The Influence Of Informal Residential Constructions On The Urban Image Of A Sector In Northern Peru

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Abstract

The study was carried out in the El Molino sector of the district of Trujillo, in northern Peru. It investigated the impact of informal residential constructions on the urban image of the sector. The research approach, type and design were quantitative, applied and non-experimental; of cross-sectional and correlational scope. The unit of analysis was the workers of the Provincial Municipality of Trujillo, including as a sample 30 technical workers belonging to the Urban Development Management, to whom two questionnaires were applied after meeting the criteria of validity and reliability. The results were presented in interpreted tables, showing that 60% of the informal residential buildings have an average level and 66.7% have a regular level with respect to urban image. The study establishes that there is an inverse influence between informal residential constructions and urban image, based on the coefficient Rho= -0.726 and a significance p<1%; likewise, it was determined that the behavior of the urban image variable was explained 89.5% by the informal constructions variable and 10.5% by other causes.

KEY WORDS: *informal construction, construction standards, urban planning, urban image, residential use, building material, seismic vulnerability, pavement, public space, urban aesthetics, etc.*

I. INTRODUCTION

This research article comes from the Master's thesis in Architecture, Universidad Cesar Vallejo, Trujillo, Peru, entitled: " Construcciones informales de uso residencial y su influencia en la imagen urbana del Sector [1]El Molino, Trujillo-2021" by the first author of this article. The city is the result of modifications over time, but certain changes in use have affected the integrity of buildings, including those considered historical heritage. The relationship between urban evolution and social changes is evident, a product of the dynamics inherent to each era (Cadela, 2018).

Modern cities emerged spontaneously, which has generated problems such as insufficient roads, lack of public spaces, inadequate zoning and scarcity of services. The lack of governmental actions for sustainable urban development aggravates these challenges. The self-construction by homeowners contributes to multiplying problems and can result in harmful living conditions and questionable quality construction. For Ortiz (2015), urban informality involves occupying areas without complying with standards, with unregulated construction and transformations, and is related to economic constraints and problems such as lack of planning, inadequate distribution of spaces and use of inadequate materials.

Worldwide, approximately one billion people live in informal settlements in urban and rural areas, which has increased since 1996. These settlements lack legal security and regulations for proper

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construction. In many places, informal construction has been tolerated due to the lack of affordable social housing, also representing underutilized capital that could contribute to economic development with appropriate policies. (UN, 2019).

In Latin America, there is little interest in addressing urban disorder and housing is built without considering housing policies. However, housing challenges vary according to geographic location and country (Candón & Domínguez, 2020). For example, Colombia, has registered an increase in housing production, but most of it is built informally (Caicedo, 2015). In contrast, in Chile, a culture oriented towards prevention and strict control in housing construction stands out, resulting in informality rates below 10%. (Mamani & Huarcaya, 2018).

In Peru, obtaining construction licenses is complicated and most homes are built informally, which makes them vulnerable to intense seismic movements. These constructions lack adequate structural reinforcements, use low-quality materials, and have deficiencies in foundations, electrical installations, and sewage systems. In addition, their inappropriate location increases the risk of accidents and collapse. Poor regulations, lax licensing controls, and unlicensed construction contribute to the problem. Lack of professional advice and the use of quality materials are also factors. (Espinoza, 2019)

In the El Molino sector, complicated, lengthy and costly bureaucratic procedures lead to irregular construction. The tendency to evade legality and the lack of supervision by the authorities also contribute to this scenario. In addition, the Building Regularization Law No. 27157 has had a significant impact on the increase of informal construction by allowing the direct declaration of buildings without a building permit, which inevitably affects the urban image of the city by formalizing what was informal. Among the specific objectives were: to identify the levels of informal constructions (O1) and urban image (O2); to determine the influence of building quality (O3), productive process (O4), architectural urban design (O5), materials used (O6) and seismic vulnerability (O6) on the urban image of the sector.

This study is justified because it seeks to analyze housing built informally, which lacks professional supervision and is of low quality, failing to comply with standards and regulations. These constructions are carried out with deficient processes and materials, which affects the image of the city and can generate stigmatization. The theoretical value of the study lies in analyzing the guidelines and strategies needed in construction processes to homogenize the urban image and address the problem of informality in construction. The practical relevance focuses on resolving informal urban development and preventing new illegal construction through appropriate policies and institutions. At the social level, it highlights the disorderly growth of the city, the lack of affordable housing and the influence of the urban image on the progress and development of society.

II. THEORETICAL FRAMEWORK

The research has international precedents in the studies by Ruiz and Toaquiza (2020), who addressed a study on the design of collective residences and the renovation of the urban image in Monte Sinai. López (2016), investigated urban informality and neighborhood improvement initiatives. Türkoğlu et al. (2019) analyzed residential satisfaction in both formal and informal neighborhoods in Istanbul. Guerrero (2019), investigated the collective imaginary of informal housing construction in Bogotá. These studies highlight the importance of approaching informality from different perspectives, considering social, economic, political and cultural aspects, and promoting the participation of informal dwellers in urban development processes.

At the national level, four precedents are mentioned, Izaguirre. (2017), conducted an analysis of informal constructions on hillsides and their influence on the safety of the inhabitants of the district of Independence in Lima. The results revealed that the safety of the inhabitants is significantly related to informal constructions. The study conducted by Castañeda (2021) examined the presence of informality in the construction industry and its influence on social

welfare in the district of Trujillo, concluding that informal civil construction has unfavorable consequences for community welfare in that district.

The study carried out by López (2019) focused on the implementation of urban and architectural strategies with the objective of revitalizing the urban image of the road known as San Pedro in Chepén. Through this research, architectural and urban elements of relevance for the improvement of the urban image in said study area were identified. Alayza (2019), examined the strategic model of informal housing constructions and their impact on the environment in the Villa wetlands, in the district of Chorrillos. It found an increase in informal constructions and environmental affectations in that area. These studies highlight the need to address informal construction and its impacts on safety, social welfare, urban image and the environment.

The study is supported by several theories; the dualistic marginality theory, which highlights the lack of belonging in society as a cause of marginality. The formalization theory, which seeks to reduce poverty and improve the quality of life through access to property titling. Turner's housing theory (1968), which highlights the preference of the poor for larger houses and the gradual improvement of these units. As for the urban image, it is analyzed from the Gestalt Theory and Kevin Lynch's (1984), which argues that human perception is based on an integrated process, and the latter which emphasizes the interaction between the observer and his environment.

In conceptual terms, the study addresses informal residential constructions, such as those built on vulnerable land, with inadequate materials, lacking technical advice and appropriate construction plans, resulting in problems of building quality, such as deficient structures and low quality execution, increasing the risk of human and economic losses in the event of seismic movements. Five dimensions related to this topic are described: building quality, construction process, urban-architectural design and construction materials. These dimensions cover aspects such as the satisfaction of consumer needs, the stages required for construction, the creation of living spaces and the contribution of materials to the functioning of the infrastructure.

Whereas, the urban image refers to the correspondence between people and the physical environment of the city, being a representation of the formal and symbolic elements of the city. It is constructed through a perceptual process and is an accumulation of individual images that create cultural identity. The dimensions of the urban image include pavements and roads, street furniture, vegetation and trees, public space and urban aesthetics; the first refers to the streets and roads of the city and its asphalt structure, the vegetation, such as trees, bushes, grasses, etc., which contribute to the composition and structure of urban ecosystems. The public space is where the inhabitants express their common interests and establish links. Finally, urban aesthetics is not exclusively attributed to the physical components of the city, but rather a subjective experience of the residents in identifying and choosing the spaces that are attractive and meaningful for them to carry out their daily activities.

III. METHODOLOGY

The study uses an applied methodology with a quantitative approach. A cross-sectional nonexperimental correlational design is used to describe the relationships between informal residential constructions as the independent variable and urban image as the dependent variable. The population was made up of technical workers of the Urban Development Management of the MPT during 2021, which included engineers and technicians hired and appointed who were performing their duties, while those who were on medical leave, on vacation or engaged in other errands were excluded. The sample used was the same as the population, composed of 30 technical workers, requiring no sampling method. The unit of analysis was each technical worker.

The study operationalizes each of the variables by means of five dimensions, the technique used was the survey, applying a corresponding questionnaire as an instrument to evaluate each variable. Both with 25 questions and represented in an ordinal scale of measurement with levels of "High", "Medium" and "Low" and levels of "Good", "Fair" and "Bad" respectively, while the evaluation

of the answers was carried out using a Likert-type ordinal scale ranging from category 1 as total disagreement to 5 as total agreement. The aforementioned instruments met the validity and reliability assessments. Four experts evaluated the relevance and content of the questionnaires, obtaining excellent validity results according to Lawshe's content validity index (0.94 for the V.I and 0.92 for the V.D). To measure internal consistency, Cronbach's Alpha coefficient was used, obtaining very acceptable and good reliability values of 0.759 for the V.I and 0.814 for the V.D. In the data analysis, descriptive and inferential statistical methods were used.

Frequency distribution tables were generated and statistical tests, such as the Shapiro-Wilk test, Spearman's Correlation Coefficient and linear regression, were performed to obtain conclusions and inferences about the hypotheses raised in the study. The SPSS V26 statistical program was used to carry out these analyses.

Important ethical aspects were also considered, such as logical review of the data collected to ensure consistency in the interpretations, adequate design to ensure scientific validity and avoid bias. The selection of participants was carried out in an equitable manner, ensuring that all had an equal opportunity to contribute. Informed consent has been obtained from the participants, who have given their conscious and voluntary approval. The study has been conducted independently, without outside influence. The researcher has acted with probity, presenting the results in an honest manner and avoiding modifying them to suit interests or biases. In addition, transparency has been promoted by disclosing the research in an accessible manner, allowing its replication and verification in different contexts, fostering trust and scientific contribution.

IV. RESULTS

Table 1: Levels of variables and their dimensions

VARIABLE		LEVELS			
		UNDER	MEDIO	ALTO	TOTAL
V.I	INFORMAL CONSTRUCTIONS FOR RESIDENTIAL USE	2(6.7%)	18(60.0%)	10(33.3%)	30(100%)
	D1	2(6.7%)	18(60.0%)	10(33.3%)	30(100%)
	D2	1(3.3%)	20(66.7%)	9(30.0%)	30(100%)
	D3	3(10.0%)	17(56.7%)	10(33.3%)	30(100%)
	D4	1(3.3%)	18(60.0%)	11(36.7%)	30(100%)
	D5	0(0.0%)	22(73.3%)	8(26.7%)	30(100%)
V.D	URBAN IMAGE	9(30.0%)	20(66.7%)	1(3.3%)	30(100%)
	D1	12(40.0%)	16(53.3%)	2(6.7%)	30(100%)
	D2	12(40.0%)	18(60.0%)	0(0.0%)	30(100%)
	D3	11(36.7%)	16(53.3%)	3(10.0%)	30(100%)
	D4	9(30.0%)	21(70.0%)	0(0.0%)	30(100%)
	D5	10(33.3%)	20(66.7%)	0(0.0%)	30(100%)

According to Table 1, most of the technical workers considered that informal residential construction in the El Molino Sector has a medium level (60.0%), 33.3% consider the level to be high and only 6.7% consider it to be low. In terms of dimensions, the predominant level in each dimension is also medium, with outstanding percentages of 60.0% for building quality (D1), 66.7% for construction process (D2), 56.7% for urban-architectural design (D3), 60.0% for construction materials (D4) and 73.3% for seismic vulnerability (D5). On the other hand, 66.7% of the technical workers consider that the urban image of the Sector is regular, 30.0% consider it bad and only 6.7% consider it a good image; when analyzing its dimensions, it is observed that the predominant level in each dimension is also regular, with outstanding percentages of 53.3% in pavements and roads (D1), 60.0% in urban furniture (D2), 53.3% in vegetation and trees (D3), 70.0% in public space (D4) and 66.7% in urban aesthetics (D5).

Table 2: Contingency table between informal constructions and urban image

| VARIABLE | VARIABLE | URBAN IMAGE | | | |
		UNDER	MEDIO	ALTO	TOTAL
INFORMAL CONSTRUCTIONS FOR RESIDENTIAL USE	UNDER	0(0.0%)	1(3.3%)	1(3.3%)	2(6,7%)
	MEDIO	0(0,0%)	18(60,0%)	0(0,0%)	18(60,0%)
	ALTO	9(30,0%)	1(3,3%)	0(0,0%)	10(33,3%)
D1	UNDER	0(0,0%)	1(3,3%)	1(3,3%)	2(6,7%)
	MEDIO	0(0,0%)	18(60,0%)	0(0,0%)	18(60,0%)
	ALTO	9(30,0%)	1(3,3%)	0(0,0%)	10(33,3%)
D2	UNDER	0(0,0%)	0(0,0%)	1(3,3%)	2(6,7%)
	MEDIO	1(3,3%)	19(63,3%)	0(0,0%)	18(60,0%)
	ALTO	8(26,7%)	1(3,3%)	0(0,0%)	10(33,3%)
D3	UNDER	0(0,0%)	2(6,7%)	1(3,3%)	2(6,7%)
	MEDIO	0(0,0%)	17(56,7%)	0(0,0%)	18(60,0%)
	ALTO	9(30,0%)	1(3,3%)	0(0,0%)	10(33,3%)
D4	UNDER	0(0,0%)	1(3,3%)	0(0,0%)	2(6,7%)
	MEDIO	0(0,0%)	17(56,7%)	1(3,3%)	18(60,0%)
	ALTO	9(30,0%)	2(6,7%)	0(0,0%)	10(33,3%)
D5	UNDER	0(0,0%)	0(0,0%)	0(0,0%)	2(6,7%)
	MEDIO	1(3,3%)	20(66,7%)	1(3,3%)	18(60,0%)
	ALTO	8(26,7%)	0(0,0%)	0(0,0%)	10(33,3%)

According to the data, most of the employees consider that informal housing construction and urban image have average and regular levels. In particular, it is highlighted that around 60% of the workers consider that both variables have an average level in relation to dimension 1: building quality, dimension 2: the construction process, dimension: the architectural urban design, dimension 4: the materials used and dimension 5: seismic vulnerability.

In addition, the normality test was performed using the Shapiro-Wilk statistic to analyze the distribution of the variables. The results indicated that none of the variables had a normal distribution, so the coefficient, a nonparametric test (Spearman's Rho), was used to analyze the correlation between them.

Table 3: Influence of informal constructions on urban image

VARIABLE INDEPENDENT	DEPENDENT VARIABLE	CORRELATION COEF. CORRELATION COEF.	SIG.	R SQUARE
INFORMAL CONSTRUCTIONS FOR RESIDENTIAL USE		Rho=-7.26	p=0,000	0,895
D1: BUILDING QUALITY		Rho=-7.54	p=0,000	0,802
D2: CONSTRUCTION PROCESS	URBAN IMAGE	Rho=-6.59	p=0,000	0,784
D3: URBAN ARCHITECTURAL DESIGN		Rho=-7.85	p=0,000	0,788
D4: CONSTRUCTION MATERIALS		Rho=-7.02	p=0,000	0,755
D5: SEISMIC VULNERABILITY		Rho=-614	p=0,000	0,720

The relationship between informal residential buildings and each of their dimensions in the urban image of the El Molino Sector is evidenced by Spearman's correlation coefficients and significance levels, which indicate a significantly inverse influence. According to the linear regression analysis, it was determined that informal residential buildings contribute 89.5% (R^2) to the urban image, while the remaining 10.5% can be attributed to other factors. Likewise, it is observed that the 5 aspects of these constructions also exert a significant inverse influence on the urban image, with influence percentages ranging from 72.0% to 80.2%.

V.   DISCUSSION

The rapid growth of cities and the demand for housing have boosted informal construction, which lacks adequate regulation by municipal authorities, generating a disorderly and visually contrasting urban growth in terms of materials and construction techniques (Ugalde, 2018). The lack of regulations and supervision, as well as costly and complicated administrative procedures to obtain construction licenses, contribute to informality in construction (Gaillard, 2020).

The relevance of the topic of study is highlighted when considering that informal constructions affect various aspects, such as safety, aesthetics and urban image. According to the data collected in this study, the majority of technical workers consider that in the El Molino Sector there is a medium level of informal constructions for residential use. These findings are complemented by the study of López (2016), which highlights how informality has been integrated into the spatial and social configuration of certain territories in developed cities. However, urban informality is only one aspect of the problematic situation of economically deprived sectors when integrating into the city, so it is necessary to consider social informality, economics, politics and culture in a comprehensive manner.

The informal residential construction variable was addressed in 5 dimensions in which the predominant level is the medium level, with values ranging from 56.7% to 73.3%. These results are complemented with the study by Alayza (2019), who discovered a clandestine increase of buildings in the swamps of Villa, built without the corresponding license. In addition to observing that precarious dwellings dump their organic waste plainly on the ground, generating contamination in the environment, including water, air, animals and plants and that cleanup programs and campaigns have been effective in addressing this specific problem.

On the other hand, 66.7% of the technical workers consider the urban image of the El Molino Sector to be fair. 30.0% rate it a bad image and only 6.7% consider it a good urban image; results that are complemented by the research of Guerrero (2019)who concludes that the future of today's cities is linked to coordination and joint planning with the urban development of informal areas, managing to recreate an example of a city, promoting integrity and sustainability, taking into account both the formal and informal sectors, focusing on popular settlements, the people who live there, their daily routine, the challenges they face as a community and the collaboration of external individuals.

The image variable was also addressed in 5 dimensions, in which the predominant level is regular, with values ranging from 53.3% to 70.0%. These results are supported by the foundations of Lynch's theory (1978), who says that the city is the place where human interactions take place and its presence is evidenced by architectural structures, public areas, roads and spaces that facilitate the social, economic, cultural and political coexistence of residents. The interaction between the observer and his surroundings, known as urban image, is not limited only to the visual, but also involves sensory impressions such as sound, smell, taste and texture.

The correlational analysis reveals that there is a negative and high correlation, supported by a Rho of -0.726 (Spearman coef.) and a $p < 0.01$ (sig.), indicating that informal constructions have a considerable and negative impact on the urban image of the El Molino Sector in Trujillo. In addition, it is determined that 89.5% of the urban image can be attributed to informal constructions of residential use, while 10.5% can be caused by other factors. Similar results were obtained when establishing the relationship between each of the dimensions of the informal constructions variable in the urban image, obtaining high and negative relationships in each case.

When comparing these findings with the study conducted by Castañeda (2021), a similarity is established since it concludes that residential buildings tend to be informal, which negatively affects the optimal development and welfare of society (T Kendall= 0.714 and significance < 5%). These results find support in Turner's (1968) principles, which emphasize that a residence should consider its environment and not only its physical characteristics. However, families' priorities vary according to their economic situation and that the poor give less importance to physical conditions and urban amenities, preferring larger dwellings that can be gradually improved and adapted to their needs. Turner criticizes traditional housing policies based on modern minimum standards as generating high costs for both the government and the poor. According to Turner, residents can save up to 50% of the costs by progressively developing their own housing.

VI.   CONCLUSIONS

The study, carried out in 2021, determined that approximately 60.0% of the technical workers of the Urban Development Management of the MPT consider that informal constructions for residential use in the El Molino Sector are at a medium level. In addition, according to 66.7% of the same workers, the urban image in the El Molino Sector of the city of Trujillo during that same period is at a regular level.

It was also shown that informal constructions have a significant and negative influence on the urban image, including building quality, construction process, urban-architectural design,

materials used and seismic vulnerability. These variables influence urban image to different degrees, with percentages ranging from 72.0% to 89.5%, while the rest can be attributed to other causes.

The topic under study addresses the relevance of informal constructions, highlighting their implications both in terms of safety for residents and in the aesthetic, landscape and urban image of the area. The lack of technical advice on seismic vulnerability puts the safety of the people living in these constructions at risk. In addition, informal construction is the result of the absence of clear regulations and inadequate supervision by the responsible authorities. This lack of regulation and supervision allows land owners or occupants to build in areas that are vulnerable and represent a high risk, without taking adequate measures to mitigate these hazards.

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