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Measurement of residential satisfaction: analysis of a brazilian metropolitan region

Mensuração da satisfação residencial: análise de uma região metropolitana brasileira

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ABSTRACT

Since the beginning of 2000, some new government programs have emerged for housing and the sector has grown in the popular housing segment and in the private market. However, an important factor in planning housing policy and developing communication strategies is the population's satisfaction with housing. Thus, this research aims at analyzing the factors that most influence the residential satisfaction of the homeowners in the state of Pernambuco, Brazil. This research uses data from 347 interviews conducted in the state of Pernambuco, Brazil, and proposes a logistic regression model to identify the factors that increase satisfaction. The results showed that the homeowners in Pernambuco are satisfied with their housing. Despite the higher percentage of satisfied individuals in the sample, among the factors related to the property's design, the standard size and design of the bathrooms do not seem to please the owners, representing a potential source of dissatisfaction. With regard to the location and distance of parks and religious temples, which are considered significant in the modeling, some factors must be considered to corroborate the preference for smaller distances to these places. Another important factor considered in the research refers to the reduction of satisfaction due to the increase in the educational level of the head of the family.

Keywords: Housing satisfaction; Residential environment; Housing sector in Brazil.

RESUMO

Desde o início de 2000, alguns novos programas governamentais surgiram para a habitação e o setor cresceu no segmento habitacional popular e no mercado privado. No entanto, um fator importante no planejamento da política habitacional e para o desenvolvimento de estratégias de comunicação é a satisfação da população com a moradia. Assim, esta pesquisa tem como objetivo analisar os fatores que mais influenciam a satisfação residencial dos proprietários de residências no estado de Pernambuco, Brasil. Esta pesquisa utiliza dados de 347 entrevistas realizadas no estado de Pernambuco, Brasil, e propõe um modelo de regressão logística para identificar os fatores que ampliam a satisfação. Os resultados mostraram que os proprietários de residências, em Pernambuco, estão satisfeitos com a moradia. Apesar da porcentagem maior de indivíduos satisfeitos na amostra, entre os fatores relacionados ao projeto da propriedade, o tamanho padrão e o design dos banheiros não parecem agradar aos proprietários, representando uma fonte potencial de insatisfação. Com relação à localização e à distância dos parques e templos religiosos, apontados como significativos na modelagem, alguns fatores devem ser considerados para corroborar com a preferência por distâncias menores para esses locais. Outro fator importante considerado na pesquisa refere-se à redução da satisfação a partir do crescimento do nível de escolaridade do chefe de família.

Palavras-chave: Satisfação com a habitação; Ambiente residencial; Setor de habitação no Brasil.

INTRODUCTION

Over the past few decades, a factor related to the lives of Brazilians has emerged in the housing deficit. Brazil has faced a chronic problem in housing, particularly a housing deficit estimated at 6.3 million (CBIC, 2018), after decades of stagnation in the sector, since the dismantling in the 1980s. After economy stabilization (Period of reduction of the high inflation rates of previous decades), a new robust program for the housing sector has been retaken by the Brazilian federal government program: "Minha Casa, Minha Vida" (My House, My Life). The combination of economic stability, economic growth and higher loan volumes for housing created a favorable scenario for the development of housing projects across the country (Valença & Bonates, 2010).

The Minha Casa Minha Vida (PMCMV) program, according to Ferreira et al (2019), was conceived with the intention of heating up the economy in a period when the global financial crisis had a strong repercussion in Brazil. The main objective of the PMCMV was to reduce the housing deficit through the creation of incentive mechanisms for the production and acquisition of new housing units. Still, according to the authors, the creation of the PMCMV was an attempt by the government to provide to the low-income population access to home ownership, influencing through this initiative the economic growth of the country with the generation of jobs.

Within this panorama, the housing segment was two decades without public policies, following the direction of a meager credit and specific initiatives of building projects and homes (Cardoso & Leal, 2010). This situation basically demanded the academy some studies on financing sources and alternatives, at the expense of aspects related to perception of users on real estate's available on the market (Azevedo & Andrade, 2007; D'agostini, 2010; Bonduki 2019). Understanding relevant aspects for satisfaction of the real estate user is paramount for the well-being and quality of life in societies (Oliveira & Heineck, 1999). In this period of shortage of projects and programs aimed at minimizing housing deficit, Brazil experienced a period of precariousness in urban space in many regions (Reis & Costa, 2019).

And this precariousness in the urban space is shown by Moura (2014), in a research done in the Metropolitan Region of Natal (NMR) and verified the way the housing units are built by the government programs, especially the PMCMV. The author identified that the housing units built are located well away from the central areas, where the absence of public services and all infrastructure is notorious in these areas. Evident that, in the municipality visited most of the housing units built do not provide to the installed population social rights, generating several urban problems, such as the absence of quality housing and difficulty accessing public services, where, for example, environment is precarious, as is the absence of a telephone signal.

Another point cited by Moura (2014) that generates residents' dissatisfaction with housing in NMR is the insecurity that exists at night, due to the absence of other projects, which only complicates their situation.

A survey carried out by the Mauricio de Nassau Research Institute in 2012 in the Metropolitan Area of Recife, Brazil, indicated that residences built in the current expansion cycle of the sector do not seem to meet requirements related to user preferences and satisfaction. According to the survey, the type of real estate desired by most respondents was a house with three bedrooms, two bathrooms and a parking space - a real estate profile inconsistent with the one offered in the market by builders and incorporators in the region, which generally consists of a small house with two bedrooms, one bathroom and a parking space. Thus, it seems that the expansion in construction of homes in the region driven by the market logic has not considered or captured consumer preferences, tending to corroborate with the generation of residential dissatisfaction. In addition to all these factors, dissatisfaction can also occur due to the detriment of construction characteristics, such as the process of executing civil works that do not follow the appropriate technical / normative standards.

Residential satisfaction theory suggests that consumers form their judgment about their housing conditions based on their needs and perceptions; such assessment is carried out by comparing actual and desired satisfaction (Galster & Hesser, 1981). Residential satisfaction is an important research area in housing field because it is related to individual quality of life; how they see and evaluate public policies, understanding the housing mobility process and the market demand.

Based on these aspects, the research has the following problem: to what extent are Brazilians satisfied with their homes and what are the most important factors for the expansion of this satisfaction? Thus, this research aims at analyzing the factors that most influence the residential satisfaction of the homeowners in the state of Pernambuco, Brazil. This research uses data from

347 interviews conducted in the state of Pernambuco, Brazil, and proposes a logistic regression model to identify the factors that increase satisfaction. The following items were considered significant: bathroom space, residential ventilation, distance from parks and distance from religious centers.

Thus, this paper highlights the qualities that those interested in the program value when choosing a property. This is extremely important because it helps the Minha Casa Minha Vida Program in terms of the structure that most impacts a house, but also brings aspects related to the location of the property, as it lists what individuals take into account when it comes to the location of the property. These issues are extremely important, as it is an asset in which the individual will remain for a long time. Therefore, knowing the characteristics that a property needs to have to meet the individual's short-term and long-term needs and above all in an ideal location (considering that commuting, especially in large centers is a primary item taken into account when buying a property). offers benefits when it comes to offering a property under the Minha Casa Minha Vida program.

LITERATURE REVIEW

Below are some concepts necessary to understand the analyzes to be performed in this work. Among these concepts are the following themes: Residential satisfaction, Housing Characteristics, Housing support services, Public facilities, Social environment and Neighborhood facilities.

RESIDENTIAL SATISFACTION

Residential satisfaction can be understood as a difference between a perception of a real housing situation and desired housing one (Galster & Hesser, 1981). According to Kowaltowski & Granja (2011), client evaluations are based in experience and perception of product/service, faced with their expectations. Satisfaction measurement, in turn, can be accomplished through dimensions and factors (Huang & Du, 2015). Several perceptions of different aspects on residential satisfaction are contained in literature.

There are some predictors of indoor housing that may be positively correlated with residential satisfaction, such as home ownership, housing size, availability of residential facilities and housing quality (Wang & Wang, 2020).

Other external predictors generally include neighborhood infrastructure (Wang & Wang, 2020), such as access to public transportation and services, job availability, schools and religious temples. These predictors have a direct relationship with the perceptual-cognitive meaning, making the comparison process between expectations and perceived performance of the residential environment evident (Adewale et al., 2019).

Recently, the affective meaning in housing has been shown to be so important in satisfaction assessments (Adewale et al., 2019). The affective meaning is based on significant and symbolic relationships that constitute the scenarios, where individuals define their residence (Freitas, 2004). Residence cannot be summarized in housing function, it must be understood as a system where individuals are confronted with the collectives (Freitas, 2004).

Studies related to the perceptual-cognitive and affective meanings can be found in the literature. The Brazilian reality of low-quality housing, and sometimes located in slums, is very similar to the reality of developing cities like Beijing, China; Idaban, Nigeria and Mumbai, India.

In Beijing, residential relocation decisions are made in response to unacceptable levels of residential satisfaction and improvements in hygiene and health conditions. Relocation tends to improve residential conditions, but there are situations where confrontation with the collective is negative due to loss valuable connections with previous neighborhood (Wang & Wang, 2020).

These connections were evidenced in the studies by Adewale et al. (2019), even in unfavorable housing conditions in the central area of Ibadan, southwestern Nigeria, it was possible to verify that residents were generally satisfied with their housing situations. This satisfaction is not directly linked to the quality of the housing units themselves, on the contrary, it has to do with

the physical characteristics of the neighborhood environment. Improvement measures in the environment and access to public services are as important as the quality of housing itself.

A similar study was applied to assess the revitalization of three slums located in Mumbai, India (Kshetrimayum et al., 2020). It was possible to observe the need for both an adequate project and housing environment planning, considering the perspective of users through the strengthening of community organization, which may lead to an improvement in the social, economic and environmental aspects of the neighborhood, which is, a better perception of ideal housing.

A summary of different studies and their main contributions to residential satisfaction is shown in Table 1. The literature shows different factors that influence residential satisfaction, as suggested by Mohit et al. (2010), which are presented in the next section.

Table 1: Different studies on residential satisfaction

Author	Research Site	Conclusion
Salleh (2008)	Malaysia	Interviewees are generally satisfied with their housing units, but nevertheless, there are some variables related to neighborhood facilities and environment that are dissatisfaction points.
Elsinga & Hockstra (2005)	Europe	Owners had greater satisfaction than tenants in similar standard real estate.
Mullins et al. (2001)	Australia	Residential dissatisfaction source; level of crime in the region.
Djebuarni & Al-Abed (2000)	Yemen	Privacy importance for residential users.
Ukoha & Beamish (1997)	Nigeria	Users satisfied with neighborhood facilities but dissatisfied with structure types and building features.
Savasdisara et al. (1989)	Thailand	Study on residential satisfaction in low housing.

Source: The Authors (2020)

HOUSING CHARACTERISTIC

They consist of aspects related to real estate internal space: dining room, bedroom, kitchen, bathroom, etc. In general, the larger the size of the rooms, the greater the satisfaction. In a study on evaluation and determinants of residential satisfaction with public housing in China, Haung & Du (2015) considered that housing characteristics were significant for residential satisfaction explanation. In another survey in China, Cheng et al. (2013) analyzed residential satisfaction and found that people were more satisfied with larger housing. Mohit et al. (2010), in a low-cost housing study, in Kuala Lumpur, Malaysia, identified a positive correlation between residence size and residential satisfaction.

The living spaces are directly linked to the specific characteristics of each family, with some common variables, varying only in the size and quality of the space (Jansen, 2014). Thus, common housing variables are considered: living-room space, bathroom space, dining-room space, bedroom space, kitchen space, laundry area space, ventilation, natural lighting, and views. Such variables were studied by several teachers when linked to residential satisfaction and are shown in Table 2.

Table 2: Variable for residential satisfaction

Variables	References
Living-room space	Jansen (2014) and Mridha (2015).
Bathroom space	Galster & Hesser (1981); Sulaiman & Yahaya (1987); Mridha (2015).
Dining-room space	Mohit & Nazyddah (2011); Mridha (2015).
Bedroom space	Lu (1999); Vera-Toscano & Ateca-Amestoy (2008); Jansen (2014).
Kitchen space	Sulaiman & Yahaya (1987); Mridha (2015).
Laundry area space	Salleh (2008); Mohit & Nazyddah (2011).
Ventilation	Sulaiman & Yahaya (1987); Kim et al. (2009).
Natural lighting	Elsinga & Hoekstra (2005); Bekleyen Korkmaz (2013); Mohit & Mahfoud (2015).

Views	Kowaltowski et al. (2006); Bekleyen & Korkmaz (2013).

Source: The Authors (2020)

Concerning the dissatisfaction with the construction characteristics, Nunes & Alvarenga (2018) analyzed the main causes of poor performance in executing the works and identified that the profile of the employed labor was poor education and high turnover. Low monitoring of the work execution and of materials used by the qualified professionals were also detected, resulting in low execution performance.

HOUSING SUPPORT SERVICES

This group of variables represents the services available in common areas of the blocks, corridors, stairs, balconies, as well as other services, such as water supply, telecommunications, etc. Mridha (2015) pointed out that the residence management and maintenance have positive contribution to residential satisfaction. Mohit & Mahfoud, (2015) state that residential satisfaction levels perceived by double-story terraced housing residents was influenced by the housing support services.

Eight variables are considered regarding this aspect: hallway, stairs, elevator, firefighting system, basic sewage/sanitation, street lighting, garbage collection, and real estate maintenance. Some works which describe the importance of each variable for residential satisfaction are presented as follows:

Hallway variable appears in the research by Mohit & Nazyddah (2011). Stairs are endorsed in Ukoha & Beamish (1997) and Mohit & Nazyddah (2011) works. Sulaiman & Yahaya (1987) and Ha (2008) use the variable elevator in their articles. Firefighting system is supported by Mohit & Nazyddah (2011). Sewage/sanitation is presented in Mohit & Nazyddah (2011) and Mridha (2015). Türkoğlu (1997) and Mohit & Mahfoud (2015) works endorse streetlight. The importance of garbage collection is outlined by Sulaiman & Yahaya

(1987) and Parkes et al. (2002). Real estate maintenance was studied by Paris & Kangari (2005) and Adriaanse (2007).

PUBLIC FACILITIES

This feature refers to the existence of public service structure, recreation areas, parking lots, pedestrian walkways, public telephones, etc. Kabisch & Grossmann (2013) identified an increase in residential satisfaction from sidewalks and construction of sidewalks and playgrounds. Grum & Grum (2014) showed the importance of Internet access for residential satisfaction.

This group of variables consists of ten items: parking spot, proximity to religious temples, sidewalks, public telephones, availability of shops and shopping centers, availability of supermarkets, internet access, as well as availability of post-offices, banks, lottery retailers and playground. Some works which describe the importance of each variable for residential satisfaction are presented as follows:

The site for parking is quoted in James et al. (2009) and Lovejoy et al. (2010). The proximity to religious temples was studied by Sulaiman & Yahaya (1987) and Mohit & Nazyddah (2011). The variable sidewalks were worked by Kowaltowski et al. (2006) and Mohit & Nazyddah (2011). The importance of public telephones is presented in Sulaiman & Yahaya (1987) works. Availability of shops and shopping centers is a feature proposed by Türkoğlu (1997) and Kabisch & Grossmann (2013). Supermarket availability is presented by Ukoha & Beamish (1997) and Mohit & Mahfoud (2015). Internet access is outlined in Grum & Grum (2014). Post-office availability is worked by Parkes et al. (2002). Huang & Du (2015) worked the availability of banks and lottery retailers. With regard to playground, it is outlined in Bonilha (2013).

França (2015), emphasized in its study on the bottlenecks for housing provision in small municipalities, that prioritization to meet the housing needs of the program My home My life, are determined by the interests of real estate market, financial institutions and construction companies, which aim at

reducing project costs by determining the location and typology of the projects. With this, we can see a housing production without urban infrastructure, followed by units with reduced size, and at the same time away from urban services and leisure areas. Consequently, these factors will contribute to housing dissatisfaction, mainly by reaffirming a segregated city model.

SOCIAL ENVIRONMENT

Social environment concerns the noise in the region, as well as safety, crimes, and community relationships. In Mohit & Nazyddah (2011) and Mridha (2015), traffic safety was appointed as one of the residential satisfaction factors. Research by Hur & Morrow-Jones (2008) identified the importance of variables related to satisfaction with the neighborhood, including security, for residential satisfaction.

This group of variables works with four items: noise level, traffic safety, public security and level of crime in the region. Some works which describe the importance of each variable for residential satisfaction are presented as follows:

The level of noise is cited by James et al. (2009), and Baum et al. (2010). Traffic safety in the region is explained by Mohit & Nazyddah (2011) and Mridha (2015). Cook (1988) and Salleh (2008) worked with public safety in the region. The impact of crime level in residential satisfaction was proposed by Basolo & Strong (2002), Chapman & Lombard (2006), and Hur & Morrow-Jones (2008).

NEIGHBORHOOD FACILITIES

Neighborhood facilities dimension is represented by the following items: distance of the housing unit to downtown, schools, hospitals, markets, public libraries, religious buildings, etc. Teck-Hong (2012), in a study in Malaysia, identified that the degree of housing satisfaction may depend on the distances from the workplace, hospitals, sports centers and others. Huang &

Du (2015), in a study carried out in Hangzhou, China, show that neighborhood characteristics and public facilities are the main factors influencing residential satisfaction.

This dimension is composed of eleven variables, which are the distances to the workplace, the school, the police station, the hospital, malls, shopping centers, public libraries, religious temples, bus stops, fire department, parks, and downtown. Some works which describe the importance of each variable for residential satisfaction are presented as follows:

Distance to the workplace is described in the works of Speare (1974), Hur & Morrow-Jones (2008), and Teck-Hong (2012). Distance to school is presented by Speare (1974), Sulaiman & Yahaya (1987), and Bekleyene Korkmaz (2013). Distance to the police station and distance to public libraries are outlined in Mohit & Nazyddah (2011) and Mohit & Mahfoud (2015). Distance to shopping centers is highlighted by Speare (1974) and Huang & Du (2015). Distance to hospital is described in Teck-Hong (2012) and Mohit & Mahfoud, (2015). Ukoha & Beamish (1997) and Mohit & Nazyddah (2011) outlined distance to shopping malls. Distance to religious temples is outlined in Salleh (2008) and Mohit & Nazyddah (2011). Distance to bus stops is presented in Baum et al. (2010) and Mohit & Mahfoud (2015). Distance to fire department is quoted in Sulaiman & Yahaya (1987) and Mohit & Nazyddah (2011). The works of Teck-Hong (2012), Hur & Morrow-Jones (2008) endorse the importance of distance to parks. Distance to downtown is pointed out in Mohit & Mahfoud, (2015) and Huang & Du (2015).

Review of previous studies has shown that various approaches to the identification of aspects and variable components in determining residential satisfaction have been proposed in the literature (Table 3).

Table 3: Categories and Variable for residential satisfaction

Categories	Variables	References
Residence Characteristics	Living room space, space of bathrooms,	Lu (1999); Elsinga & Hoekstra (2005); Kowaltowski et al. (2006); Vera-

	spaciousness of the rooms, kitchen space, service area space, etc.	Toscano & Ateca-Amestoy (2008); Salleh (2008); Kim et al. (2009); Mohit & Nazyddah (2011); Bekleyen Korkmaz (2013); Jansen (2014); Mridha (2015).
Residence Support Service	Stairs, elevator, garbage collection etc.	Sulaiman & Yahaya (1987); Ukoha & Beamish (1997); Türkoğlu (1997); Parkes et al. (2002); Paris & Kangari (2005); Ha (2008); Adriaanse (2007); Mohit & Nazyddah (2011); Mridha (2015); Mohit & Mahfoud (2015).
Support Services	The site for parking, proximity to religious temples, supermarket availability, Post-office availability etc.	Sulaiman & Yahaya (1987); Türkoğlu (1997); Kowaltowski et al. (2006); James et al. (2009); Lovejoy et al. (2010); Mohit & Nazyddah (2011); Kabisch & Grossmann (2013); Grum & Grum (2014); Mohit & Mahfoud (2015); Huang & Du (2015).
Public Services	The level of noise, Traffic safety, etc.	Cook (1988); Basolo & Strong (2002); Chapman & Lombard (2006); Salleh (2008); Hur & Morrow-Jones (2008); James et al. (2009); Baum et al. (2010); Mohit & Nazyddah (2011); Mridha (2015).
Social environment	Distance to the workplace, distance to shopping centers, distance to commercial centers, distance to hospital, distance to the police station, distance to school etc.	Speare (1974); Sulaiman & Yahaya (1987); Ukoha & Beamish (1997); Hur & Morrow-Jones (2008); Mohit & Mahfoud (2015); Salleh (2008); Hur & Morrow-Jones (2008); Baum et al. (2010); Mohit & Nazyddah (2011); Teck-Hong (2012); Bekleyene Korkmaz (2013); Huang & Du (2015).

Source: The Authors (2020)

These constructs show the relationship between the five categories and residential satisfaction. These categories constitute the research hypotheses.

H1: Residence Characteristics positively affect the residential satisfaction.

H2: Residence Support Service positively affect the residential satisfaction.

H3: Support Services positively affect the residential satisfaction.

H4: Public Services positively affect the residential satisfaction.

H5: Social environment positively affect the residential satisfaction.

METHODOLOGY

This research used the methodology of survey type with the use of a structured questionnaire (Appendix 1), seeking to analyze the factors that most influence the residential satisfaction Thus, this research aims at analyzing the factors that most influence the residential satisfaction of the homeowners in the state of Pernambuco, Brazil. This research can be classified as an exploratory research for practical purposes, since it is intended to collect information to make an initial diagnosis and contribute to the improvement of the services offered (Lakatos & Marconi, 2003).

RESEARCH DESIGN

The starting point of this study is the concept that residential satisfaction is critical to people's welfare, just as the determinants of such satisfaction are of utmost importance for housing project planning and urban environment management. Thus, a binary logistic regression model was proposed, having as a dependent variable the satisfaction or dissatisfaction with the current housing, taking as independent variables the socioeconomic profile and issues pertaining the following aspects of residential satisfaction: Residence characteristics, residence support services, public facilities, social environment and neighborhood facilities.

SAMPLE

The sample was collected among residents in the state of Pernambuco, Brazil. The following steps were used in order to obtain the data. A questionnaire was prepared based on the literature review (Table 3), which contained the socioeconomic profile (questions 1 to 12) questions related to the global assessment of housing (questions 13, 19 and 20) and related to the dimensions of residential satisfaction (questions 14 to 18). These last two groups of questions used a 5-point Likert scale.

Among the variables that explore the global evaluation of the evaluation (Questions 13, 19 and 20), only question 13 was taken as a dependent

variable "general satisfaction with housing", the variable was conceived as a five-point Likert (1- very dissatisfied, 2 - dissatisfied, 3 - neutral, 4 - satisfied and 5 - very satisfied). However, this variable was transformed into a binary variable when grouping the assessments (1,2 and 3) as a negative assessment, on the other hand, assessments 4 and 5 were grouped as a positive assessment.

A group of students was trained to administer the questionnaire step followed by the interviews. The students administered the questionnaires in person to verify the residential satisfaction of the homeowners in the state of Pernambuco. The sample was chosen at random. In the collection stage, 360 questionnaires were collected. Those which had incomplete answers and outliers were excluded from the sample, leaving a total of 347 in the end.

RESULTS

In this section, main sample profiles and characteristics are shown, as well as data analysis through binary logistic regression.

SOCIO-DEMOGRAPHIC CHARACTERISTICS

Table 4 summarizes the sample main characteristics. When analyzed by gender, the total percentage of women participating, considering both those who were satisfied and dissatisfied, was significantly higher than of men. As the percentages themselves show, the female gender was in the range of 60.5%, while the male 39.5%. Regarding the most active age group in the survey, it is clear that the age group between 16 and 24 years was the most frequent (46.1%), of this percentage the number of people dissatisfied with housing was slightly higher than satisfied. However, if we quickly analyze the other participating age groups, regardless of the age group, the level of dissatisfaction is prevalent in all. Even this percentage of dissatisfaction is reinforced when assessed by marital status, only demonstrating that for the single/widowed / divorced class the dissatisfaction is more accentuated (58.2%), but this does not mean that for married people the panorama is not

the same, on the contrary, for married couples the percentage of dissatisfaction is only slightly below with (41.8). The current situation of the interviewees was also analyzed, showing that most of the interviewees were unemployed (62.5%), and the most frequent qualification was High School (59.4%), where the majority had family income between 553.46 and 1,383.65 dollars.

Table 4: Socio-Demographic Characteristics

	Variable	Satisfied		Dissatisfied		Total	
		n	%	n	%	n	%
Gender	Male	53	38,7	84	61,3	137	39,5
χ = ,738 P=,398	Female	91	43,3	119	56,7	210	60,5
	16 – 24	72	45	88	55	160	46,1
	25 – 34	31	53,4	27	46,6	58	16,7
	35 – 44	16	30,2	37	69,8	53	15,3
Age	45 – 59	21	31,8	45	68,2	66	19,0
χ = 9,69 P=,048	> 60	4	40	6	60	10	2,9
Marital status	Single/Divorced/Widowed	83	41,1	119	58,9	202	58,2
χ = ,33 P=,855	Married	61	42,1	84	57,9	145	41,8
Employment status	Employed	57	43,8	73	56,2	130	37,5
χ = ,472 P=,492	Unemployed	87	40,1	130	59,9	217	62,5
	Elementary School	41	38	67	62	108	31,1
Highest qualification	High School	85	41,3	121	58,7	206	59,4
χ = 2,875 P=,238	Higher Education	18	54,5	15	45,5	33	9,5
	<276,73 U$$	22	43,1	33	56,9	55	15,9
Estimated monthly household income (US$)χ = ,096 P=,992	276,73 – 553,46 U$$	48	40,7	70	59,3	118	34,0
	553,46 – 1.383,65 U$$	57	41,6	80	58,4	137	39,5
	> 1.383,65 U$$	14	41,2	20	58,8	34	9,8

Source: The Authors (2020)

In relation to the breakdown in the socioeconomic profile with satisfaction, only the cross-checking between age group and satisfaction

proved significant, attested by the chi-squared test and P-value according to Table 2. As from this relationship, one can infer that the largest number of individuals who were satisfied with the housing was in the age range from 24 to 34 years old. As far as dissatisfaction was concerned, the most highly dissatisfied were the older groups, with 69.8% of individuals between 35 and 44 being dissatisfied with housing, similarly to the result regarding the following age group (45-59), who presented dissatisfaction percentage of 68.2.

DATA ANALYSIS

To test the relationship between satisfaction with housing and the different aspects proposed in the literature a model of binary logistic regression was proposed. The proposed modeling establishes satisfaction as a dependent variable and the socioeconomic aspects of the sample, and the aspects of residential satisfaction identified in the literature as independent variables. Outliers were removed in a preliminary analysis of the distribution of variables. The estimated model was able to correctly classify 71% of the observations according to the specificity test. The model adjustment statistics can be observed by the Nagelkerke R^2, which presented a value of 0.252. The modeling results are presented in Table 5.

Table 5: Regression Model

	B	S.E.	Wald	Sig.	Exp(B)	95% C.I. for EXP(B)	
Level of Education of the head of the household	-0,202	0,074	7,439	0,006	0,817	0,707	0,945
Bathroom space	0,464	0,144	10,43	0,001	1,59	1,2	2,107
Residence Ventilation	0,322	0,113	8,11	0,004	1,381	1,106	1,724
Distance to religious temples	0,379	0,139	7,40	0,007	1,461	1,112	1,92
Distance to parks	0,389	0,11	12,48	0	1,476	1,189	1,831
Constant	-4,154	0,817	25,85	0	0,016		

Source: The Authors (2020)

The Stepwise method was used, by which with each interaction only the variables that are significant to the model of all socioeconomic variables as

well as those related to residential satisfaction are added, shown in sections 2.2 to 2.6, only level of Education of the head of the household, bathroom space, residence ventilation, distance to religious temples and distance to parks have proved significant for the elevation in the likelihood of satisfaction with residential housing.

The variable with the most significant impact for the expansion of the probability of satisfaction is bathroom space; for each unit increment in the evaluation of the space in the bathrooms, there is an elevation by 59% in the probability of satisfaction with housing (OR 1.59; 95% CI: 1.2-2,107). In other words, it is noticed that the variable space of the bathrooms is something that causes a lot of dissatisfaction, contributing for this percentage to rise.

The distance from the dwelling to parks and religious temples is another factor that can contribute to the expansion of residential satisfaction (OR 1.479; 95% CI: 1,189-1,831) and (OR 1.461; 95% CI: 1,112-1,92) respectively, whici is, the best assessment of the location of parks expands the probability of satisfaction by 47.6%, whereas in the case of religious temples the percentage is 46.1%.

Another significant factor for housing satisfaction according to the model is residence ventilation, the more positive the satisfaction assessment, the greater the likelihood of expansion in housing satisfaction, at 38.1% according to (OR 1.381; 95% CI: 1,106-1,724). The level of education of the head of the family was also assessed, it can be seen in the sample that the higher the level, the greater the probability of dissatisfaction to grow (OR 0.817; 95% CI: 0.707-0.945), which is, as the level of individual's schooling increases, the probability of satisfaction decreases 18.3%.

It is also considered that satisfaction with housing influences different aspects of individuals' lives, so that adding the consumer perspective to housing projects creates value for the whole of society (Reis & Lay, 2003). This research brings to light aspects of the project and location that can add

value to society. Often in the development of housing projects, some of these aspects may represent only a cost, however, each one brings with it an opportunity that can be used by companies attentive to consumer preferences to differentiate their offer (Oliveira & Mitidieri Filho, 2012).

When a company can add to its projects requirements that add more value to customers, the company must communicate this to the market through marketing (Aquino et al., 2019). That is, understanding the elements that most influence users' residential satisfaction is essential for the development of an efficient communication strategy with consumers (Bonaiuto et al., 1999; Azemati et al., 2017).

CONCLUSION

In general, homeowners in the state of Pernambuco are satisfied with their housing. The survey details such satisfaction and points out that the different age groups have significantly different levels of satisfaction in relation to housing. Despite the higher percentage showing individuals satisfied in the sample, the proposed modeling assists in the design and planning of housing developments from the perspective of the housing project, bathroom space and ventilation up to the aspects related to the location of the real estate, such as distance to parks and religious temples.

Among the property design factors, the standard size and design of the bathrooms do not seem to please the consumer, representing a potential source of dissatisfaction; such perception can be associated to the reduction in the size of the bathrooms of the dwellings in recent years in the Brazilian market. As for ventilation, the sample was collected in a region of high temperature throughout most of the year, so that a project that contemplates and enhances natural ventilation is more likely to please the consumer.

With regard to location as in the distance to parks and religious temples, pointed out as significant in the modeling, some factors should be considered

to corroborate with the preference for smaller distances to such sites. Firstly, a significant portion of the housing projects, especially those targeted at lower-income families, were situated farther from the central regions of the cities, making it difficult to access these places. Secondly, mobility issues in Brazilian urban centers generate an incentive for minor shifts and for finding points of interest for work, leisure, etc., in the vicinity of the residence.

Another important factor considered in the survey refers to the reduction in satisfaction as from the growth in the level of Education of the head of the household. When considering the correlation between the years of study and the income, it can be inferred that the current standard in property in the region considered in the sample does not meet the profile of individuals with higher education. Thus, a scope of dissatisfaction in higher standard projects is perceived.

Although the theme is still incipient, the findings of this research follow the same guidelines as the work of Mohit et al. (2010) when pointing the residential satisfaction index. And also, the work of Salleh (2008), Turok (2015) and Chen et al. (2016) when satisfaction is verified by factors such as public facilities and neighborhood facilities.

The survey is considered to have reached its objectives in identifying the factors that influence housing satisfaction of homeowners in the state of Pernambuco, However, the sample size was identified as a work limitation, which Hair et al. (2006) suggest that in logistic regression it requires large samples, and a number of at least 10 observations for each independent variable. In estimating the model, 40 independent variables are used, so a sample of 400 individuals would be necessary, but the sample collected by this research was 347 individuals.

Thus, it is suggested that in future works the sample be expanded to a national level considering all the particularities of the country, as well as the application of other techniques and statistical variables, in order to clarify the

relationship between residential satisfaction and exchange claim properties, quality of life, etc. Another recommendation is to investigate the importance of residential satisfaction as a marketing tool as part of a strategy to be used in the real estate market.

It is also important to point out that the country has enormous social differences, differences that end up reflecting in a large demand for home ownership, but that unfortunately the income of the majority does not allow to acquire. In this context, public incentive policies such as Minha Casa Minha Vida are timely. However, the big problem is still in the income of individuals, having a program that facilitates the acquisition of property without an adequate level of income on the part of those eligible for the program means that the incentive policy does not reach optimal levels. Within this range, one can think of a future study that takes into account income generation policies so that individuals who really need a home can have income that guarantees access to Minha Casa Minha Vida.

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APPENDIX 1

Questionnaire Part I

1. Gender: (.) Male (.) Female

2. Age: .....

3. Degree of instruction:

(.) Elementary school I
(.) Elementary school II incomplete
(.) High school
(.) Superior complete
( ) Specialization
(.) Master and Doctorate

4. Individual income:

(. .) Up to 1 minimum wage
(.) Above 1 to 2 minimum wages
(. .) Above 2 to 5 minimum wages
(. .) Above 5 up to 10 minimum wages
(.) Above 10 minimum wages
(.) Does not know or did not answer

5. Family income:

(.) Up to 1 minimum wage
(.) Above 1 to 2 minimum wages
(.) Above 2 to 5 minimum wages
(.) Above 5 up to 10 minimum wages
(.) Above 10 minimum wages
(.) Does not know or did not answer

6. What is your employment status? _____

7. Marital status: _____

8. Number of children living in the household: _____

9. What region do you live in? _____

10. How many people live in your house? _____

11. Do elderly people live in your home? (From 60 years old) _____

Questionnaire part II: only for residents who live in houses

12. You are currently:

(.) Owner of the property where you live

(.) Pay rent in the property where you live

(.) The property where you live is not yours, but you do not pay rent

(.) Living with parents or relatives and do not pay rent.

(.) Other_____

13. AVG1: On a scale of 1 to 5, how would you rate YOUR SATISFACTION WITH THE GENERAL QUALITY of your property?

1 Very dissatisfied	2 Dissatisfied	3 Neutral	4 Satisfied	5 Very satisfied

14. H1: RESIDENCE CHARACTERISTICS

H1.1: Living Room Space	1	2	3	4	5
H1.2: Dining Room Space	1	2	3	4	5
H1.3: Kitchen space.	1	2	3	4	5
H1.4: Space rooms	1	2	3	4	5
H1.5: Bathroom space	1	2	3	4	5
H1.6: Service area space	1	2	3	4	5
H1.7: Residence Ventilation	1	2	3	4	5
H1.8: Natural lighting	1	2	3	4	5
H1.9: View	1	2	3	4	5

15. H2: RESIDENCE SUPPORT SERVICES (OUTSIDE THE RESIDENCE, BUT WITHIN THE HOUSING SPACE)

H2.1: Sewer Cleaning	1	2	3	4	5
H2.2:Street lighting	1	2	3	4	5
H2.3: Garbage collection	1	2	3	4	5

H2.4: Property maintenance	1	2	3	4	5
16. H3: SUPPORT SERVICES					
H3.1: Parking space	1	2	3	4	5
H3.2: Proximity to religious temples	1	2	3	4	5
H3.3: Sidewalks	1	2	3	4	5
H3.4: Public telefones	1	2	3	4	5
H3.5: Availability of stores and shopping centers	1	2	3	4	5
H3.6: Supermarket availability	1	2	3	4	5
H3.7: Internet access	1	2	3	4	5
H3.8: Post Office Availability	1	2	3	4	5
H3.9: Availability of Banks and Lotteries	1	2	3	4	5
17. H4: PUBLIC SERVICES					
H4.1: Noise level, noise	1	2	3	4	5
H4.2: Traffic safety in the region	1	2	3	4	5
H4.3: Public security in the region	1	2	3	4	5
H4.4: Level of crime	1	2	3	4	5
18. H5: SOCIAL ENVIRONMENT					
H5.1: Distance from the workplace	1	2	3	4	5
H5.2: Distance to school	1	2	3	4	5
H5.3: Distance to police station	1	2	3	4	5
H5.4: Distance to hospital	1	2	3	4	5
H5.5: Distance to Shopping Center	1	2	3	4	5
H5.6: Distance to Comercial Centers	1	2	3	4	5
H5.7: Distance to public libraries	1	2	3	4	5

H5.8: Distance to religious temples	1	2	3	4	5
H5.9: Distance to bus stops	1	2	3	4	5
H5.10: Distance from fire station	1	2	3	4	5
H5.11: Distance from parks	1	2	3	4	5
H5.12: Distance from city center	1	2	3	4	5

TICK THE STATEMENT THAT BEST REPRESENTS YOUR LEVEL OF SATISFACTION WITH YOUR CURRENT PROPERTY

19. AVG2: I consider my current property excellent	Strongly disagree	Partially disagree	Neither agree nor disagree	Partially agree	I totally agree
20. AVG3: My current property is among the best in the region	Strongly disagree	Partially disagree	Neither agree nor disagree	Partially agree	I totally agree