Campinas | Campinas | Brasil | doris@fec.unicamp.br

Abstract
Brazilian Social Housing (SH) programmes have positively reduced the housing deficit. However, Brazilian SH studies still reveal negative impacts. Exploring the problem source is fundamental to understand and develop actions to mitigate the most influential SH issues. Thus, the study aims to categorise the main topics investigated in SH, identify and evaluate SH shortcoming, analyse the intersections of issues, and understand their overarching. A systematic literature review and a systematic mapping study were applied to analyse and map SH studies. Investments and public housing policies linked to the social interests of society are necessary to upgrading SH.

Keywords: Social Housing. MCMV. Housing Programmes. Urbanisation. Brazil.

Resumo
O programa brasileiro de Habitação de Interesse Social (HIS) reduziu positivamente o déficit habitacional. Contudo, estudos sobre HIS brasileiros ainda revelam impactos negativos. Investigar a causa do problema é fundamental para entender e desenvolver ações para mitigar as questões de HISs. Assim, o estudo tem como objetivo categorizar os principais tópicos estudados em HISs, identificar e avaliar erros, analisar intersecções e compreender a sua abrangência. Uma revisão sistemática e mapeamento sistemático da literatura foram aplicados para analisar e mapear os estudos de HIS. Investimentos e políticas públicas de habitação vinculadas aos interesses sociais da sociedade são necessários para melhorar HISs.

Palavras-chave: Habitação de interesse social. MCMV. Programa habitacional. Urbanização, Brasil.

INTRODUCTION

The topic of Social Housing (SH) programmes has been widely studied over the years in different housing policies around the world. However, barriers to achieve real

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benefits of SH Programmes, mostly in emerging economies, exist. Scientific research evidences that SH often fail to deliver the intended socio-economic benefits, and may trigger negative impacts for the society [1][2][3].

Brazil's SH policies began with expressive efforts in 1964 through the National Housing Bank policy which lasted until 1985 [4][5]. Then, the Ministry of Cities was created in 2003 (extinct 2019), envisaged the coordination, management and formulation of the National Urban Development Policy. In 2009, the Brazilian government launched a SH programme, called 'My house My life' (MCMV, '*Minha Casa Minha Vida*' in Portuguese) [6][7]. MCMV programme aimed to reduce the housing deficit, improve the living conditions of vulnerable people, and increase economic growth [8][9][10][11][12][13]. Although a new programme was announced in 2019 by the present federal government, named *Casa Verde e Amarela* (CVeA), so far, MCMV is still in operation [15].

Beneficiaries of MCMV are classified according to the income[1] groups or *Faixas*[2] that include: *Faixa 1* (income of up to USD 383,1); *Faixa* 1.5 (income up to USD 553,4), considered lower-income families; and *Faixa* 2 (gross income up to USD 851,4) as well as *Faixa* 3 (gross income of up to USD 1.489,8), considered middle-income families. Three architectural typologies of MCMV use repetitive models across the national territory, with the following types: (i) single-family homes, (ii) multifamily vertical buildings of four to five floors and (iii) multifamily vertical buildings with elevators [14].

Even with the effectiveness in reducing housing deficit, studies on SH in Brazil also emphasise negative impacts, mostly in urban and neighbourhood scale rather than building and unit [16][13]. Most of MCMV projects are characterised by socio-spatial segregation conditions [11][17][18][19][20][23][24]. Location therefore plays a significant role in the wellbeing of families, and there is a need for investments in such existing SH to reduce negative impacts [19][23][25][26].

A substantial volume of studies on SH in Brazil exists. However, the literature needs to be analysed to evaluate the roots of SH problems and consequences. Thus, two questions guided the development of our research: What are the main shortcomings of SH in Brazil? What are the main solutions presented by studies conducted?

To answer the questions, the research aims to categorise issues related to SH studies, also, identify and assess SH shortcomings, and analyse the intersections of SH issues to the state of the art. The research contributes with a visual panorama of SH issues that may be applied to develop actions for SH upgrading. As an additional contribution, an organised knowledge base on SH research in Brazil is presented.

[1] Federal Savings Bank Brazilian currency *Faixa* 1 (income of up to R$ 1,800.00); *Faixa* 1.5 (income up to R $ 2,600.00), considered lower-income families, and *Faixa* 2 (gross income up to R $ 4,000.00); *Faixa* 3 (gross income of up to R $ 7,000.00).

[2] Values converted on 03-04-2022. 1Real/BRL=0.188USD: https://www.bcb.gov.br/conversao.

METHOD

The study combined two Systematic Review (SR) methodologies: (1) Systematic Literature Review (SLR) to identify gaps in current research [27][28][29][30], and (2) a Systematic Mapping Study (SMS), or Systematic Literature Mapping (SLM) to contextualise a particular topic [31][32]. Snowballing techniques complement the study sample, also qualitative and quantitative analyses were applied to generate visual and descriptive results [33][34].

Research data were retrieved through the 'StArt' software. 'StArt' stands for 'State of the Art through SR was developed by LaPES (Laboratory of Research on Software Engineering), from Federal University of São Carlos (UFSCar), in Brazil. The 'StArt' software allows users to search for evidence in the scientific literature and automate coding processes through qualitative and quantitative methods [35][33][36].

RESEARCH PROCEDURE

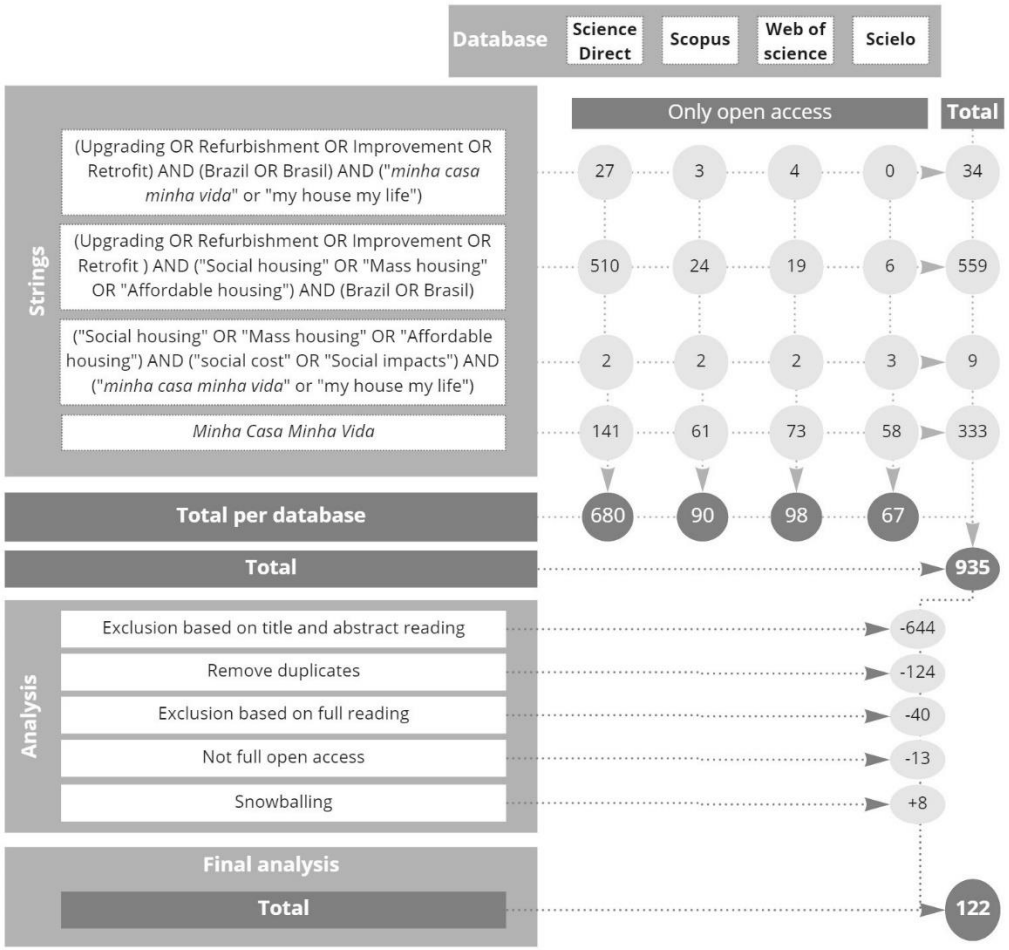
The SR process uses three steps: (1) planning of the review, (2) implementation of the review, and (3) analysis, synthesis, presentation and dissemination of research results [37][27].

- Planning of the review*:* the terms and search strings are presented in Figure 1. Boolean operators were included to define relations between search terms and construct appropriate strings. Strings were applied to selected Databases: Scopus, ScienceDirect, Web of Science, Scielo. Our analysis strategy used inclusion and exclusion criteria by title and abstract reading. All studies on Brazilian SH were selected, in both Portuguese or English. However, studies published in non-open access journals were excluded;
- Implementation of the review: after selection, accepted studies were read and data extracted. The SMS method was applied. Studies were classified by main topics (Figure 2), issues and organised by categories. Snowballing processes were applied to add studies to the sample. SLR method was applied for quality and data synthesis;
- Analysis, synthesis, presentation and dissemination: existing studies developed in Brazil related were identified and contextualised. Review outcomes were synthesised and documented for the dissemination.

QUANTITATIVE ANALYSIS

A panorama of studies selection is presented in Figure 1. The first search identified 935 studies. After the application of the SLR protocol, our study sample included 122 studies.

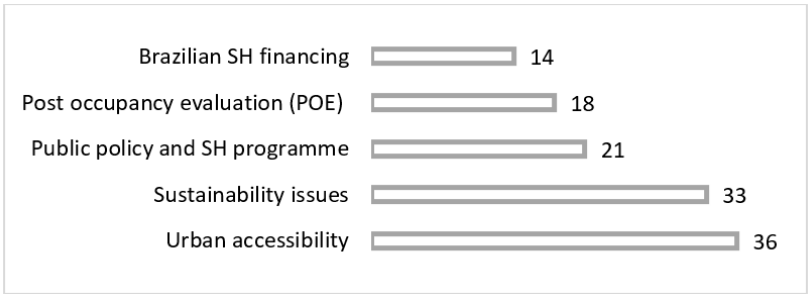
Figure 1: Identification and selection of studies on SH in Brazil according to specific strings



Source: The Authors

The research evaluated clusters of studies on SH. The analysis identified five topics outlined in SH studies: (1) urban accessibility, (2) sustainability, (3) public policies and SH programmes, (4) post-occupancy evaluation (POE), and (5) Brazilian SH financing. Figure 2 presents the topic of studies, and Figure 3 presents references considered in each topic.

Figure 2: Cluster of topics of SH studies



Source: The Authors

Figure 3: Studies considered in each topic

Topics	References
Urban accessibility	[12; 18; 19; 39; 40; 41; 42; 43; 44; 45; 46; 47; 48; 49; 50; 51; 52; 53; 55; 56; 57; 58; 59; 61; 60; 62; 63; 64; 65; 66; 67; 68; 69; 70; 111; 119]
Sustainability	[7; 13; 115; 116; 117; 118; 120; 121; 122; 123; 124; 125; 126; 127; 128; 129; 130; 131; 132; 133; 134; 135; 136; 137; 138; 139; 140; 141; 142;143; 144; 145]
Public policies and SH	[4; 6; 8; 23; 24; 71; 72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 84; 83; 85; 86]
Post-occupancy evaluation	[21; 22; 54; 99; 100; 101; 102; 103; 104; 105; 106; 107; 108; 109; 110; 112; 113; 114]
Brazilian SH financing	[9; 10; 11; 87; 88; 89; 90; 91; 92; 94; 95; 96; 97; 98]

Source: The Authors

Urban accessibility is a topic widely investigated in geography and architectural studies. In sociology, topics such as public policies that support the production of SH, as well as the organisational structure of the agents involved are frequently addressed in investigations. In economics, the process and performance of the financial market in SH productions, and the relationship between production quality, location of developments and the real estate market are investigated. In the construction area, including both architecture and civil engineering, POEs and sustainability issues exist. User satisfaction, transformations and possibilities of improvements of dwellings are investigated topics on POEs studies.

DESCRIPTION OF SH ISSUES – QUALITATIVE ANALYSIS

From each cluster of topics presented in Figure 2 and Figure 3, issues were identified and analysed. For each topic, the main impacts of SH are presented.

URBAN ACCESSIBILITY

Although urban environments have social implications, many Brazilian urban designs are fragmented, characterised by socio-spatial segregation [39][12][40][41]. The context of urban segregation also overarching most of *Faixa* 1 and *Faixa* 1,5 SHs projects, located at mono-functional neighbourhoods [42][43][44]. Even the SH systems have been designed to provide well inserted housings, those programmes fail in this context [45][46][47]. Real estate speculation also exerts pressure on urban morphologies favouring the finance of new homes for middle-class families, and expelling programmes such as MCMV to the periphery of urban areas [48][41].

Special Social Interest Zones, (*Zonas Especiais de Interesse Social* – ZEIS, in Portuguese), are demarcated areas within a city's territory, for housing settlements for low-income populations. However, ZEIS are not effective in relation to their social function for which they were intended [49][44][50]. Land values and, therefore, the final value of a housing unit are decisive in the marginalisation of the beneficiaries of MCMV [51][52]. As a consequence, residents have to move and spend a long time travelling to access jobs, education spaces, and daily activities [49].

Living in SH, very low income families also find themselves having to pay for new expenses such as utility bills and the instalments of their new home [26]. The financial state of such families does not enable them to assume new property spends, and return to the neighbourhood where they come from occurs as a way to minimise costs [53].

The impact of territorial segregation on intra-urban dynamics generates neighbourhoods that demand public infrastructure, public and private services and equipment, access to sewage systems, public transport, green areas, public spaces of leisure and culture [42][54][55][56][57], and trigger social costs [26]. Also the necessity of private cars, daily dislocations may cause health impacts due air pollution and stress, and also cause productivity losses [58][43][59]. In some cases, to overcome such shortcomings, in critical situations of urban fragmentation, local communities attempt to develop their own service cores that operate independently from the overall logic of an urban system [60][42].

SH programmes should be restructured to promote adequate locations with appropriate infrastructure [39] [44] [48][51]. In this sense, it is important to reduce real estate "businesses" which result in lawful procedures of SH production [61][62]. Thus, it is necessary to increase the institutional and regulatory capacity of SH programmes to overcome location impacts [62][63][64] and reduce the pressure for precarious occupations in environmentally fragile areas [52][50][41]. Municipal actions should provide infrastructure and equipment, and public transport lines based on social demands for work, health, education, leisure and culture services [65][66][67][59].

Understanding SH beneficiary and considerate they need and participation in the process is necessary to better define the integration of SH neighbourhoods and urban spaces [68][19][18]. The involvement of the communities, through participatory planning, is recommended to develop legitimate urban and SH planning with local interests in mind [45][46][69][55][70][5].

PUBLIC POLICY AND SH PROGRAMME

Socio-spatial segregation still represents an obstacle for SHs policy [71][4][72]. SHs still facilitate the outsourcing of programmes to private developers [8][73][74][23]. It is also evident that MCMV is guided by short-term business and economic logic, and is not part of an effective structural policy of planning and urban reform of long-term process, which is essential to improve the quality of life in cities [6][75].

National Rural Housing Program (*Programa Nacional de Habitação Rural* in Portuguese - PNHR), rural extension of the MCMV, provides housing access settlement for people in rural areas to maintain their activities [76][77]. Is designed to minimise the national housing deficit, allowing people to build a new house or even renovate the house they already own [78]. Nonetheless, PNHR fails in providing infrastructure, water, energy,

sewage, drainage, quality public transport networks, education, health and supply facilities [79][78][77].

Even though MCMV has improved life conditions for vulnerable families, this programme still intensifies stigma and social segregation [24]. Despite that dwellers demonstrate satisfaction for owning a property, which may be considered a positive social result [80], they still restricted to experience the city and its diversity [81][24]. Aspects related to health, education, work, leisure, culture, sociability, and other amenities are priority for long-term satisfaction [82].

Emphasising the value of the home besides the cost of production, focusing on the impacts on the lives of individuals should contribute with improvements of social programs [82]. Furthermore, the dissemination of shortcoming of SH may act to reduce and avoid failure repetitions and establish a continuous improvement process [83]. The local administrative capacities associated with the preference of dwellers and decentralised public policies autonomy, from historical evaluation of MCMV should contribute with improvements [84].

Refurbishment and upgrading actions with participatory processes may also have positive effects on SH programmes [85][86][81]. Upgrading of SH may touch on subjective details as well to advance long-term, sustainability-oriented solutions.

BRAZILIAN SH FINANCE

Although MCMV have made significant progress regarding housing deficit [10], housing programmes tend to transfer the leading role of its implementation to the real estate market (builders and developers). Real estate market has high autonomy in the project development and execution, with less consideration of social outcomes [87][88][89]. SH programmes should be aligned with the interests of social policies [89]. However, SH is mobilised as an instrument for including the low-income social strata in the consumer market [10][90][91][92].

Even with rules and restrictions, SH is developed in a contiguous model. For instance, an official limitation of housing units (UH) per project is stipulated by the regulations, considering 500 for single family units, and 250 for multi-family units, or apartments [93]. However, this does not prevent construction companies from implementing “contiguous developments” that spatially configure a much larger number of units [21][92]. The social costs of living in such large developments are still neglected [14][94].

The low effective income of beneficiaries, insufficient to cover the housing expenditures, play some significant role in the differential in delinquency rates between cities and peripheral locations [95][11]. The combination of low incomes with peripheral locations may produce an unsolvable equation, since jobs access and poor urban infrastructure tend to impose high costs on poor households, triggering higher delinquency rates and worse social outcomes [11].

There is a need to develop effective and targeted actions to minimise the problem of default in the MCMV and reduce real estate market business [10]. A public guarantee fund may eliminate the risk of loan defaults during the construction period, while thereafter units are sold to the national housing bank that assumes subsequent risks [96][97]. The situation of the workplace is a factor that leads families with lower income to be in constant change of residence, as they are more susceptible to job changes [9]. Thus, job and income should also be addressed, such as actions to map the profession of SH beneficiaries in surroundings, and provide services and employment systems [97][98].

POST OCCUPANCY EVALUATION (POE)

Despite all the adverse impacts of SH experienced by the residents regarding their poor quality neighbourhood, and housing unit, they keep adapting and seeking for alternatives to transform and improve their physical environment [99]. The transformations occur mainly with the purpose to amplify space dimensions, modify layout, provide new rooms for diverse activities, and to meet particular dwellers needs [100][101][102]. For instance, the creation of new rooms due to changes in the family profile, the separation between living room and kitchen, box and cabinet for the bathroom, and the adaptation of some rooms characterise different layout possibilities [103][104][105].

Also demands for outdoor transformations occur [100], such as adaptations of pathways, construction of wall and sidewalk, changing the floor and wall covering, and green areas [104][21]. On the other hand, transformations may cause various impacts in the unit performance [146]. The construction of roofs to accommodate balconies and new rooms, use of low thermal and performance materials, obstruction of openings may increase discomfort, reduce cross ventilation and natural light, and affect housing infrastructure [104][99].

Impacts on cost of living exist. Live-in condominium models represent a new problem for residents [22]. Furthermore, risk on security limits comfortably with the external environment. There is a less use of leisure spaces due to the depredation of areas and equipment, and lack of visibility for children control [106].

Actions properly designed and developed by specialists under end-users participation, may promote SH projects suitable to the residents needs in the long term [103][105][107][99][108][109][110]. In this context, public policies should ensure the interaction between society and SH stakeholders, enabling participatory discussions and actions for improvements [111][112].

The importance of space flexibility and individualization should be incorporated in SH programmes [21]. Functionality, spaces for appliances, solar control in openings, visual and thermal comfort, natural lighting, ventilation natural, private leisure spaces, balcony, backyard, spaces for pets and plants should be considered [113]. Also improve infrastructure, improve landscaping and provide shady trees around the buildings,

consider social networks of residents, communal spaces, leisure facilities, may improve the habitability of SH and represent major value for dwellers [101][102]. In general, detailed investigation of the existing design configuration of SH, may add value in the eyes of end-users and substitute these with improvements considered important [114][107].

SUSTAINABILITY ISSUES

Sustainability certification tools have been used to assess buildings and urban areas in order to promote more sustainable development goals and practices in civil construction and urban planning [115][116]. In Brazil, Blue House Label (*Selo Casa Azul* in Portuguese) is known as a certification of sustainability, focusing on the social sector [115][116]. User comfort level of a housing unit should meet compliance with NBR 15.575 standard, and NBR 15.220 considering minimum conditions for summer and winter in all Brazilian Bioclimatic Zones [117][118][119][120][121][122].

Brazilian housing is made by ceramic or block walls, covered by mortar, with a timber structure and ceramic roofs [13][123]. This pattern of construction may be not suitable in some locales with a high climatic temperature during all year, which imply air conditioning installations, or in cold areas that imply heat systems in winter, consequently, an increase in the electricity consumption [124].

The current challenge of promoting sustainability on SH requires an evaluation of the built environment [125][126]. Alternatives such as heating during winter, season adaptation for thermal comfort, water efficiency, rainwater, and photovoltaic electricity generation are necessary [127][128][117][118][129][124][130]. A well-ventilated building, adequate windows that fulfil daylighting, colour absorption of walls and in some cases for roofs, may provide thermal comfort for its users, reducing the energy consumption for conditioning [131][130][7][127].

Currently, the public policies for SH in Brazil have included the use of domestic Solar Water Heating (DSWH) [132][133][134][135], which represents a benefit of annual energy savings [136][130][7][137][138][139][140]. Thus, metamodels to analyse thermal performance of SH may promote thermal comfort assessment during the early stages of the design process [141][142][143][144][145].

FINAL REMARKS

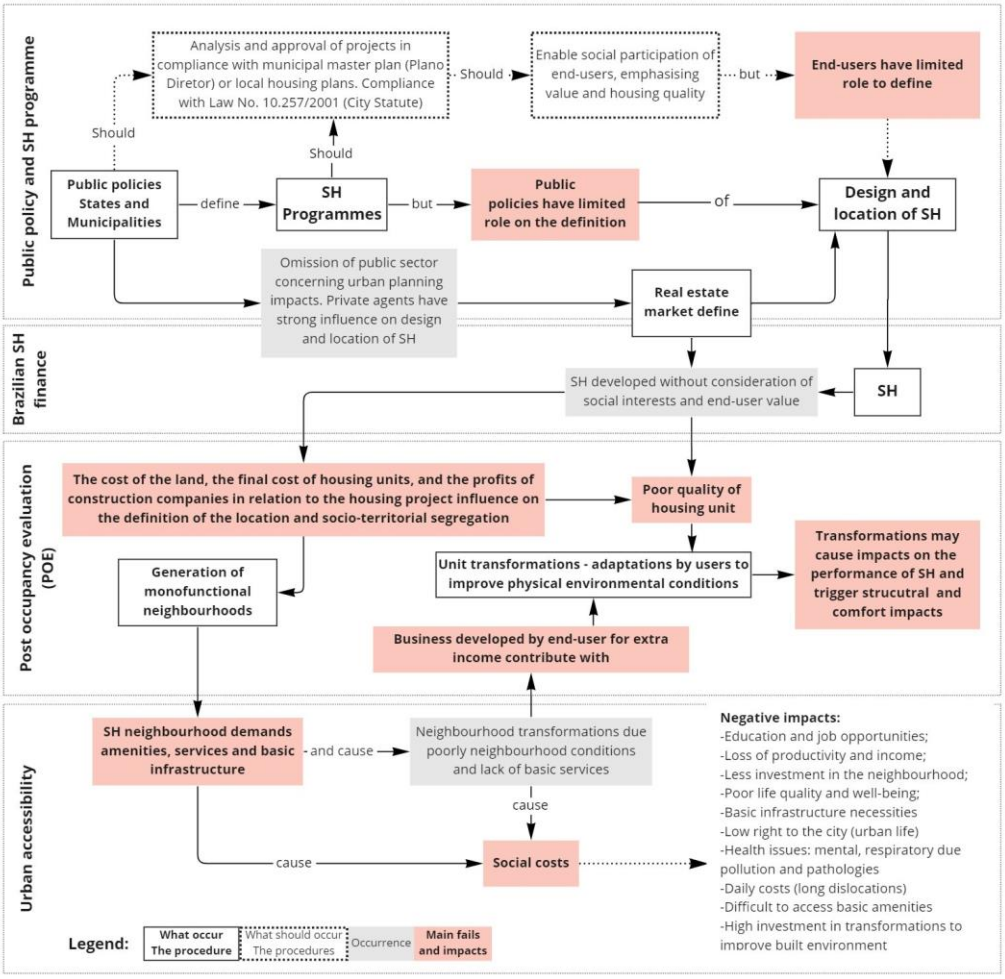
Urban accessibility, public policies and the production of SH programmes stimulate more studies in Brazilian SH topics. Also, there is a worldwide responsibility to improve the environmental issue, focused on energy efficiency. Therefore, various strategies and possibilities for implementing sustainable projects also foster the development of studies, covering various fields of study.

In the POE studies, although issues involving indoor and outdoor SH are raised, most of the studies analyse external issues and the location of these housing units. Few

studies detail the impacts of the physical environment of the units, or present opportunities for improvements aimed at the quality of life of the beneficiaries. In addition, financing, and high delinquency rates also drive research in economics, although with less impact.

Figure 4 presents a panorama of SH programmes and its impacts through topics analysis. It is presented in synthesis how the actions and decisions of public policies and financing made during the initial phase of the project may trigger negative impacts throughout the production and use (post-occupancy) of housing, also urban accessibility issues.

Figure 4: Main impacts of SH programmes



Source: The Authors

From Figure 4 analysis it is evident that public policies and SH programmes definition influence all SH development, and trigger negative impacts. The lack of public policy action and users' participation on SH definition and production, and less consideration of urban necessities reinforce the errors' repetition and result in less value for end-users.

In the absence of changes in the production of SH, in which public authorities and users could lead the main decisions on design and location, many of the recurrent problems

will be repetitive in future projects. It is necessary an overarching involvement and large investments in infrastructure and potentials to create public and private spaces, and essential services for segregated sites, to reduce daily costs of access to basic facilities. Thus, efforts to socially benefit the beneficiaries of these housing, in terms of satisfaction, quality of life, and sustainability are necessary and constitute a goal of a built environment. It is necessary to develop public housing policies linked to the social interests of society.

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