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EARLY VIEW

POST-OCCUPANCY EVALUATION TO ASSESS VALUE GENERATION IN SOCIAL HOUSING PROJECTS: APPLICATION IN THE BRAZILIAN CONTEXT

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ABSTRACT

Social housing projects have major social and economic importance in many developing countries, including Brazil. For this reason, it is important to assess the benefits of housing projects in terms of achieving housing programme goals, including the benefits for users. However, most post-occupancy evaluations (POE) have focussed on product attributes, without consideration of value generation from the perspective of the users. Indeed, previous studies in Brazil have highlighted numerous issues with social housing projects failing to meet the population's needs. The aim of this research is to develop a POE method for assessing the effectiveness of housing programmes in generating value, examining both the quality of the built environment and the achievement of project goals. This method is based on the means–end value chain conceptual model, which has been widely applied in the field of marketing. Design science research was the methodological approach adopted in this investigation, which was divided into five phases: (a) understanding the context of social housing projects in Brazil; (b) development of data collection instruments; (c) evaluation of three social housing projects; (d) comparison of the results and discussion; and (e) assessment of the proposed method and reflection. The main contribution of this research is the development of a POE method that provides a comprehensive assessment that is not limited to product attributes. The method also introduces several innovations compared to traditional POE processes: (a) adaptation of the means–end value chain to the context of social housing; (b) involvement of different stakeholders in the evaluation process (e.g. social workers and technical staff from funding bodies), in addition to end users; (c) flexibility for assessing projects from different housing programmes; and (d) the definition of a set of constructs that are relevant for evaluating social housing projects in the Brazilian context.

KEY WORDS

Social housing, perceived value, value hierarchy, post-occupancy evaluation

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INTRODUCTION

Social housing projects (SHPs) play a significant social and economic role in developing countries. In Brazil, housing provision has been inconsistent due to a variety of housing programmes with differing rules and implementation strategies (Ministério das Cidades, 2009; Costa *et al.*, 2018). This inconsistency is partly the result of the discontinuation of certain programmes, often due to shifts in housing policy. In addition, Brazil faces a significant housing shortage, with the deficit estimated at 6.215 million dwellings in 2022 (Fundação João Pinheiro, 2024), and the anticipated demand for housing by 2027 standing at approximately 12 million dwellings (ABRAIN, 2018).

It is essential to evaluate social housing provision both in terms of the benefits it provides to the population (Villarosa, 2011) and building performance from the perspective of the users (Al Mughairi *et al.*, 2023). Post-occupancy evaluations (POE) serve this purpose and are often carried out by academic institutions. Way and Bordass (2005) suggest that feedback from users can be used to measure outcomes against project goals and to understand how to enhance user satisfaction in future projects. POE studies in Brazil have identified numerous issues with SHPs failing to meet the needs of the population, such as (i) inadequate space (Ornstein *et al.*, 2011; Villa *et al.*, 2022); (ii) lack of housing diversity (Formoso *et al.*, 2011; Garrafa *et al.*, 2021); (iii) poor aesthetics (Reis and Lay, 2009; Kowaltowski *et al.*, 2019); (iv) lack of privacy (Reis and Lay, 2004); (v) inadequate building performance (Lima *et al.*, 2008); (vi) ineffective facilities management (Lima *et al.*, 2008); (vii) building defects (Villa *et al.*, 2022); and (viii) difficulties in urban mobility and social segregation due to the location of housing projects in urban outskirts (Kowaltowski *et al.*, 2019; Villa *et al.*, 2022).

Several issues have been highlighted in the literature regarding the application of POEs, including (i) insufficient stakeholder involvement (Way and Bordass, 2005); (ii) inadequate resources in terms of cost, time, and skills required to carry out POEs (Sanni-Anibire *et al.*, 2016; Vischer, 2002); (iii) challenges in understanding impacts from the users' perspective (Sanni-Anibire *et al.*, 2016; Vischer, 2002); and (iv) a lack of clarity about who is in charge of addressing issues identified in POEs (Roberts *et al.*, 2019). Additionally, most POEs have been limited to evaluating product attributes rather than the expected benefits or perceived value from the perspective of users (Kowaltowski and Granja, 2011). Consequently, many studies fail to provide a comprehensive assessment of SHPs in terms of achieving project goals, as they do not adequately consider users' desired values and needs (Kowaltowski and Granja, 2011).

The objectives of SHPs are often framed in terms of enhancing the quality of living for communities, considering factors such as health, education, safety, employment, and income generation (Tillmann and Miron, 2020). Therefore, POE methods must assess SHPs not only by examining product attributes but also by

evaluating value generation. Value generation includes delivering a built environment that is fit for a purpose, that is, one that meets the intended goals and considers the needs of the various stakeholders involved, within the constraints of available resources, such as time and money (Tillmann and Miron, 2020).

In this study, the means–end value chain conceptual model proposed by Woodruff and Gardial (1996) was used to represent a hierarchy of constructs, connecting product attributes, consequences of use, and project objectives. This model was chosen because it describes how value is generated, linking tangible product and service attributes to abstract values. Furthermore, it has been successfully applied in evaluating consumer goods (Gutman, 1982; Zeithaml, 1988), food quality (Vranesevic *et al.*, 2004), tourism management (Gallarza and Gil Saura, 2006; Naoi *et al.*, 2006), and business management (van Rekom *et al.*, 2006).

The aim of this research study is to develop a POE method that assesses the effectiveness of housing projects in terms of value generation, considering both the quality of the built environment and the achievement of project goals. Additionally, the proposed method accounts for the need to adapt evaluation constructs to the frequent changes in Brazilian social housing policies and highlights the importance of involving housing providers, especially funding organisations, in the evaluation process. This investigation was conducted in collaboration with the Federal Savings Bank⁴, and POEs were performed in three SHPs funded by different Brazilian social housing provision programmes.

This paper begins with a discussion of the hierarchy of user-perceived value, followed by an explanation of the research method and the presentation of the proposed model. The results of the evaluation of three SHPs are then discussed. The conclusion summarises the main contributions and limitations of the proposed POE method.

User-Perceived Value Hierarchy

The concept of value has been explored across different disciplines, including marketing (Cook and Wu, 2001), psychology (Schmenner and Swink, 1998), operations management, and economics (Koskela, 2000). Existing theories provide a framework for understanding how value is generated, focusing on stakeholders' perception of value (Formoso and Miron, 2017; Tillmann, 2012).

The concept of perceived value is a key business issue that has emerged in the field of marketing (Sanchez-Fernandez and Iniesta-Bonillo, 2007). Extensive research has been undertaken to examine the relationship between product attributes and the value perceived by customers. From the users' perspective,

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products and services are means to an end. Therefore, the delivery of value should be based on a precise understanding of users' desires, from which project goals can be defined (Woodruff and Gardial, 1996).

Perceived value is inherently complex and multi-dimensional (Sánchez-Fernández and Iniesta-Bonillo, 2007; Huang *et al.*, 2019; Caber *et al.*, 2020), resulting from the interaction between consumers and products (Sánchez-Fernández and Iniesta-Bonillo, 2007). It is also relative, influenced by comparative, personal, and situational factors. Additionally, perceived value is preferential, perceptual, and has cognitive-affective dimensions (Sánchez-Fernández and Iniesta-Bonillo, 2007). Consequently, the same product may be perceived differently by different customers (Holbrook, 2006; Mustak, 2019), depending on their personal needs, preferences, and willingness to make sacrifices (Ravald and Grönroos, 1996; Zhang *et al.*, 2020).

The means–end value chain model has been widely used as a theoretical framework for developing customer value hierarchical maps (Woodruff *et al.*, 1993; Woodruff and Gardial, 1996). These maps represent the relationships between product attributes and customer values. This conceptual model is based on the premise that customers acquire and use products or services to accomplish favourable ends (Khalifa, 2004) and that customer values can be grouped into sets or classes (Gutman, 1982). The 'means' are related to product attributes, while the 'ends' represent the customers' ultimate goals or purposes (Gutman, 1982).

Customer value hierarchical maps include constructs ranging from tangible, objective aspects (e.g. desired product attributes) to more subtle, intangible goals and purposes. Woodruff and Gardial (1996), building on Gutman's (1982) model, developed a hierarchical model that links the delivery of products and services to their impacts on users, including values, goals, and objectives.

Woodruff *et al.*'s (1993) model consists of three levels (see Figure 1): (i) attributes: the most concrete level, referring to the physical characteristics, resources, or components of a product; (ii) consequences of use: the positive or negative experiences that result from using the product, often described in terms of user experiences; and (iii) objectives (or goals): the most abstract and intangible level, representing the values sought by a group of customers. When customers describe their experiences with a product, they often mention attributes, but these attributes must be linked to the use situations, the benefits sought, and the purposes behind using the product (Woodruff *et al.*, 1993).

The levels in Woodruff *et al.*'s (1993) model can be associated with customer satisfaction (see Figure 1, right side), which is based on evaluative judgments of product use (Woodruff, 1997; Woodruff and Gardial, 1996). Woodruff (1997) explains that a means–end value hierarchy can clarify both the desired value (prior to acquisition) and the received value (after use). Satisfaction, as the behavioural response to comparing expected and perceived value (Gallarza

and Gil Saura, 2006), reflects how much value was derived from using a product in specific situations (Woodruff *et al.*, 1993). Consequently, measuring satisfaction provides insights into customers' perceived value, including that of users or residents (Gallarza and Gil Saura, 2006; Keshavarz and Jamshidi, 2018; Caber *et al.*, 2020).



Figure 1- Customer value hierarchy model (Woodruff, 1997)

Users can experience varying levels of satisfaction at each stage of the value hierarchy (attributes, consequences, and objectives), which helps to capture the complexity of perceived value after product use (Woodruff *et al.*, 1993). Thus, POEs should extend beyond product attributes the measurement of users' satisfaction by considering the more abstract, upper levels of the value hierarchy.

Overview

Existing literature highlights the limitations of current POEs in the social housing context, particularly regarding the assessment of social housing benefits (Villarosa, 2011). Therefore, improvements to POE methods are needed to better account for the consequences of product use and desired abstract values. By understanding how value is generated, it becomes possible to identify the attributes of the built environment that contribute most effectively to achieving benefits.

Previous studies on the assessment of the built environment in SHPs have explored users' perceived and desired value. However, some gaps in knowledge still exist, including the need for more flexible methods that accommodate frequent changes in social housing policies, a deeper understanding of the relationship between housing attributes and project goals, the integration of housing providers in the evaluation process, and the development of a feedback system

to improve new housing projects.

Adapting hierarchical value maps (Woodruff, 1997; Woodruff and Gardial, 1996), based on the means–end value chain model (Gutman, 1982), offers a potential improvement for POE methods (Zinas and Jusan, 2012; Hentschke *et al.*, 2014; Aule *et al.*, 2022). Such maps can support the assessment of user satisfaction by showing the relationships between product attributes, consequences, and abstract values.

RESEARCH METHOD

Design science research (DSR) was adopted as the methodological approach for this study. DSR aims to develop artefacts that solve specific classes of problems while contributing to the development of prescriptive theories (Lukka, 2003). DSR outcomes can include models, methods, constructs, and instantiations (March and Smith, 1995). The artefact proposed in this study is a POE method that produces a model of value generation, which can be used to assess housing projects in terms of achieving project goals and user satisfaction with the built environment.

The research process was divided into five steps, similar to those proposed by Lukka (2003): (a) understanding the problem – exploring the context of SHPs and Brazilian housing programmes; (b) developing a data collection instrument – creating a generic questionnaire to capture different levels of users' perceived value; (c) applying the questionnaire in three SHPs; (d) comparing results and discussing findings; (e) reflecting on the POE process to identify opportunities for improving value generation within the context of SHPs in Brazil. Each step is detailed below.

Step A – Understanding the context of SHP

The main sources of evidence in the first step were document analysis and six interviews with technical staff from the National Savings Bank, who had been involved in social work, design assessment, and providing technical assistance to users (Table 1). The design development process in each housing programme was analysed, and key attributes of housing projects were identified. Three housing projects funded by different housing programmes were selected in collaboration with social workers from the bank. These projects were chosen because of their distinct characteristics in terms of programme development processes, user participation, project location, and typology, as further described in Step C.

The SHP attributes were grouped into the following categories:

- Housing unit: a building or part of a building for single-family occupancy, such as one- or two-story houses and apartments.
- Communal areas: open or closed spaces or whole buildings for shared used, such as lounges, parking spaces, playgrounds, and sports facilities.

- Surroundings: relating to urban infrastructure and access to services, depending on project location.
- Support by social workers: encompassing community development activities like environmental education, facility use and maintenance training, and income generation projects.
- Facilities Management: operation and maintenance of the housing estate. A facilities management company is hired in some projects, while others are self-managed by users.

Table 1 – The interviews conducted in Step A

Interviewee's Role	Institution	Type of Interview
Architect – in charge of project assessment	Urban Development Unit – CAIXA, Caxias do Sul town	Individual
Social workers – including the supervisor and staff in charge of project assessment	Urban Development Unit – CAIXA, City of Porto Alegre	Group
Architect – manager of engineering, architecture and social work teams	Urban Development Unit – CAIXA, City of Porto Alegre	Individual
Architect – supervisor of Solidarity Credit and Collective Operations	Urban Development Unit – CAIXA, City of Porto Alegre	Individual
Architect – Supervisor of Technical Assistance and Sustainable Development	Urban Development Unit – CAIXA, City of Porto Alegre	Individual
Architect – Responsible for Project Development Unit	Municipal Department of Housing, City of Porto Alegre	Individual

Step B – Questionnaire development

Drawing on previous studies on Brazilian SHPs (Lima *et al.*, 2008; Miron and Formoso, 2010; Formoso *et al.*, 2011; Kowaltowski and Granja, 2011; Hentschke *et al.*, 2014), a set of constructs describing housing project attributes and consequences was identified. These were discussed during two seminars with social workers from the National Savings Bank and two workshops with researchers experienced in POE for social housing. These discussions helped refine the elements to be included in the questionnaire and shape the data collection process.

The research team anticipated that using the same data collection instrument across different projects would yield poor results, as it would not reflect the specificities of each project. Hence, the data collection tools had to be adapted to the unique characteristics of each project. Figure 2 represents the generic process for preparing a POE, which is further described below.



Figure 2 – Generic process for preparing a POE

The first activity involved identifying the product attributes, including both the physical characteristics and associated services of the specific SHP. This information was obtained through the analysis of project documents and meetings with housing providers (see

Table 1).

The second activity was the identification of potential consequences of product use within a specific SHP (Figure 3).

The third activity focused on creating the initial version of the value hierarchical map for each project, which included the identification of project goals (highest level of the value hierarchy). This hierarchical map was essential for understanding of the relationships between constructs across different levels of abstraction. Based on these constructs and their interconnections, evaluation criteria were established for inclusion in each questionnaire.

The final activity was the customisation of the questionnaire, along with planning the data collection process, including sample definition. The generic POE questionnaire was divided into four parts: (i) project attributes; (ii) users' profiles, (iii) users' perception of housing attributes and consequences of use; and (iv) changes made by users to their housing units. Users' perceptions were captured using several instruments: (i) open-ended questions about product attributes and consequences, aiming to identify the best and worst aspects of the project; (ii) satisfaction levels regarding the performance of products and services; (iii) comparisons with previous dwellings; and (iv) intent to remain in the housing unit. Changes in housing units were recorded based on modifications made or planned by the users.

In developing the final version of the questionnaire, the specific characteristics of different housing programmes were considered. Consequently, each housing project required an initial preparation phase in which the questionnaire was customised for the specific project. Figure 3 shows the constructs mapped during Steps A and B through a literature review and discussions with social workers (CAIXA).

		CONSEQUENCES OF USE	ITEMS FOR EVALUATION OF SATISFACTION			CONSEQUENCES OF USE	ITEMS FOR EVALUATION OF SATISFACTION		
ATTRIBUTES OF SOCIAL HOUSING PROJECT	HOUSING UNIT	ADEQUACY OF SPACE TO USE	a) Living room	a) Noise levels from outside the house / apartment b) Noise level between the spaces of the house / apartment c) Internal temperature of the house / apartment in winter and summer d) Natural ventilation of spaces e) Natural lighting of spaces	ATTRIBUTES OF SOCIAL HOUSING PROJECT	APPEARANCE	a) Appearance (beauty) condominium / allotment		
			b) Kitchen			SECURITY	a) Security inside your condominium / allotment		
			c) Area for washing tank and clothesline			ACCESS TO INFRASTRUCTURE AND URBAN SERVICES	a) Garbage disposal		
			d) Bedrooms				b) Water supply (clean tap water)		
			e) Bathrooms				c) Electricity provider		
	f) Yard	d) Sewerage	SECURITY	a) Safety in the surroundings of the condominium					
	g) Stairs	e) Paving of streets		LOCATION		a) Location in the apartment block/housing estate			
	ENVIRONMENTAL COMFORT	a) Walls b) Floor c) Ceiling d) Doors e) Windows f) Electrical facilities g) Hydraulic facilities	QUALITY OF CONSTRUCTION AND FINISHINGS	-		ACCESSIBILITY TO TRANSPORT AND URBAN EQUIPMENT	SUPPORT by SOCIAL WORKERS	MONITORING BY SOCIAL WORKERS	a) Monitoring by social workers
								MOBILISATION, USE AND CARE OF CONDOMINIUM	a) Behavior of users b) Use and care of condominium c) Participation of users in the activities of the condominium / allotment d) Management of users association
								SOCIAL INTERACTION IN CONDOMINIUM	a) Relationship with neighbors
INCOME GENERATION					a) Professional courses offered / results				
COMMON USE AREAS					ADEQUACY OF SPACE TO USE			a) Parking lots	a) Walls b) Floor c) Ceiling d) Doors e) Windows f) Electrical facilities g) Hydraulic facilities
	b) Stairways and corridors	MAINTENANCE OF CONDOMINIUM	a) Cleaning of streets and sidewalks (public area) b) Conservation of yards and facades of houses						
	c) Community hall	MAINTENANCE OF ALLOTMENT	a) Type of condominium administration b) Administration (housing cooperative)						
	d) Playground		SELF-MANAGEMENT	a) Type of condominium administration b) Administration (housing cooperative)					
	e) Sports court	INCOME GENERATION	Actions and initiatives to generate income for the community (ex.: bakery)						
	f) Concierge		COSTS	-					
	g) Laundry	INCOME GENERATION	Actions and initiatives to generate income for the community (ex.: bakery)						
	h) Theater		COSTS	-					
	i) Serigraphy	INCOME GENERATION	Actions and initiatives to generate income for the community (ex.: bakery)						
	j) Bakery		COSTS	-					
k) Collective kitchen	INCOME GENERATION	Actions and initiatives to generate income for the community (ex.: bakery)							
l) Refectory		COSTS	-						
m) Office	INCOME GENERATION	Actions and initiatives to generate income for the community (ex.: bakery)							
n) Terrace		COSTS	-						
o) Headquarters of users association (physical space)	INCOME GENERATION	Actions and initiatives to generate income for the community (ex.: bakery)							
QUALITY OF CONSTRUCTION AND FINISHINGS		-	QUALITY OF CONSTRUCTION AND FINISHINGS	-					

Figure 3 – Constructs at the attribute and consequence levels

Step C – Questionnaire application

The three POEs were conducted sequentially, with increasing levels of participation from housing providers (CAIXA's technical staff and local government staff).

Table 2 summarises the teams involved as well as the time spent on data collection and processing for each project.

Table 2 – Summary of the data collection and processing in the three studies

Study 1 – SHP 1	Study 2 – SHP 2	Study 3 – SHP 3
Training of 2 researchers	Training of 5 researchers	Training of 3 social workers
2 researchers applying 27 questionnaires (2 days)	5 researchers applying 81 questionnaires (1 day)	1 researcher and 3 social workers by CAIXA applying 67 questionnaires (2 days)
Data processing by 2 researchers (1 month)	Data processing by 2 researchers (10 days)	Data processing by 2 researchers (4 days)

The three housing projects are presented in Table 3. SHP1 was funded by the Solidary Credit Programme, which is run by the local government and promotes user self-management. Beneficiaries were families with a monthly income up to US\$ 440. SHP2 was funded by the Residential Leasing Programme, which is managed by the private sector. Beneficiaries had a monthly income of up to US\$ 705. SHP3 was funded by the Urbanisation Program for Slums and Informal Settlements, which is run by not-for-profit organisations. Beneficiaries had a monthly income up to US\$ 410.

Table 3 – SHPs evaluated and sample size

Social Housing Project	Location	Program	Beneficiaries	Characteristics	Typology	Population (N)	Calculated Sample (n)
SHP 1	Porto Alegre, RS South of Brazil	Solidary Credit	Families organised through associations, with monthly income of up to US\$ 440.00	Participative management of the project in use	Refurbished building with 8 floors 42 apartments	36	27
SHP 2	Porto Alegre, RS South of Brazil	Residential Leasing Program	Families with monthly income up to US\$ 705.00	Large size of the Housing Project	Condominium 6 blocks of buildings with 5 floors 469 apartments	469	80
SHP 3	Novo Hamburgo, RS South of Brazil	Urbanization Program, Settlement and Integration Slums	Families with monthly income up to US\$ 410.00	Housing Resettlement conducted by the City Council	Allotment of 156 two-storey houses	156	60
					9 story houses	7	7

The POEs involved visits to the SHPs for applying the questionnaire to a sample of users (Table 3). The sample size was calculated using Bolfarine and Bussab's (2007) equation, with a 50% proportion, 0.05 significance, and 10% error. Only occupied houses were included in the population. During the same visit, direct observations were made of the housing units and communal areas. Social workers' input provided additional evidence on good practices and challenges in each project. For the third case study, technical staff from companies hired by CAIXA and the city council also participated in data collection.

Step D – Comparison of the results and discussion

The data from each POE were processed and analysed by the research team. A second version of the value hierarchy map was created based on the user perceptions and observations during the visits. The open-ended questions, in which the users listed the five best and five worst characteristics of the project, were particularly valuable assessing users' satisfaction. Qualitative data from the open-ended questions and observations revealed new constructs and relationships between them. Consequently, the second version of the value hierarchy map included new constructs and relationships, frequency analyses of the best and worst characteristics, satisfaction levels with product and service performance, and reasons for staying in the housing unit.

The results were then presented to and discussed with CAIXA's technical staff, and representatives of one of the city councils involved in the study, and academics who had previous experience in this type of evaluation. The technical staff directly involved in the development and evaluation of the model were engineers and architects in charge of assessing project proposals and monitoring project execution as well as social workers supporting community development (Table 4).

The graphical representation provided by the value hierarchical maps helped visualise and simplify the relatively large data set for the technical staff involved in discussing the results.

Table 4 – Summary of the discussion of results in the three studies

Study 1 – SHP 1	Study 2 – SHP 2	Study 3 – SHP 3
Presentation and discussion of the results with social workers from CAIXA (2 hours)		Presentation and discussion of results with CAIXA's staff: professionals from Urban Development Unit, and social workers (2 hours)

Step E – Refinement of the proposed POE method and identification of improvement opportunities

Figure 4 presents the final version of the POE method, which consists of 10 steps. The first four steps focus on defining and refining a set of constructs (attributes, consequences, and objectives). Step 5 involves the initial creation of a value

hierarchical map before conducting the POE. Steps 6 and 7 cover the customisation of a questionnaire and planning data collection. Steps 8 and 9 encompass the application of the questionnaire and the analysis of results. The last step is the development of the final version of the value hierarchical map (after the POE). Due to space limitations, only the value hierarchical maps of SHP3 are presented in the results. This project was chosen because it featured the strongest participation from technical staff hired by CAIXA and the city council, enriching the data collection and analysis.

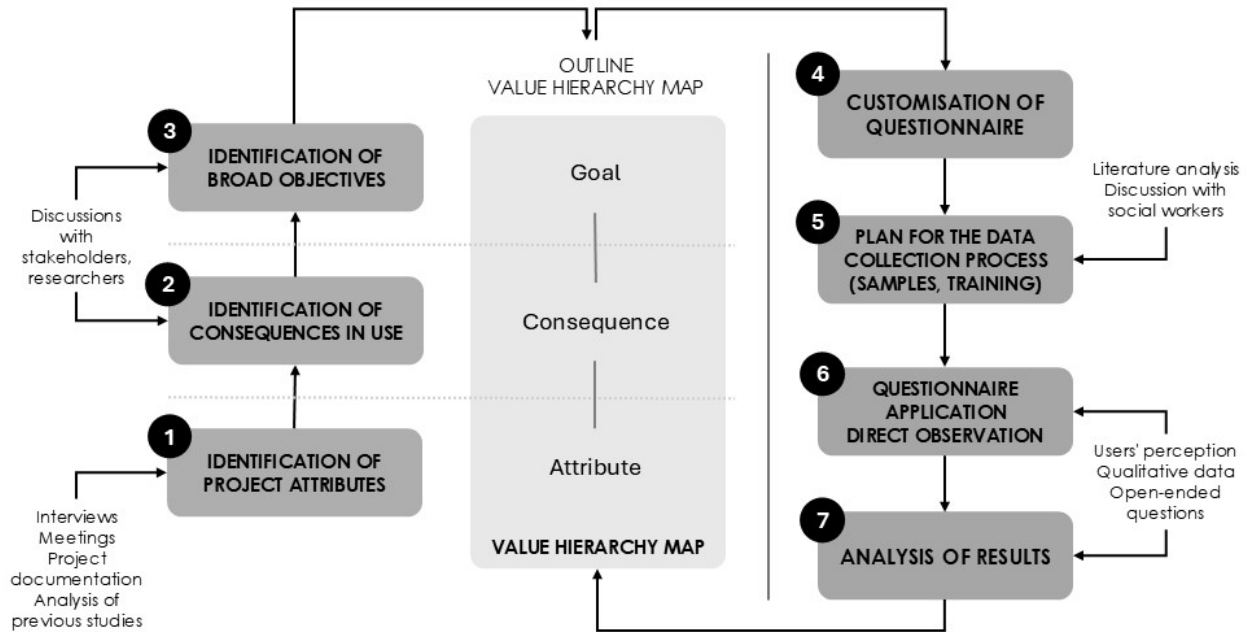


Figure 4 – Final version of the POE process

RESULTS

POE results

Table 5 presents the users' profiles for the three SHPs. In SHP1, 39% of units were occupied by individuals living alone, primarily young adults (68%). Despite the lack of parking spaces, 11% of the users owned a car. In SHP2, 31% of units were occupied by three users, and 59% of the heads of households being female. Regarding previous housing (see Table 5), 49% of users used to pay rent, and nearly half (47%) owned cars. SHP2 provided parking for only 306 vehicles but had 469 housing units. SHP3 units had only one bedroom, but family sizes ranged from one to eight people, with 46% of units housing four or more users.

During preparation for the SHP3 evaluation, additional information was requested by the Porto Alegre Council team regarding users' profiles. One request was the inclusion of human-powered vehicles, such as bicycles, as several residents used them. In SHP 3, 23% of the users owned a car. Researchers also monitored the duration of residency, noting that 77% of users in previous homes lived in informal

housing settlements.

Table 5 – Users' profiles

		SHP 1	SHP 2	SHP 3
HOUSEHOLD GROUPS				
	PERSON ALONE	39%	6%	6%
	COUPLE WITHOUT CHILDREN	21%	17%	13%
	COUPLE WITH CHILDREN	18%	37%	58%
	OTHER	22%	40%	23%
FAMILY PROVIDER PROFILE				
GENDER	MALE	57%	41%	39%
	FEMALE	43%	59%	61%
AGE	10-19 years old	3%	0%	0%
	20 to 39 years old	68%	48%	51%
	40 to 59 years old	29%	42%	39%
	From 60 years old	0%	10%	10%
OCCUPATION	EMPLOYEE	53%	57%	29%
	SELF EMPLOYED with social security	11%	4%	1%
	SELF EMPLOYED without social security	18%	10%	23%
	WORKER without vinculum	7%	3%	20%
	RETIRED	3%	15%	1%
	JOBLESS	4%	9%	13%
	OTHER	4%	2%	13%
EDUCATION	ILLITERATE	0%	0%	13%
	JUNIOR INCOMPLETE	14%	7%	72%
	JUNIOR COMPLETE	3%	14%	4%
	MIDDLE INCOMPLETE	4%	5%	4%
	MIDDLE COMPLETE	29%	43%	6%
	HIGHER INCOMPLETE	29%	15%	1%
	HIGHER COMPLETE	21%	16%	0%
PREVIOUS HOUSE				
OCCUPANCY CONDITION	RENTED	43%	49%	10%
	COHABITATION WITH RELATIVES	29%	31%	6%
	BORROWED	25%	5%	7%
	IRREGULAR AREA	0%	0%	77%
	OTHER	3%	15%	0%

Table 6, Table 7 and Table 8 present the results from the three SHPs, focusing on (i) best and worst characteristics and reasons to stay or leave the SHP, (ii) improvements made or intended in the housing units, (iii) comparisons with previous housing, and (iv) users' satisfaction with product elements and services.

Facilities management and social services had a significant influence on users' satisfaction. For instance, in SHP1, users highlighted the positive impact of self-management due to strong community involvement (Table 8). However, in SHP2,

ineffective facilities management and poor communal care negatively impacted satisfaction (Table 8). Thus, in both cases, facilities management seemed to have affected the degree of user satisfaction, either positively or negatively (Table 6).

In all three studies, a sense of ownership emerged as a key reason for staying, while inadequate space was the primary reason for users wanting to leave. Ownership of property appeared to be a major goal for users, differing from the housing programmes' emphasis on improving living quality.

In SHP3, there was an additional benefit derived from the legal ownership of the property, which was the fact that users felt able to make improvements to and changes in the dwellings as needed (Table 6). Furthermore, the high levels of changes to the housing units in all SHPs suggested a need to adopt mass customisation strategies. This may be related to the Brazilian culture and has been pointed out in previous POE studies (Miron and Formoso, 2010; Formoso *et al.*, 2011).

Despite the variability of responses regarding the best and worst features in the comparison with previous housing (see Table 7), the main reported consequences of use were location and accessibility to transport and urban equipment, indicating that location and the availability of urban infrastructure strongly influence users' perceived value.

Table 6 – Users' perceptions and house improvements made or intended by users – open-ended questions

USERS' PERCEPTIONS	SHP 1		SHP 2		SHP 3	
	BEST C.	WORST C.	BEST C.	WORST C.	BEST C.	WORST C.
HOUSING UNIT	8,4%	17,4%	5,6%	5,6%	16,1%	11,4%
COMMUNAL AREAS	6,5%	0,0%	10,5%	12,8%	28,6%	8,9%
SURROUNDINGS	16,8%	12,3%	12,0%	17,4%	10,6%	5,6%
SUPPORT by SOCIAL WORKERS	18,1%	0,6%	5,4%	4,9%	6,7%	5,6%
FACILITIES MANAGEMENT	9,0%	7,1%	1,5%	21,7%	1,1%	5,3%
OTHERS	2,6%	1,3%	2,0%	0,5%	0,3%	0,0%
TOTAL	61,3%	38,7%	37,1%	62,9%	63,3%	36,7%
REASONS TO STAY OR LEAVE THE SHP	STAY	LEAVE	STAY	LEAVE	STAY	LEAVE
HOUSING UNIT	27,0%	5,4%	16,8%	15,4%	29,4%	2,9%
COMMON USE AREAS	0,0%	0,0%	1,0%	2,9%	22,1%	1,5%
SURROUNDINGS	16,2%	0,0%	3,1%	17,3%	11,8%	2,9%
SUPPORT by SOCIAL WORKERS	18,9%	0,0%	6,3%	4,8%	1,5%	2,9%
FACILITIES MANAGEMENT	13,5%	0,0%	2,1%	12,5%	4,4%	0,0%
OTHERS	18,9%	0,0%	5,2%	12,5%	20,6%	0,0%
TOTAL	94,6%	5,4%	34,6%	65,4%	89,7%	10,3%

HOUSE IMPROVEMENTS MADE OR INTENDED BY USERS	SHP 1		SHP 2		SHP 3	
	MADE	INTENDED	MADE	INTENDED	MADE	INTENDED
HORIZONTAL FINISHINGS	57.1%	17.9%	98.8%	25.9%	76.1%	32.4%
VERTICAL FINISHINGS	42.9%	35.7%	96.3%	51.9%	29.6%	19.7%
BATHROOM ACCESSORIES	17.9%	14.3%	1.2%	3.7%	0%	0%
LAYOUT	10.7%	21.4%	0%	1.2%	9.9%	8.5%
DOOR AND WINDOWS	3.6%	10.7%	9.9%	8.6%	5.6%	4.2%
EXPANSIONS	0%	0%	0%	0%	64.8%	76.1%
SAFETY DEVICES	0%	0%	25.9%	17.3%	36.2%	11.3%
OTHER	7.1%	35.7%	16%	21%	7%	4.2%

Table 7 – Comparison with previous housing – closed questions

RESULTS CLOSED QUESTIONS	SHP 1			SHP 2			SHP 3		
	WORST	NEUTRAL	BEST	WORST	NEUTRAL	BEST	WORST	NEUTRAL	BEST
HABITABILITY AND FUNCTIONALITY	4%	39%	57%	33%	20%	47%	10%	7%	83%
APPEARANCE	4%	29%	68%	36%	28%	36%	6%	6%	89%
SAFETY	7%	46%	46%	37%	33%	30%	4%	21%	75%
LOCATION	0%	11%	89%	43%	23%	33%	1%	15%	83%
SOCIAL INTERACTION IN THE CONDOMINIUM	0%	25%	75%	15%	58%	27%	7%	28%	65%
COSTS	46%	14%	39%	-	-	-	-	-	-
ACCESSIBILITY TO TRANSPORT AND URBAN EQUIPMENT	-	-	-	-	-	-	3%	10%	87%

Table 8 – Users satisfaction – closed questions

RESULTS OF CLOSED QUESTIONS	SHP 1					SHP 2					SHP 3				
	VD	D	N	S	VS	VD	D	N	S	VS	VD	D	N	S	VS
HOUSING UNIT															
ADEQUACY OF SPACE TO USE															
a) Living room	-	3,6%	3,6%	75,0%	17,9%	6,2%	24,7%	19,8%	40,7%	8,6%	8,5%	26,8%	12,7%	39,4%	12,7%
b) Kitchen	-	17,9%	7,1%	60,7%	14,3%	16,0%	45,7%	11,1%	24,7%	2,5%	11,3%	40,8%	5,6%	33,8%	8,5%
c) Laundry	-	20,0%	50,0%	20,0%	10,0%	44,4%	37,0%	9,9%	7,4%	1,2%	8,5%	35,2%	8,5%	40,8%	7,0%
d) Bedrooms	-	7,1%	7,1%	78,6%	7,1%	6,2%	17,3%	16,0%	55,6%	4,9%	4,2%	32,4%	15,5%	39,4%	8,5%
e) Bathrooms	-	10,7%	3,6%	50,0%	35,7%	2,5%	18,5%	13,6%	60,5%	4,9%	9,9%	39,4%	12,7%	29,6%	8,5%
f) Yard	-	-	-	-	-	-	-	-	-	-	8,5%	23,9%	11,3%	47,9%	8,5%
g) Stairs	-	-	-	-	-	-	-	-	-	-	1,4%	5,6%	4,2%	69,0%	19,7%
ENVIRONMENTAL COMFORT															
a) Noise levels from outside the house / apartment	39,3%	28,6%	14,3%	10,7%	7,1%	32,1%	28,4%	17,3%	18,5%	3,7%	12,7%	32,4%	15,5%	33,8%	5,6%
b) Noise level between the spaces of the house / apartment	-	7,1%	21,4%	60,7%	10,7%	8,6%	16,0%	22,2%	46,9%	6,2%	4,2%	23,9%	11,3%	50,7%	9,9%
c) Internal temperature of the house / apartment in winter and summer	-	17,9%	17,9%	53,6%	10,7%	14,8%	23,5%	14,8%	43,2%	3,7%	9,9%	39,4%	12,7%	29,6%	8,5%
d) Natural ventilation of spaces	-	25,0%	7,1%	50,0%	17,9%	3,7%	12,3%	6,2%	69,1%	8,6%	8,5%	23,9%	11,3%	47,9%	8,5%
e) Natural lighting of spaces	-	14,3%	17,9%	60,7%	7,1%	2,5%	11,1%	6,2%	67,9%	12,3%	1,4%	5,6%	4,2%	69,0%	19,7%
QUALITY OF CONSTRUCTION AND FINISHINGS															
a) Walls	3,6%	28,6%	7,1%	53,6%	7,1%	29,6%	37,0%	9,9%	19,8%	3,7%	4,2%	16,9%	8,5%	60,6%	9,9%
b) Floor	10,7%	17,9%	3,6%	50,0%	17,9%	28,4%	29,6%	12,3%	24,7%	4,9%	8,5%	26,8%	7,0%	52,1%	5,6%
c) Ceiling	3,6%	21,4%	25,0%	46,4%	3,6%	27,2%	32,1%	13,6%	21,0%	6,2%	5,6%	25,4%	4,2%	60,6%	4,2%
d) Doors	-	14,3%	17,9%	57,1%	10,7%	23,5%	32,1%	16,0%	27,2%	1,2%	9,9%	19,7%	9,9%	52,1%	8,5%
e) Windows	-	25,0%	21,4%	46,4%	7,1%	12,3%	28,4%	13,6%	43,2%	2,5%	9,9%	21,1%	11,3%	50,7%	7,0%
f) Electrical facilities	3,6%	17,9%	3,6%	64,3%	10,7%	6,2%	18,5%	9,9%	59,3%	6,2%	2,8%	21,1%	2,8%	56,3%	16,9%
g) Hydraulic facilities	3,6%	17,9%	10,7%	64,3%	3,6%	8,6%	12,3%	6,2%	67,9%	4,9%	2,8%	18,3%	2,8%	60,6%	15,5%
COMMON USE AREAS															

RESULTS OF CLOSED QUESTIONS	SHP 1					SHP 2					SHP 3				
ITEMS FOR EVALUATION OF SATISFACTION	VD	D	N	S	VS	VD	D	N	S	VS	VD	D	N	S	VS
ADEQUACY OF SPACE TO USE															
a) Parking lots	-	-	-	-	-	25,9%	22,2%	34,6%	16,0%	1,2%	-	-	-	-	-
b) Stairways and corridors	-	3,6%	7,1%	71,4%	17,9%	34,6%	40,7%	12,3%	11,1%	1,2%	-	-	-	-	-
c) Community hall	-	-	-	-	-	14,8%	18,5%	35,8%	27,2%	3,7%	-	-	-	-	-
d) Playground	-	-	-	-	-	27,2%	35,8%	16,0%	18,5%	2,5%	-	-	-	-	-
e) Sports court	-	-	-	-	-	35,8%	23,5%	27,2%	12,3%	1,2%	-	-	-	-	-
f) Concierge	-	-	-	-	-	21,0%	34,6%	13,6%	27,2%	3,7%	-	-	-	-	-
g) Laundry	-	3,6%	10,7%	46,4%	39,3%	-	-	-	-	-	-	-	-	-	-
h) Theater	-	-	10,7%	53,6%	35,7%	-	-	-	-	-	-	-	-	-	-
i) Serigraphy	-	14,3%	60,7%	25,0%	-	-	-	-	-	-	-	-	-	-	-
j) Bakery	-	3,6%	25,0%	53,6%	17,9%	-	-	-	-	-	-	-	-	-	-
k) Collective kitchen	3,6%	7,1%	42,9%	39,3%	7,1%	-	-	-	-	-	-	-	-	-	-
l) Refectory	-	3,6%	42,9%	46,4%	7,1%	-	-	-	-	-	-	-	-	-	-
m) Office	-	-	32,1%	64,3%	3,6%	-	-	-	-	-	-	-	-	-	-
n) Terrace	-	7,1%	25,0%	39,3%	28,6%	-	-	-	-	-	-	-	-	-	-
QUALITY OF CONSTRUCTION AND FINISHINGS															
a) Walls	3,6%	7,1%	21,4%	57,1%	10,7%	30,9%	37,0%	17,3%	13,6%	1,2%	-	-	-	-	-
b) Floor	7,1%	35,7%	21,4%	32,1%	3,6%	38,3%	30,9%	13,6%	16,0%	1,2%	-	-	-	-	-
c) Ceiling	3,6%	10,7%	32,1%	50,0%	3,6%	33,3%	34,6%	13,6%	17,3%	1,2%	-	-	-	-	-
d) Doors	3,6%	7,1%	17,9%	67,9%	3,6%	27,2%	28,4%	25,9%	17,3%	1,2%	-	-	-	-	-
e) Windows	3,6%	10,7%	10,7%	64,3%	10,7%	23,5%	25,9%	25,9%	23,5%	1,2%	-	-	-	-	-
f) Electrical facilities	7,1%	14,3%	14,3%	60,7%	3,6%	14,8%	23,5%	27,2%	30,9%	3,7%	-	-	-	-	-
g) Hydraulic facilities	7,1%	10,7%	14,3%	64,3%	3,6%	16,0%	16,0%	32,1%	32,1%	3,7%	-	-	-	-	-
APPEARANCE															
a) Appearance of condominium or allotment	-	3,6%	-	42,9%	53,6%	34,6%	27,2%	21,0%	16,0%	1,2%	-	9,9%	8,5%	57,7%	23,9%
SECURITY															

RESULTS OF CLOSED QUESTIONS	SHP 1					SHP 2					SHP 3				
ITEMS FOR EVALUATION OF SATISFACTION	VD	D	N	S	VS	VD	D	N	S	VS	VD	D	N	S	VS
a) Safety inside condominium or allotment	-	3,6%	7,1%	78,6%	10,7%	27,2%	39,5%	12,3%	17,3%	3,7%	15,5%	26,8%	4,2%	46,5%	7,0%
ACCESS TO INFRASTRUCTURE AND URBAN SERVICES															
a) Garbage disposal	-	-	-	-	-	-	-	-	-	-	-	2,8%	1,4%	70,4%	25,4%
b) Water supply (clean tap water)	-	-	-	-	-	-	-	-	-	-	1,4%	11,3%	4,2%	64,8%	18,3%
c) Electricity provider	-	-	-	-	-	-	-	-	-	-	-	4,2%	1,4%	71,8%	22,5%
d) Sewage	-	-	-	-	-	-	-	-	-	-	1,4%	7,0%	2,8%	76,1%	12,7%
e) Paving of streets	-	-	-	-	-	-	-	-	-	-	1,4%	1,4%	2,8%	59,2%	35,2%
SURROUNDINGS															
SECURITY															
a) Safety in the surroundings areas of the condominium	10,7%	71,4%	7,1%	10,7%	-	24,7%	42,0%	22,2%	11,1%	-	13,0%	43,5%	11,6%	24,6%	7,2%
LOCATION															
a) Location in the apartment block/housing estate	-	7,1%	3,6%	42,9%	46,4%	-	-	-	-	-	-	-	-	-	-
ACCESSIBILITY TO TRANSPORT AND URBAN EQUIPMENT															
a) Accessibility to the project by public transport	-	-	-	-	-	8,6%	12,3%	11,1%	55,6%	12,3%	-	9,9%	5,6%	66,2%	18,3%
b) Proximity to shopping areas	-	-	-	-	-	9,9%	29,6%	11,1%	44,4%	4,9%	1,4%	11,4%	4,3%	70,0%	12,9%
c) Proximity to leisure and sports areas	-	-	-	-	-	13,6%	30,9%	22,2%	29,6%	3,7%	21,4%	47,1%	14,3%	12,9%	4,3%
d) Proximity to day-care centers and schools	-	-	-	-	-	14,8%	38,3%	17,3%	24,7%	4,9%	2,9%	15,7%	18,6%	51,4%	11,4%
e) Accessibility to healthcare units and hospital	-	-	-	-	-	-	-	-	-	-	7,0%	32,4%	11,3%	42,3%	7,0%
SUPPORT by SOCIAL WORKERS															
MONITORING BY SOCIAL WORKERS															
a) Monitoring by social workers	-	21,1%	42,1%	31,6%	5,3%	43,8%	18,8%	15,6%	21,9%	-	1,7%	6,9%	6,9%	62,1%	22,4%
MOBILISATION, USE AND CARE OF CONDOMINIUM															
a) Behavior of users	-	-	3,6%	71,4%	25,0%	13,6%	19,8%	32,1%	28,4%	6,2%	5,6%	25,4%	18,3%	45,1%	5,6%
b) Use and care of condominium	-	17,9%	7,1%	71,4%	3,6%	25,9%	45,7%	16,0%	8,6%	3,7%	4,2%	29,6%	14,1%	46,5%	5,6%

RESULTS OF CLOSED QUESTIONS	SHP 1					SHP 2					SHP 3				
ITEMS FOR EVALUATION OF SATISFACTION	VD	D	N	S	VS	VD	D	N	S	VS	VD	D	N	S	VS
c) Participation of users in the activities of the condominium	7,1%	25,0%	32,1%	35,7%	-	19,8%	33,3%	38,3%	8,6%	-	11,6%	36,2%	17,4%	29,0%	5,8%
SOCIAL INTERACTION IN CONDOMINIUM															
a) Relationship with neighbours	-	3,6%	14,3%	57,1%	25,0%	-	3,7%	22,2%	56,8%	17,3%	3,1%	15,4%	7,7%	58,5%	15,4%
FACILITIES MANAGEMENT															
FACILITIES MANAGER															
a) Communication	-	-	-	-	-	34,6%	27,2%	17,3%	19,8%	1,2%	-	-	-	-	-
b) Speed in the provision of technical assistance services	-	-	-	-	-	32,1%	34,6%	21,0%	11,1%	1,2%	-	-	-	-	-
c) Transparency in accountability	-	-	-	-	-	30,0%	23,8%	35,0%	8,8%	2,5%	-	-	-	-	-
d) Efficiency of the facilities manager	-	-	-	-	-	34,6%	22,2%	25,9%	13,6%	3,7%	-	-	-	-	-
MAINTENANCE OF CONDOMINIUM															
a) Condominium cleaning services	3,6%	21,4%	7,1%	64,3%	3,6%	39,5%	28,4%	9,9%	19,8%	2,5%	-	-	-	-	-
b) Condominium maintenance services (repairs, painting, etc)	-	7,1%	7,1%	78,6%	7,1%	40,7%	37,0%	17,3%	4,9%	-	-	-	-	-	-
MAINTENANCE OF ALLOTMENT															
a) Cleaning of streets and sidewalks (public area)	-	-	-	-	-	-	-	-	-	-	5,7%	35,7%	10,0%	44,3%	4,3%
b) Conservation of yards and facades of buildings	-	-	-	-	-	-	-	-	-	-	1,4%	30,0%	20,0%	42,9%	5,7%
SELF-MANAGEMENT															
a) Type of condominium administration	3,6%	10,7%	21,4%	53,6%	10,7%	-	-	-	-	-	-	-	-	-	-
b) Administration of cooperative	3,6%	14,3%	17,9%	57,1%	7,1%	-	-	-	-	-	-	-	-	-	-
INCOME GENERATION															
a) Actions and initiatives to generate income for the community	3,6%	7,1%	14,3%	57,1%	17,9%	-	-	-	-	-	-	-	-	-	-

VD = Very Dissatisfied; D = Dissatisfied; N = Neutral; S = Satisfied; VS = Very Satisfied

SHP3 – Value hierarchical Map

Figure 5 presents the first version of the hierarchical value map (research Step B) for SHP3, while the final version of that map is presented in Figure 6. The second version of the map combines a model of value generation, and the evaluation by the users, considering the reasons to leave or stay, and the degree of satisfaction (Step D). Therefore, the map presented in Figure 6 is a synthesis of evaluation results, highlighting key constructs in value generation and their relationships, so that it can be used as a visual device to support decision making. Regarding the evaluation of SHP3, the most and least cited project characteristics are presented in Table 6, as well as satisfaction levels (Table 8), and reasons to stay or leave (Table 6). Among the consequences considered, quality of construction and finishings received 50.7% to 60.6% satisfaction for all items (see green ellipse). Responses explaining the best characteristics accounted for 16.1% of the responses (intermediate green), while 11.4% highlighted the worst (light red), and 29.4% of users intention to stay (light green).

New constructs and relationships emerged from the data collected through direct observations and interviews. A comparison was made between the value hierarchical map created before the POE (Figure 5) and the map created after it (Figure 6). The maps reflected the different perspectives, on one hand, of the housing providers (i.e. city councils, cooperatives, construction companies and funding agencies like CAIXA), and, on the other, of the final users. However, there was a high degree of similarity, which might be related to the strong involvement of housing provider representatives, such as social workers from CAIXA and technical staff from the Novo Hamburgo City Council.

One key relationship identified in the final map was between the appearance and adequacy of space in the housing unit, which was represented in the final value hierarchical map (Figure 6). Due to the small size of dwellings – only one bedroom – several users had built housing extensions (65% of housing units). These were self-funded by users, often using poor-quality materials, affecting aesthetics, especially from the point of view of neighbours. A relationship was also found between health and access to infrastructure and urban services (Figure 6). The project is in an area prone to floods, raising concerns about insect infestations and spread of diseases. Health had not been identified as a construct in the hierarchical value map, but there are clear benefits of having access to infrastructure and urban services. In fact, sewage and access to infrastructure and urban services were the most cited positive characteristics of this project, while facility management costs were seen as a negative characteristic, as users had to pay for some services.

The technical staff from housing providers involved in this investigation agreed that the graphical value hierarchical map effectively summarised the large data set (Tables 6 and 8), providing a clear overview of the evaluation results.

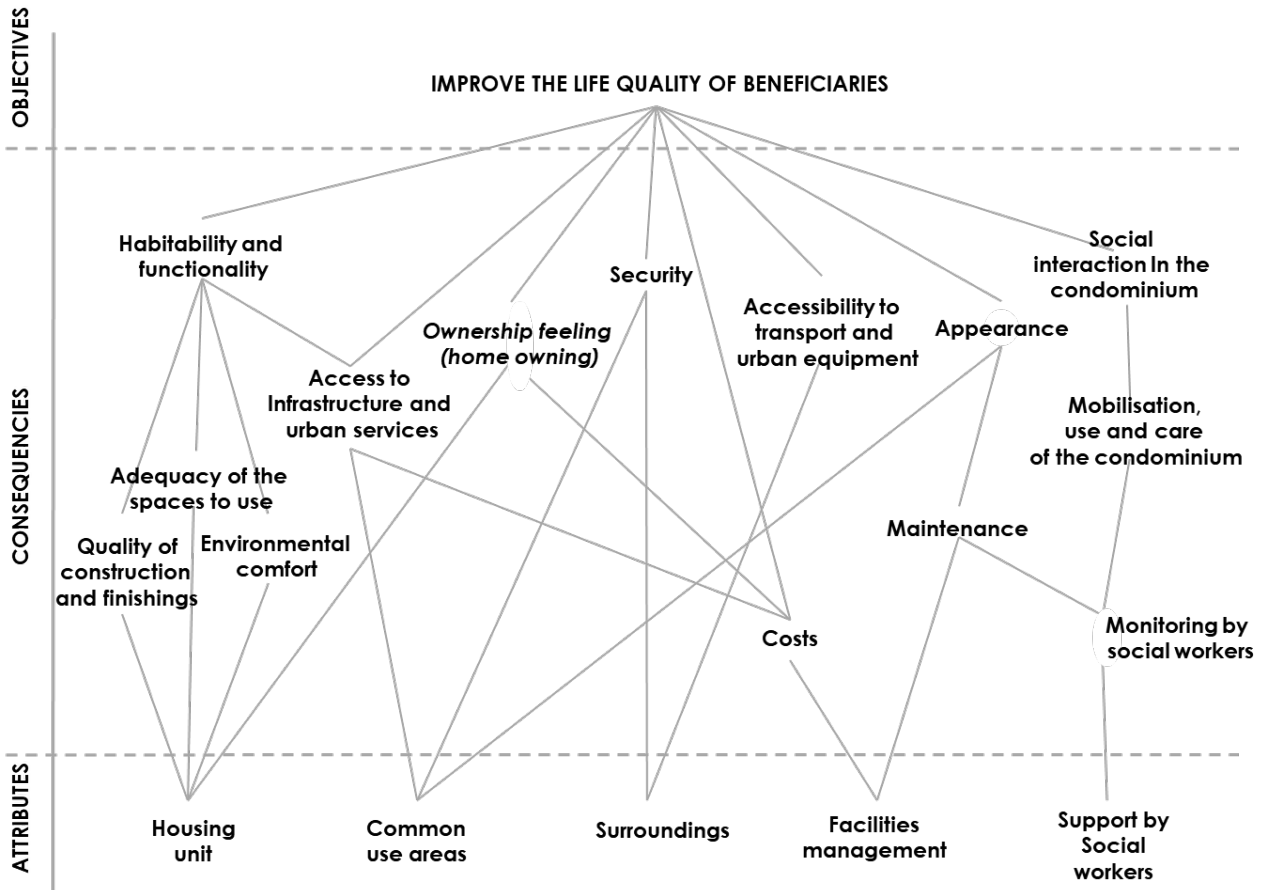


Figure 5 – Value hierarchy (Step B) for SHP3

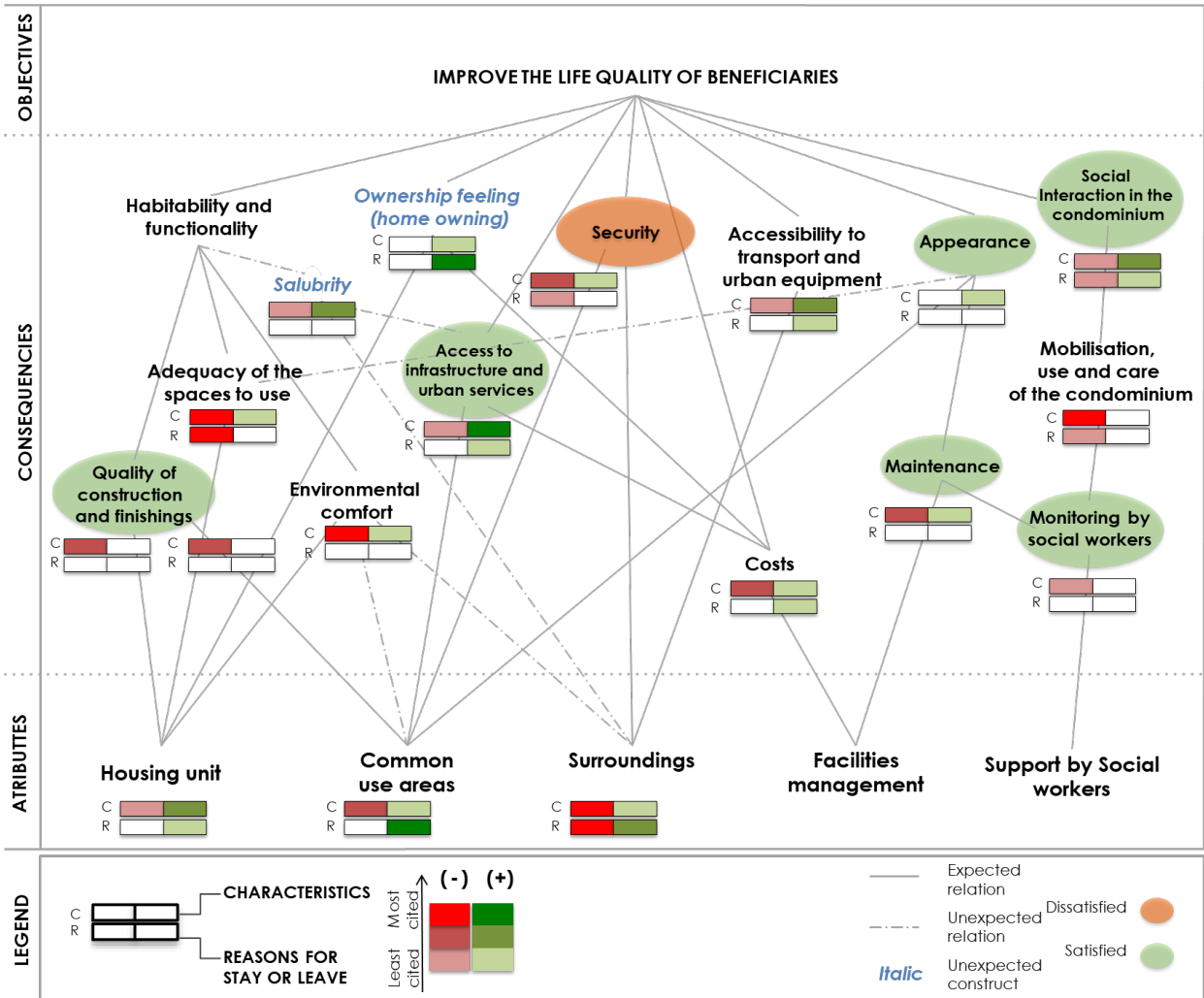


Figure 6 – Visual display of the value hierarchy map for SHP3

DISCUSSION

This study proposed a POE method for assessing SHPs and identifying opportunities to improve value generation. In relation to previous POE studies (Kowaltowski and Granja, 2011; Sanni-Anibire *et al.*, 2016; Roberts *et al.*, 2019; Villa *et al.*, 2022), the main innovations include the following: (1) the use of multiple sources of data, including perceptions captured from social workers and other stakeholders, user questionnaires, and direct observations of housing units and communal areas; (2) the adoption of a structured process for modelling value generation, including the proposal and refinement of a set of constructs, development of a preliminary value hierarchical map, customisation of the questionnaire according to the characteristics of the project, and development of the final version of the value hierarchical map. A customised data collection instrument was developed for each project, although all questionnaires had sections that produced comparable results. This method established a structure for data collection and

analysis, allowing for explicit connections between constructs and evidence, making the evaluation process traceable.

'Product attributes' is the easiest hierarchical level for data collection, as it is based on the descriptions of products and services, which are usually well documented in the programme or project documents (e.g. design drawings, standards, contracts). Some 'consequences of use' were identified in project documents, while others required the use of other sources of evidence, such as interviews and reports.

During the interviews with users, some additional consequences emerged, which had not been foreseen by other stakeholders. These included a sense of ownership (SHP1), improvements in infrastructure and urban services (SHP2), and enhanced sanitation (SHP3). In contrast, some consequences deemed essential by CAIXA, such as maintenance, were less important to SHP3 users. Defining project goals related to value generation proved to be the most challenging task, as conflicting views among stakeholders led to differing expectations for each project, often expressed as abstract values. Consequently, only one generic goal for SHPs was considered in the empirical studies: improving the quality of life for users.

As previously mentioned, an important step in developing value hierarchical maps is understanding housing providers' perceptions of project expected outcomes. The input from housing providers and funding organisations was instrumental in producing the preliminary maps used in the evaluation (e.g. Figure 5). These preliminary maps broadened and integrated the expected values from various stakeholders. For instance, social workers' perceptions of the three SHPs offered additional insights into good practices and problems related to each project. Moreover, these preliminary maps can be used to compare the value envisioned during project conception with the value actually received by users (Woodruff and Gardial, 1996). This comparison also allowed the identification of expected benefits that were not realised in practice.

From a theoretical perspective, an important contribution of this study is the set of constructs (see Figure 3) used to produce the value hierarchical maps. While some constructs have been used in previous studies, an effort was made in this study to understand the connections between them. The construct definitions were initially based on the literature and then contextualised for SHPs in Brazil. Clearly defining these constructs is essential for developing databases that could be used for comparing results from different projects in the future.

CONCLUSIONS

The main outcome of this research is the development of a POE method for SHPs, grounded in the means–end value chain model devised by Gutman (1982). By using value hierarchical maps, this evaluation approach extends beyond product attributes to focus on user consequences and benefits.

The concepts of perceived value and value hierarchy proved useful in linking project expectations to actual outcomes as experienced by users. Analysing these results enabled the identification of the consequences perceived by users. One advantage of using value hierarchical maps is that they offer a structured framework for meaningfully comparing POE results across different types of projects, emphasising the benefits perceived by both users and other stakeholders (e.g. representatives from housing providers). The utility of this method is evident in the comparative analysis of the three housing projects that were assessed.

A set of constructs was developed to support the evaluation process, grounded in the literature, and expressed in a way that could be understood by project stakeholders. These constructs were identified and refined through the application of the POE method. Additionally, involving representatives from housing providers and funding organisations in the design, execution, and discussion of POE results enhanced the assessment of value generation.

Several limitations should be pointed out. First, the evaluation was based on three empirical studies of housing programmes in Brazil, so the results cannot be generalised to other programmes or locations. Further work is needed to assess the method's utility and applicability in other social housing programmes. Future research should also explore the use of value hierarchical maps to support decision-making in the planning of social housing programmes or in the design of new projects. Finally, another opportunity for future research is to develop and test digital tools to process data and disseminate POE results, making feedback to new projects more effective.

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