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Visual pollution in the intensive preservation area of Sucre´s Historic Center A Regulatory Approach

Contaminación visual del área de preservación intensiva del Centro Histórico de Sucre Una aproximación desde la normativa

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Abstract

This research aims to demonstrate the impact signs have on visual pollution of the Historic center of Sucre, Bolivia, by identifying conflict points and areas of opportunity. The sample comprises current commercial signs in the intensive preservation area of the city, which UNESCO has designated a World Heritage Site. The study adopts a mixed-methods, multidisciplinary approach, combining quantitative and qualitative methods. The findings show that identifying samples in conflict areas and developing proposals that comply with the regulations can produce a visual communication model which, when reinforced through education about the regulations, provides an alternative for addressing visual pollution. The sample indicates that an excess of visual elements degrades the urban image.

Keywords: Visual communication, visual pollution, public space, urban identity, cultural heritage

Resumen

Esta investigación tiene por objetivo evidenciar la incidencia que tienen los letreros en la contaminación visual del Centro Histórico de Sucre, Bolivia, identificando puntos de conflicto y áreas de oportunidad, tomando como muestra letreros comerciales actuales en el área de preservación intensiva de la ciudad declarada por la UNESCO Patrimonio Cultural de la Humanidad. Se considera un enfoque mixto y multidisciplinar, combinando métodos cuantitativos y cualitativos. Se evidencia que, a partir de la identificación de muestras en áreas de conflicto y las propuestas acordes a normativa, se logra un modelo de comunicación visual que —fortalecido por la educación sobre la norma— se constituye en una alternativa para la solución a la contaminación visual, considerando que la muestra afirma que los excesos de elementos visuales deterioran la imagen urbana.

Palabras clave:Comunicación visual, contaminación visual, espacio público, identidad urbana, patrimonio cultural

Introduction

Visual pollution in heritage areas is defined as the presence of elements that generate discontinuities in facades of buildings of artistic and historical value, directly altering their visual coherence and integrity (Lozano Castro *et al*., 2025). This phenomenon takes the form of several specific pollutants, among which advertising graphics, inadequate signage, unfinished construction work and the accumulation of " graphic waste" or materials attached to non-authorized surfaces stand out (Santamaría Freire *et al*., 2024). These factors accelerate the visual degradation processes, a concept that encompasses the aesthetic deterioration of the heritage and demands the development of specific technical protection guidelines to mitigate its progression (Albarrán-Periáñez *et al*., 2023).

Beyond physical damage to structures, the visual pollution has a profound impact on the citizens' perception and the user experience. It has been observed that 92% of the population tends to identify the heritage just by its aesthetic features, ignoring or overlooking the underlying pathological process of underlying deterioration ((Aguirre Ullauri *et al*., 2023). This simplistic view not only makes conservation work more difficult, but also is further aggravated by psychophysiological effects in citizens, such as visual fatigue and mental exhaustion, resulting from the stimulus saturation and the disorganized academic signage (Santamaría Freire *et al*., 2024).

On the other hand, the emphasis on the visual perception within the United Nations Educational, Scientific and Cultural Organization (UNESCO) framework for heritage cities could exclude contemporary conceptions of the heritage in historical places. The preeminence of certain aesthetic or commercial codes tends to marginalize alternative forms of culture and to restrict contemporary interpretations of the historical space (García-Esparza, 2022). In this sense, the urban image distortion highlights the need to update regulations aimed at harmonizing the urban development and the commercial advertising with the graphic and historical heritage conservation, thereby ensuring the preservation of the collective memory and the integrity of the urban image (Lozano Castro *et al*., 2025).

Among the most common causes of pollution are excessive signage and advertising, disorderly urban infrastructure, such as overhead utility lines, utility poles, and antennas, as well as litter and dumping sites that have been set up haphazardly and without enforcement of current regulations; however, buildings constructed in violation of regulations also play a significant role, creating chaos and visual disorder in the urban image.

These excessive conditions in urban spaces create poor living conditions, resulting in the visual stress, eye strain and reduced safety generated by the excess of visual stimuli that increase the possibility of traffic accidents.

However, because these are urban heritage sites, this is compounded by the negative impact on tourism, since excessive visual clutter creates an unattractive, cluttered urban image, which, in turn, affects the local economy, as tourism is the main driver of economic growth in historic districts.

Beyond these general considerations, let us now consider those Latin American contexts, such as El Salvador, Colombia, Bolivia, whose historic centers are valuable due to their architecture and urban image.

El Salvador has advertising guidelines that address placement regarding thein relation to the facade, duration, the location in the public space and surface area, thus constituting in a valuable ordinance for the preservation of the historic center's urban image.

In Cartagena de Indias, Colombia, a visual decontamination guide for the historic center has been developed. It addresses specific aspects of signs, including typologies, materials, dimensions, and the application procedure itself.

In Sucre, Bolivia, the **Reglamento de Anuncios y Letreros para el Centro Histórico de Sucre** (Regulations on Advertisements and Signs for Sucre's Historic Center) is in force. This helps control the visual pollution generated by advertising and signage, and addresses materials, location, and design, among other matters, in order to safeguard balance and harmony in the urban image of the city's intensive preservation area. An examination of this area of Sucre's historic center reveals an excessive number of signs, which affects the **architectural beauty** and the **heritage nature** of the city, designate a UNESCO World Heritage Site in December 1991. Local authorities have identified the problem and are implementing measures to mitigate it.

This proliferation of signs is primarily the result of the **commercial signage**, which is excessive in regard to each property, besides the signs themselves are made of prohibited materials and with dimensions that are not appropriate for its context, which affects the perception of the architectural aesthetics.

Likewise, there is an excessive wiring on the facades of Category A, B, and C buildings, which, together with poles, saturate the visible urban image of citizens and tourists.

At the same time, the visual pollution goes hand in hand with changes in land use, which in recent years has been seen saturated by the commercial use that originally was residential.

In response to this issue, the Gobierno Autónomo Municipal de Sucre has taken action on several fronts to seek a solution. One is the **regulation**, consequently it has issued specific regulations, such as the Reglamento de Anuncios y Letreros for the Centro Histórico de Sucre (Decreto Municipal Nº 54/22), which regulates the installation of commercial signage to ensure that they are coherent with the heritage aesthetic.

From the executive dimension, it promotes the periodical **cleanup and inspection operations.** Thus, the Subalcaldía del Distrito 1 and the Dirección Municipal de Medio Ambiente carry out operations to remove polluting elements, like banners, posters, and unauthorized advertising.

For its part, visual pollution in the intensive preservation area of Sucre's historic center is mainly approached through a **specific municipal regulation**, that regulates elements that affect the aesthetics of the heritage urban image. The key regulations are the Reglamento de Áreas Históricas and the specific rules for announcements and signs.

- **Reglamento de Preservación del Patrimonio Histórico (Ordenanza Municipal Nº 003/98):** Establishes the basis for the historical area protection. Classifies properties in different categories (A, B, and C) according to its heritage value (monumental, preservation or integration), and establishes general principles for its conservation, including restrictions about external modifications that could alter the visual harmony of the ensemble.

- **Reglamento de Anuncios y Letreros para el Centro Histórico de Sucre (Decreto Municipal Nº 54/22 y RG.M-077-2024):** This regulation is the most directly applicable to the visual pollution generated by advertising and signage. Establishes strict rules about:

    - **Materials:** Prohibits the use of artificial materials or prone to rapid deterioration, such as the particleboard.

    - **Location and dimensions:** Specify where the signs can be placed (generally attached to the facade, non perpendicular in intense traffic zones) and requires them to be separated from decorative architectonic elements such as moldings or pilasters.

- **Design:** Seeks visual harmonization with the environment, limiting the size, the illumination and the type of font to not disrupt the colonial aesthetic of the city, recognized as a UNESCO World Heritage Site.

Intensive Preservation Areas

Inside the zoning, the area for intensive preserving (Category A) includes properties and public spaces with the greatest monumental value. The rule is stricter in these zones, seeking to preserve the original image and the architectural integrity of buildings. However, the lack of an effective oversight body, such as the now-defunct Plan de Rehabilitación de Áreas Históricas de Sucre, has made compliance difficult. Various studies and reports point out a significant gap between the established regulations, that seeks to mitigate the visual pollution by the detailed regulation of signs and the preservation of the original architecture, and its practical application in the urban context.

The following section describes some previous studies related to the subject of study, as well as the research problem, the context, the purpose of this study, and its impact.

Theoretical foundation

Lynch (2018), as cited by Peláez (2018) in *La imagen de la ciudad,* presents multiple starting points for analyzing the urban phenomenon, arguing that, unlike an architectural work, the city also constitutes a construction in space, but on a much larger scale

He also asserts that the city's dynamic elements, especially people and their activities, are just as important as its inert physical components, in which we are not merely observers of the spectacle but part of it, and in which our perception of the city is often not continuous but rather partial and fragmentary (Lynch, 1964, 1984).

Urban spaces incorporate a variety of elements within their layout that make pedestrian and vehicular areas safer. These elements may include: benches, trash cans, telephone booths, signage, playground equipment, streetlights, and commercial advertisements (Bazant, 1983). Of all these elements, commercial advertisements are the greatest source of visual pollution in an urban space; not only because of the enormous variety of content they offer but also because of their great diversity of sizes, shapes, colors, and locations (Bazant, 2009; Casarin, 2019; Moreno and Acosta, 2015).

In response to this tangible reality across urban contexts, Bazant (2009) asserts that visual order in terms of size, shape, and location would not only contribute to visual cleanliness in urban spaces but would also enable pedestrians to perceive and read the space more clearly.

According to Sánchez (2021), historic urban landscapes endow the city with certain characteristics that make it identifiable, as do the lively urban settings occupied by citizens moving about outside their homes.

On the other hand, Troitiño Vinuesa (1998) argues that interpreting cultural heritage as a source of wealth, rather than merely as an expense, opens up new avenues for action when addressing the relationships among culture, tourism, commerce, and other fields. It is within this complex and diverse context that the analysis and evaluation of protection and recovery policies for historic centers becomes important.

Aguirre Ullauri *et al*. (2020) explain that the diversity of pollutants involved is reflected in a set of elements through the excessive manipulation of size, color, materials, quantity, order, or distribution. Furthermore, encroachment on public streets is a major contributor to pollution, followed by building facades that are obscured or marred by the indiscriminate placement of signs, as well as excessive, chaotic, and unregulated signage and mounting structures on commercial establishments, as is the case in Sucre.

In this context, historic centers, which are an important and essential part of cities, experience urban growth that is often uncontrolled and that, over recent decades, have created areas, neighborhoods, or territories with structures that differ from the grid layouts typical of historic centers.

According to the Gobierno Autónomo Municipal de Sucre (2021), the area designated as intensive preservation zone in Sucre, as defined by the Municipal Land-Use Plan, contains 3,964 properties, of which 2,231 fall under the heritage category to be preserved (Categories A, B1, and B2), accounting for 53.36%, while the remainder fall under categories C1, C2, and C3, which correspond to new buildings or vacant lots, classified under the integration category.

This research focuses on the signs located in the intensive preservation area of the historic center of the city of Sucre. As noted by the Gobierno Autónomo Municipal de Sucre (GAMS, 2021, 2022), the municipality of Sucre is one of the most important tourist destinations due to the historical and architectural richness of its monumental buildings, which earned it "UNESCO World Heritage Site" status in 1991.

According to Barriga (2017), visual pollution in historical centres has been addressed by municipal governments in several Bolivian departments since the 1990s, including those from Sucre, La Paz, Cochabamba, in order to regulate the characteristics of signs and enhance these areas and the architectural and urban potential.

Barriga (2017) states that, in most cases, passersby are unaware of or disregard the heritage value of the streets, because advertising

saturation creates a setiing in which attention is drawn solely to the ground floor level, blocking views of the upper stories that make up the urban heritage image.

On the other hand, the *Reglamento de Anuncios y Letreros para el Centro Histórico de Sucre* (GAMS, 2022), which regulates shapes, colors, sizes, location, layout, materials, lighting, and other characteristics, and establishes mechanisms for its implementation in the historic center of the city of Sucre, thereby safeguarding the harmony of the ensemble and enabling a proper appreciation of the architectural richness recognized by UNESCO, states that visual pollution is any advertising that, due to its excessive size, oversaturation of text or images, poor material quality, poor state of repair, or inappropriate location, negatively affects people as a result of urban disorder or visual chaos. It also defines what it terms negative advertising, as advertising that covers or obstructs natural or panoramic views, surrounding vegetation, road safety signs, the building on which the advertisement is placed, or the immediate urban environment (GAMS, 2022).

It is important to understand that visual pollution affects various areas, such as the economy and health (Universidad Nacional Autónoma de México, UNAM, 2019). Organizations such as the World Health Organization (WHO) indicate that 40% of people who live in an apartment or work in an office with unpleasant images tend to become depressed.

Similarly, Pérez Manrique (2022) asserts that the haphazard use of space, architectural disorder, and ill-conceived interventions not only affect the physical and mental health of pedestrians but also undermine the quality of the urban heritage image, degrade historical and cultural heritage, and result in lost opportunities.

For his part, Maron Curasi (2023) asserts that most of the pollution stems from advertising signs and commercial establishments selling light fixtures (light bulbs), elements that generate light pollution exceeding the acceptable limits established by international organizations.

Another valuable contribution comes from Pérez Manrique (2022), who argues that images have become a fundamental communication tool, as they serve to convey a message, influence the observer, or elicit a response. The author notes that images, whether of a person, an object, or a place, conveys positive or negative stimuli to the viewer.

Thus, in the specific case of an urban image, it is essential to identify its characteristic features and reinforce them. An image, for example, can become an icon, and its richness lies precisely in the fact that it brings together meaningful elements that we are all able to recognize throughout our lives and that connect us to the community of which we are a part.

According to the indicators proposed by Maron Curasi (2023) regarding the consequences of visual and light pollution, 10.16% of people report difficulty concentrating, 20.33% report irritability, 47.45% report discomfort, and 22.06% report distraction. Furthermore, the main problems caused by visual pollution are reported to include stress, headaches, dizziness, and anxiety.

In order to mitigate and better understand these effects, Castro Ortega (2021) uses Tukey's test to analyze the interaction among the variables, considering measurements of pollutants, the roads evaluated, and the days evaluated, while also conducting surveys of the population to examine, among other topics, the health problems caused by visual pollution. The author concludes that, for 42% of respondents, the greatest problem is psychological, followed by mood, the nervous system, and the cardiovascular system.

In light of these realities, Pérez Manrique (2022) argues that one mitigation strategy is to educate the public and raise awareness of the concepts of visual and perceptual pollution and the problems they cause, thereby encouraging citizen participation and reversing the deterioration of urban centers.

Finally, Leva (2005) and Hernández (2017), as cited in Valdivia *et al*. (2020), state that the quality of life in urban space depends on its historical-geographical, dynamic, and multidimensional character, as well as on the realization of three dimensions: environmental quality, well-being, and identity.

All of the authors cited above serve as references for this research, in which, following an analysis, the importance of documenting, analyzing, measuring, and evaluating the impact of signs in urban spaces, particularly in cities' historic centers, is evident, especially in the case of Sucre, where no study of this nature has been conducted. This study thus contributes to scientific knowledge and municipal public policy aimed at improving citizens' quality of life by demonstrating the feasibility of conducting such a study in the future.

In this context, the objective of this research project is to demonstrate the impact of signs (graphic objects) on visual pollution in the historic center of Sucre by identifying points of conflict and areas of opportunity, based on a representative sample of current commercial signs in the intensive preservation area of central Sucre and an analysis of compliance with the sign regulations governing the heritage urban image through a data matrix that demonstrates compliance with current regulations.

Methodological design

The research was conducted using a mixed-methods, multidisciplinary approach that combined quantitative and qualitative methods to obtain a more complete understanding of the subject of study.

Type of research

The research is described as experimental according to the interaction of the variables. Thus, the independent variables are manipulated to observe their effect on the dependent variables, as indicated below:

a. According to the level of analysis: This is a correlational study, as it seeks to establish relationships among variables without manipulating them.

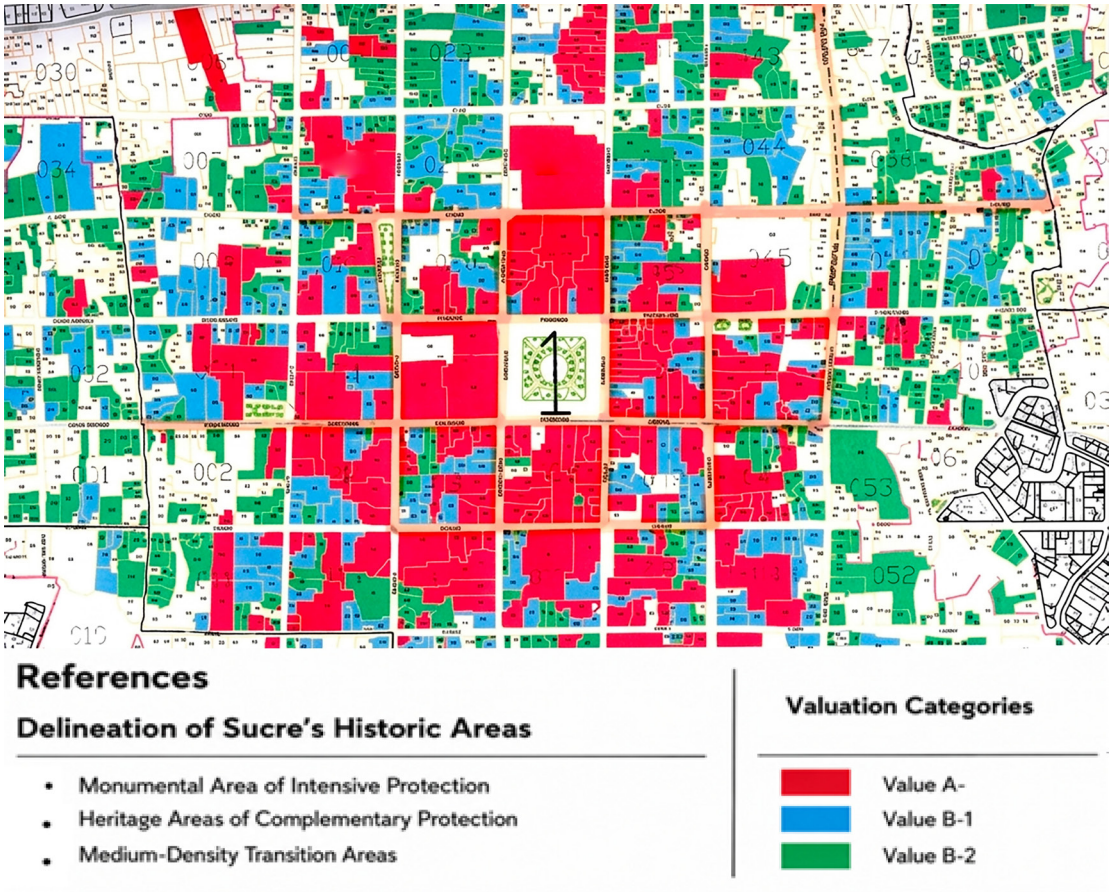
b. According to the type of inference: The research is based on the observation and the statistical analysis to infer relationships and generalize the results.

c. According to the time period: The research is cross-sectional, because data are collected at a single point in time.

Initially, the entire intensive preservation area of Sucre, Bolivia, was considered. According to the Municipal Land-Use Plan, this area contains 3,964 properties, of which 2,231 fall under the heritage categories to be preserved (Categories A, B1, and B2), accounting for 53.36%, while the remainder fall under Categories C1, C2, and C3, which correspond to new buildings or vacant lots classified under the integration category.

In accordance with the methodological process, several areas of conflict related to the city blocks surrounding the main square and the primary roads (based on traffic flow) have been identified and selected as the key sample for this study. These areas are located along Junín Street and Hernando Siles Avenue. They comprise 32 city blocks (as defined by the regulations) within a two-block radius of the central plaza (see Figure 1).

Figure 1
Historic areas of Sucre.



Note: Gobierno Autónomo Municipal de Sucre-Dirección de Patrimonio Histórico, 2024.

Figure 1 identifies the 32 city blocks where Category A properties, or properties under intensive protection, predominate.

Using the city block and lot codes shown in Figure 1, an individualized record has been created for each lot; in the vast majority of cases, these records contain more than one sign, exceeding the regulations that permits one sign per property.

The identification and characterization sheet for each sign is provided below.

Table 1

Identification and Characterization of Signs in the City of Sucre.

Item	Characteristics	Complies	Does not comply
Business name	Terra mall		
Public or private	Private		
Sign No./Business	1	x	
No. of signs/property	+5		x
Fastening system	Flush-mounted, parallel		
Lighting	Direct	x	
Material	Metal	x	
Language	Spanish	x	
Graphic symbol	Logo with symbol		
No. of words	-		
Shape and dimensions	Rectangle		

Note: Compiled by authors.

Once the conflict areas in Sucre's historic center had been identified, they were assessed in accordance with the current regulations set forth in Municipal Decree No. 77/2024 (GAMS, 2022), which take the following into account:

- Restricted area, consisting of two blocks around Plaza 25 de Mayo, which is the area of conflict in this research
- Types of advertisements and signs
- Amount of advertisements and signs per property
- Content and materials of advertisements and signs
- Location, shape, and dimensions

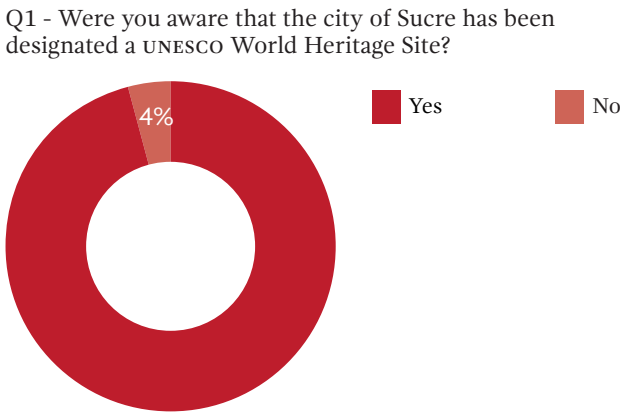
This assessment has made it possible, first, to create a database containing an individual record for each sign and, second, to generate statistical data to establish relationships between the type of property and the signs it displays, making it possible to communicate information about vulnerability indicators in Sucre's historic center.

A survey of the population of Sucre was also conducted with a total of 257 observations, examining respondents' knowledge of the regulations assessed above and the impact of signs on visual pollution in a historic center declared by UNESCO as cultural heritage.

Results

After the study was conducted in the intensive preservation area of Sucre's historic center, Bolivia, the survey produced the following results (see Figure 2):

Figure 2
Awareness of Sucre's designation as a UNESCO World Heritage Site



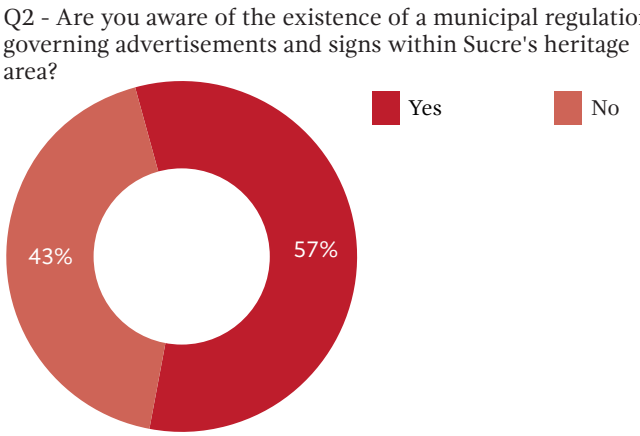
Note: Compiled by authors.

The results reveal a high level of awareness of the city's heritage status. As shown in Figure 2, 96.1% of respondents (247 of 257) confirmed that they were aware of the UNESCO designation, whereas only 3.9% (10 of 257) reported being unaware of it.

This markedly asymmetrical distribution shows that the city's status as a UNESCO World Heritage Site is widely known among the population studied.

Figure 3, however, shows a notable division in the level of awareness of the regulations.

Figure 3
Public awareness of the municipal regulations governing advertisements and signs in Sucre's heritage area.

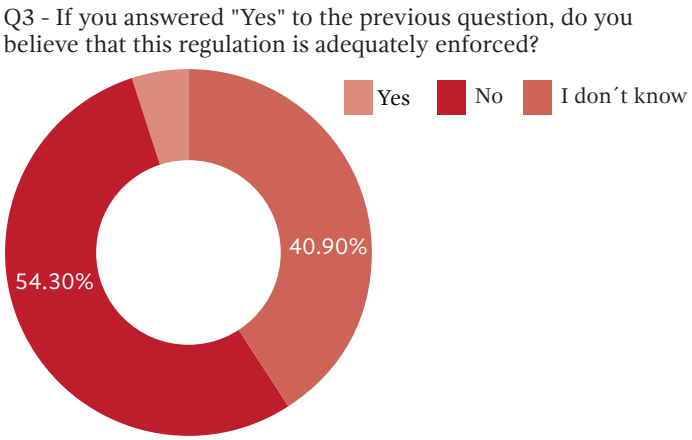


Note: Compiled by authors.

While 57% of participants (147 individuals) confirmed being aware of the existence of the regulation, a significant 43% (111 individuals) reported being unaware of it. Unlike the broad consensus shown in Figure 2, these data indicate a substantial lack of familiarity with the legal instruments intended to protect the UNESCO World Heritage Site and, consequently, Sucre's urban image.

Figure 4, in turn, shows a predominantly negative or uncertain perception of compliance with the regulation.

Figure 4
Perception of compliance with Sucre's municipal regulation.



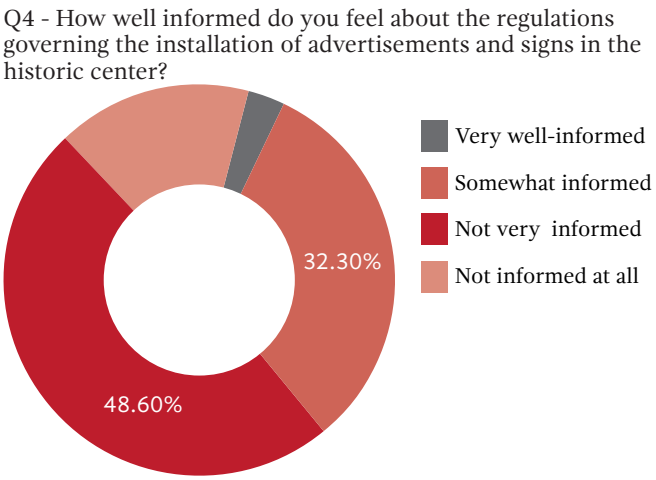
Note: Compiled by authors.

As indicated, 54.3% of participants (125 people) believe that the regulation is not being adequately complied with, while a notable 40.9% (94 people) say they do not know whether it is being complied with. By contrast, only 4.8% (11 people) believe that the regulation is being complied with.

In total, 95.2% of the sample either perceives noncompliance or is uncertain about its implementation, reflecting a clear lack of confidence in the effectiveness of the regulation.

Figure 5 also shows a significant deficit in the level of information respondents perceive themselves to have.

Figure 5
Perceived level of knowledge of the regulations governing the installation of advertisements and signs in the historic center.



Note: Compiled by authors.

The most frequent category, "Not very informed," accounts for 48.6% of the sample (125 people). In addition, 15.6% (40 people) consider themselves "Not informed at all," indicating that 64.2% of participants feel little or not at all informed about the regulations. By contrast, 32.3% (83 people) consider themselves "Somewhat informed," while only 3.5% (9 people) consider themselves "Very well informed."

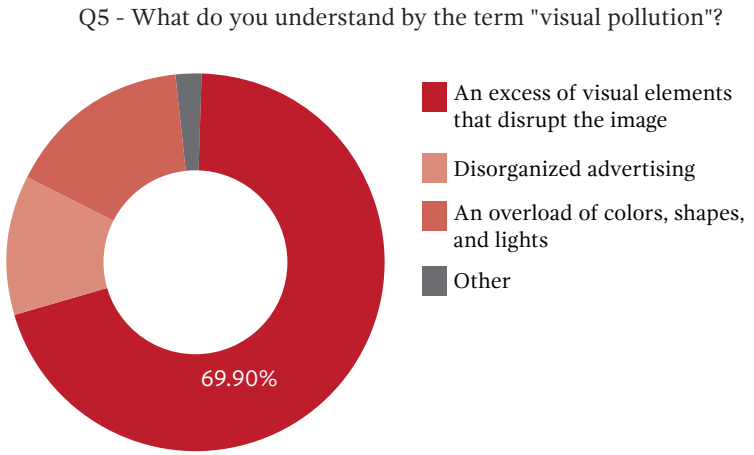
A summary of the information contained in Figures 2, 3, and 4 reveals a compelling argument: citizens value their heritage (see Figure 2), but a significant portion are unaware of the rules for protecting it (see Figure 3), and the vast majority perceive that these rules are not followed in practice (see Figure 4). This logical sequence fully justifies the need for a visual communication model that operates on three fronts: educating the public about the regulations, making them easy to apply, and, as a result, making compliance evident in the urban image, thereby reversing the current perception of disorder and ineffectiveness.

In summary, with regard to knowledge of regulations and cultural heritage, the findings reveal a robust understanding of cultural heritage that is, however, disconnected from the regulations, a disconnect interpreted as a communication failure that undermines preservation.

Addressing this gap through visual tools not only mitigates visual pollution but also strengthens Sucre's cultural sustainability, aligning with UNESCO's global objectives for living and participatory heritage.

Regarding this term, as can be seen in Figure 6, the data reveal a clear pattern in the understanding of "visual pollution."

Figure 6
Public understanding of the concept of visual pollution in Sucre's historic center.

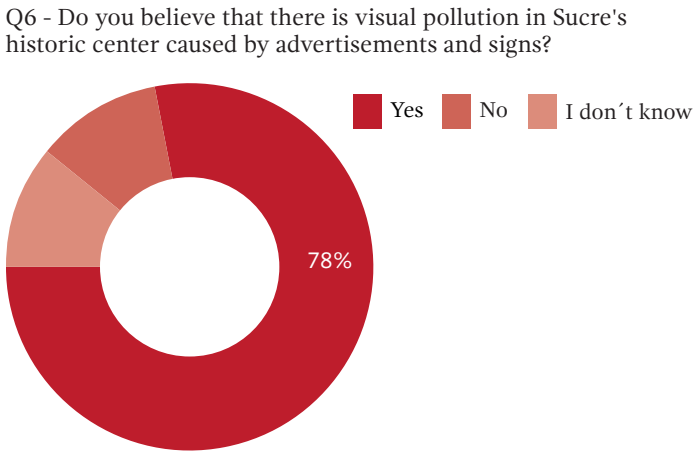


Note: Compiled by authors.

The majority, 69.9%, associate the term "visual pollution" with the most comprehensive definition: "An excess of visual elements that disrupt the image." Other options referring to specific aspects of the phenomenon received less support: 16.4% associated the term with "an overload of colors, shapes, and lights," while 12.1% linked it to "disorganized advertising." The "Other" category accounted for only 1.6%, indicating minimal preference for alternative definitions. Figure 6 therefore shows that the citizens of Sucre not only value their heritage (as shown in Figure 2) but also clearly understand one of the principal threats affecting it.

Furthermore, the data reflect a majority consensus regarding the existence of the problem, as shown in Figure 7.

Figure 7
Public assessment of the Impact of Advertising as a source of Visual Pollution.

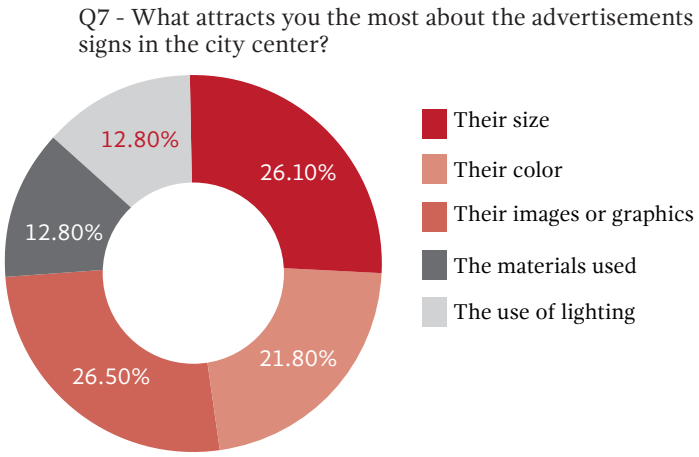


Note: Compiled by authors.

According to Figure 7, 77.8% of respondents (approximately three out of every four) state that commercial signage causes visual pollution in the heritage area. By contrast, 10.9% believe that no such problem exists, while 11.3% are undecided. Therefore, visual pollution is clearly a real problem for residents.

The advertisements displayed on the streets of the historic center have different characteristics that attract passersby's attention in different ways. As shown in Figure 8, the visual appeal of signs depends on multiple factors, with three attributes standing out clearly.

Figure 8
Advertising characteristics that have the greatest visual impact, according to residents.

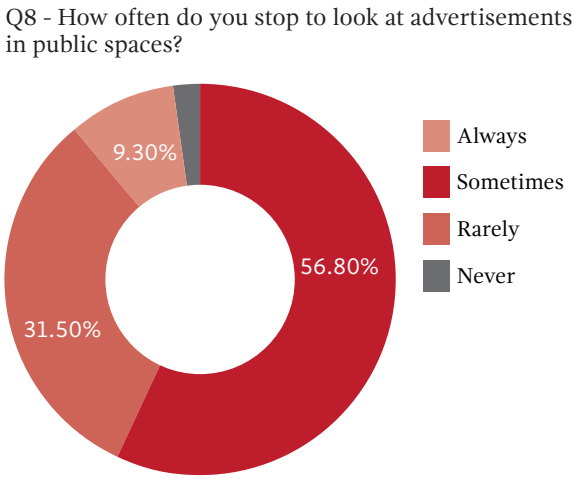


Note: Compiled by authors.

"Images or graphics" were the most frequently mentioned factor (26.5%), closely followed by "size" (26.1%) and "color" (21.8%). Together, these three elements account for 74.4% of responses, making them the principal factors in attracting attention. Meanwhile, "materials used" and "use of lighting" each accounted for 12.8%, playing a secondary role.

Regarding how often people observe advertisements in public spaces, as shown in Figure 9, deliberate attention to commercial signage is predominantly occasional.

Figure 9
Frequency of observing advertisements in public spaces: An indicator of urban visual saturation.



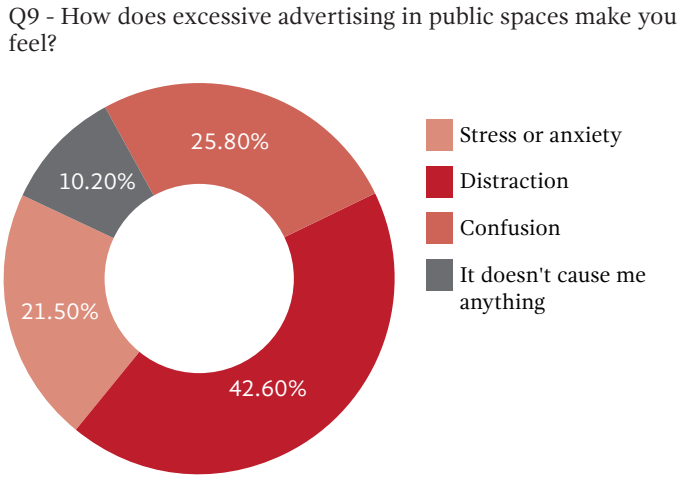
Note: Compiled by authors.

As shown in Figure 9, the most frequently selected category is "Sometimes," with 56.8% of responses. A further 33.9% of respondents observe signs infrequently, combining the categories "Rarely" (31.5%) and "Never" (2.4%). Finally, only 9.3% report that they "Always" stop to look at advertisements. In this regard, Figure 9 adds to the analysis by showing that the current signage model not only poses a problem for cultural heritage and citizens' well-being but is also ineffective as a communication tool. This reinforces the proposal for a visual communication model as a comprehensive solution that balances heritage preservation, citizens' comfort, and commercial effectiveness.

As for the impact of excessive advertising on the public, as shown in Figure 10, it is predominantly negative, affecting the well-being of passersby.

Figure 10

Psychological effects of excessive advertising in public space: Distraction and stress as the predominant feelings.

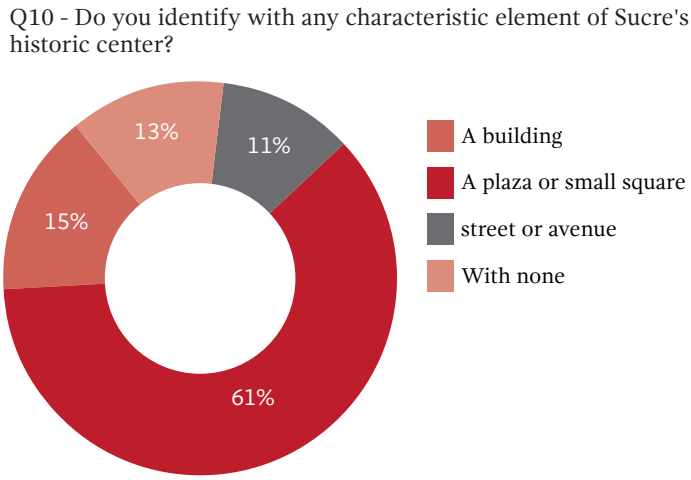


Note: Compiled by authors.

The graph shows that the most frequent feeling is "distraction," reported by 42.6% of participants, followed by "confusion" (25.8%) and "stress or anxiety" (21.5%). Overall, 89.9% of respondents experience some form of adverse effect due to advertising overload. Only 10.2% indicate that excessive advertising causes none of these feelings.

Regarding the sense of identification that citizens feel toward particular elements of the historic center, Figure 11 shows that public spaces, particularly plazas and small squares (61%), foster the strongest sense of identity, creating a substantial gap compared with individual architectural features ("a building").

Figure 11
Elements that anchor the urban identity of Sucre's historic center.

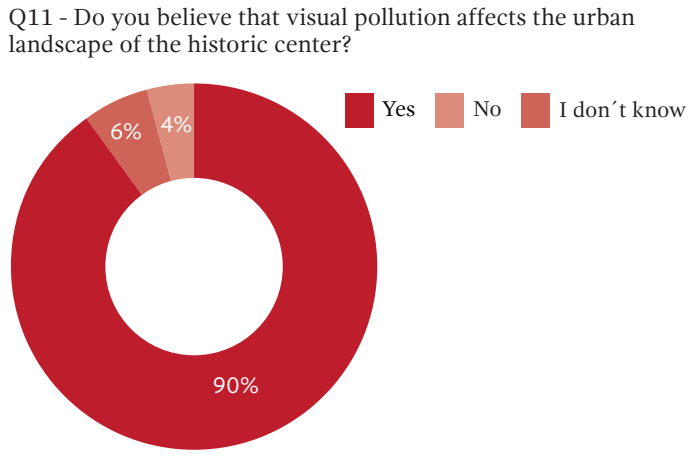


Note: Compiled by authors.

This result highlights an important point: the urban setting in which the heritage image is formed is of greatest interest to people, thereby demonstrating that citizens understand their heritage as a whole rather than as isolated elements.

Accordingly, the impact of visual pollution on the urban image of the historic center is generally perceived as negative, as shown in Figure 12.

Figure 12
Consensus on the negative impact of visual pollution on the urban image of the historic center.



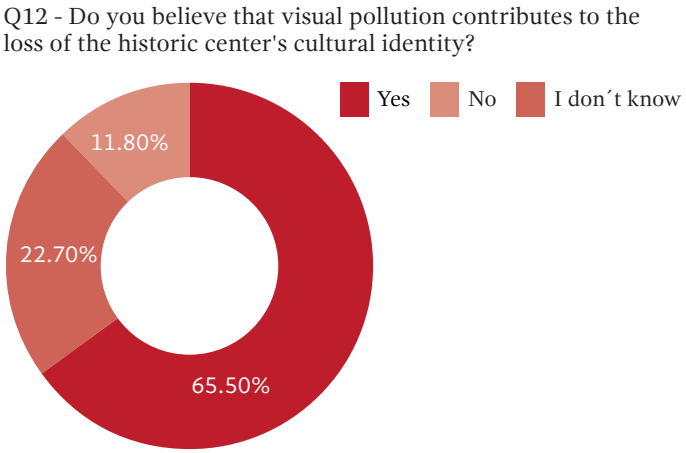
Note: Compiled by authors.

The results in Figure 12 show near-unanimous agreement. An overwhelming 89.8% of respondents state that visual pollution affects the urban image of the historic center. Opposing or uncertain opinions are marginal, accounting for only 10.2% of responses combined.

As mentioned, this finding reinforces the view that what matters to citizens is the urban environment as a whole rather than isolated elements.

In this sense of unity, visual pollution is perceived as a threat to the cultural identity of the historic center, as shown in Figure 13.

Figure 13
Perceived link between visual pollution and the erosion of the historic center's cultural identity.



Note: Compiled by authors.

The results in Figure 13 reveal that a clear majority of respondents associate visual pollution with the degradation of cultural identity. Thus, while 65.5% of participants believe that visual pollution contributes to this loss, 11.8% do not perceive this connection, and a notable 22.7% are uncertain or have no definite opinion on the matter.

The vast majority who feel that the identity of the place is being affected attribute this effect to various reasons (see Figure 14).

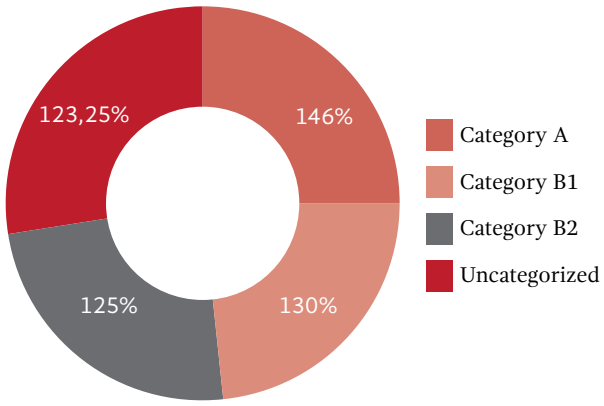
Figure 14
Reasons why visual pollution is considered to affect cultural identity.

Note: Compiled by authors.

Among the various responses provided, several common themes emerge, such as the fact that citizens identify with the city's historic center and believe that visual pollution causes it to lose its harmony, essence, colonial architectural character, and image as the "White City."

The graphs also reveal that the aesthetics of signs compete with architectural aesthetic standards, detracting from the beauty of the architecture (see Figure 15).

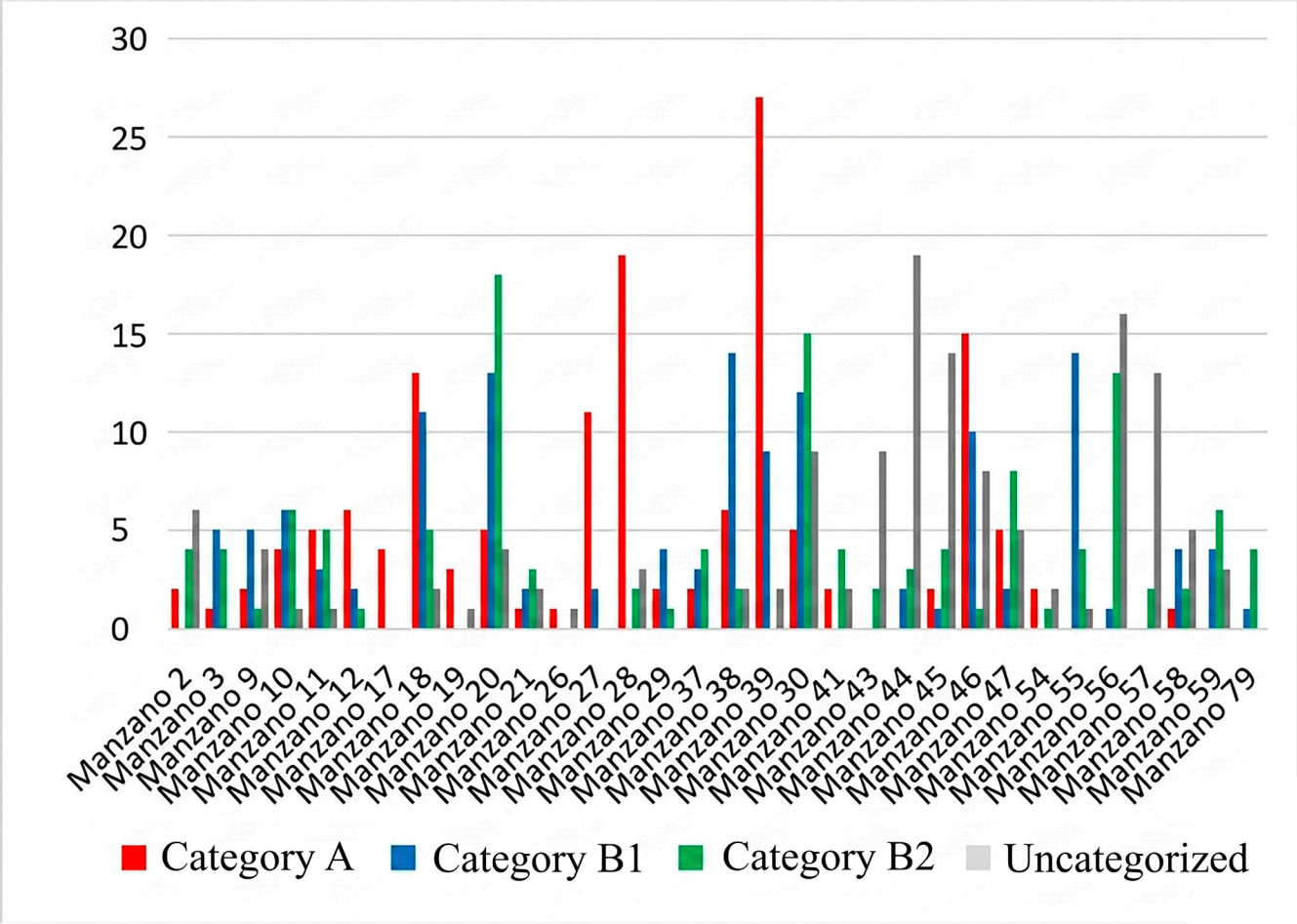
Figure 15
Relationship between Property Categories and the study area.



Note: Compiled by authors.

Likewise, returning to the territorial space and setting aside the population survey, a statistical assessment of the study area was conducted through its lots, understood both as the physical support for each sign and as tesserae in an urban mosaic that embodies social, cultural, and aesthetic value, thereby making the urban space itself vulnerable. According to the statistics, there is a predominance of Category A properties, that is, those designated for intensive preservation. Consequently, a total of 536 lots were identified across the 32 city blocks, of which 27% correspond to monuments under intensive protection (A), 24% correspond to properties under complementary protection (B1), and 24% correspond to properties in a medium-density transition area (B2), while 25% remain uncategorized (see Figure 16).

Figure 16
Study Area



Note: Compiled by authors.

From this group of lots, it is evident that the blocks immediately surrounding the main square contain a large number of Category A heritage properties, creating an urban image characterized by intensive

protection, as shown in Figure 16, where Blocks 19, 27, 28, 39, and 46 have the highest concentration of Category A properties.

Junín Street was selected as the conflict area because it contains the greatest number of elements contributing to visual pollution, considering the quantity per lot, façade surface area, materials, size, typeface, and number of words. This made it possible to select a sample to which all regulatory requirements could be applied, thereby generating a standardized, legible, clean, and visually comfortable communication model for human perception—one that is also universal, persuasive, relevant, appropriate to its context, and distinctive, so that the urban image conveys this experience to citizens.

Figure 17 presents two signs in their current condition and two proposed signs based on the correct application of the regulations.

Figure 17
Two existing signs compared with the signs proposed in this study

Note: Compiled by authors.

As previously noted, points of conflict were identified during this study. As shown in Figure 17, there are two commercial areas with an excessive number of signs, a situation that violates the current regulation, which permits only one sign per commercial establishment.

The proposed design is objective, as it rationalizes the number of signs in accordance with the regulation, which permits only one, and establishes dimensions and characteristics consistent with the provisions regarding size, color, and arrangement, thereby creating an urban image that is legible, not visually jarring, and comfortable for users during their stay in the area.

In this way, the proposed ideal sign models would make it possible to achieve visual harmony throughout the entire block, creating an urban image that combines identity and functionality.

Conclusions

This study establishes a direct relationship between advertising saturation and the degradation of the urban image in the intensive preservation zone of Sucre's historic center. Through a mixed-methods, multidisciplinary approach, it determines that the problem does not lie in the absence of legal instruments, but rather in a critical gap in regulatory implementation and communication.

The Paradox of Heritage and Regulatory Awareness

The results reveal a systemic contradiction: while 96.1% of citizens have a strong sense of belonging and awareness of the city's UNESCO World Heritage status, 64.2% feel poorly or not at all informed about the rules governing the aesthetics of the urban image. This information gap translates into a perception of impunity, with 95.2% of participants perceiving noncompliance with municipal regulations. This disconnect undermines the sustainability of living heritage, as citizens value the resource but are unaware of the mechanisms for its safeguarding.

Territorial vulnerability and visual saturation

Technical analysis of the 32 critical blocks confirms that Category A properties (monumental buildings) are the most vulnerable to commercial pressure. There is evidence of saturation with "graphic waste" along thoroughfares such as Junín Street and Hernando Siles Avenue, where the use of unauthorized materials, excessive dimensions, and the accumulation of more than one sign per façade fragment the historical reading of the building. The research demonstrates that the current advertising model is inefficient, even for businesses, since 56.8% of passersby ignore the signage due to visual fatigue, which invalidates the argument that invasive advertisements are necessary for economic competitiveness.

Impact on Human Identity and Well-Being

It has been confirmed that visual pollution has gone beyond mere aesthetics to become a factor contributing to psychosocial deterioration. According to the study, as a result of this pollution, 89.9% of residents experience negative feelings, such as distraction, stress, and anxiety, which compromise the habitability of the historic center. Likewise, 65.5% of those surveyed associate this disorder with a loss of cultural identity, noting that the "essence" of the White City is being eroded by an anarchic commercial language that competes with the principles of colonial aesthetics.

Value Proposition: The Visual Communication Model

In response, the visual communication model proposed in this study, when applied to real-world cases, demonstrates that it is possible to harmonize commercial activity with preservation. The transition to signage

based on Municipal Decree No. 77/2024, prioritizing traditional materials, flush-mounted installation, and typographic legibility, not only restores the harmony of the architectural ensemble but also enhances the user experience and the perception of safety.

In conclusion, the elimination of visual pollution in Sucre is an urgent urban management measure that must be reinforced through public education and rigorous technical oversight to preserve the city's collective memory and outstanding universal value.

Finally, beyond a visual communication solution, this research seeks to demonstrate that the quality of life proposed by Cisneros et al. (2020) lies in the synergy between environmental quality, well-being, and identity. In this regard, the study shows that citizens identify with an urban space that brings together historical and aesthetic elements of great value, and that, regardless of citizens' awareness of the UNESCO designation and the existence of regulations governing signs, it is important to consider the heritage urban image as a solution to visual pollution through education.

Bibliography

Aguirre Ullauri, M.D.C., Castillo Carchipulla, E.M. y López León, D.M. (2020). Diagnóstico de materiales y lesiones en las fachadas del centro histórico de Cuenca (Ecuador). *Ge-conservacion*, 17, 47-63. https://doi.org/10.37558/gec.v17i1.682

Aguirre Ullauri, M.D.C., Reinoso Calle, V.C., Huiracocha Reino, P.S., Garnica Garnica, P.S. y Espinosa Iñiguez, E.A. (2023). Envolventes patrimoniales y percepción ciudadana. Una aproximación al caso del Centro Histórico de Cuenca. *Territorios*, (50). https://doi.org/10.12804/revistas.urosario.edu.co/territorios/a.11126

Albarrán-Periáñez, J.D. (2023). Patrimonio Mundial y Turismo: La dialéctica entre la conservación del paisaje urbano y el desarrollo turístico en el ordenamiento local. *Ciudad y Territorio Estudios Territoriales*, 55(215), 27-46. https://doi.org/10.37230/CyTET.2023.215.2

Barriga Arteaga, J.C. (2017). *Contaminación visual del paisaje urbano patrimonial en vías peatonales del Centro Histórico de La Paz* [Tesis de maestría]. La Paz: Universidad Mayor de San Andrés. Retrieved July 5, 2024 from https://repositorio.umsa.bo/xmlui/handle/123456789/26892

Bazant, J. (1983). *Manual de criterios de diseño urbano*. Editorial Trillas.

Bazant, J. (2009). *Espacios urbanos: Historia, teoría y diseño*. Editorial Limusa.

Casarin, V. (2019). A relação entre anúncios comerciais e a paisagem urbana de Roma | The relationship between commercial ads and the urban image in Rome. *Oculum Ensaios*, 16(1), 39. https://doi.org/10.24220/2318-0919v16n1a4061

Castro Ortega, E.F. (2021). Evaluación de niveles y tipos de la contaminación visual en el Centro Comercial del barrio Bellavista de la ciudad de Puno. *Universidad Privada San Carlos*. Retrieved August 13, 2024 from https://repositorio.upsc.edu.pe/handle/20.500.14891/250

Cisneros, A.V., Villafuerte, L.P. y Zúñiga, M.H. (2020). Instrumento de medición del Índice de Calidad de Vida Urbana: Barrios Urbano Marginales, Perú, *Revista de ciencias sociales*, 26(2), 355-375. Retrieved August 14, 2024 from https://dialnet.unirioja.es/servlet/articulo?codigo=7599951

García-Esparza, J.A. (2022). Urban Scene Protection and Unconventional Practices-Contemporary Landscapes in World Heritage Cities of Spain. *Land*, 11(3), 324. https://doi.org/10.3390/land11030324

Gobierno Autónomo Municipal de Sucre (gams). (2024). *Dirección de Patrimonio Histórico*. Recibido el 22 de mayo en formato digital a través de correspondencia oficial.

Gobierno Autónomo Municipal de Sucre (gams). (2021). *Plan territorial de desarrollo integral*. Retrieved November 8, 2024 from https://sucre.bo/wp-content/uploads/2021/10/Plan-Territorial-de-Desarrollo-Integral-2016-2020.pdf

Gobierno Autónomo Municipal de Sucre (gams). (2022). *Reglamento de anuncios y letreros para el centro histórico de Sucre, Decreto Municipal No 54/22*. Retrieved July 22, 2024 from https://sucre.bo/wp-content/uploads/2024/03/RG.M-054-2022-REGLAMENTO-DE-ANUNCIOS-Y-LETREROS-PARA-EL-CENTRO-HISTORICO-DE-SUCRE.pdf

Lozano Castro, R.I., Bárcenas Curtis, C. y Lemus Pool, M.C. (2025). Discusión de objetos gráficos identificativos históricos y comerciales para reglamentación patrimonial de Tampico. *grafica*, 13(26), 359-367. https://doi.org/10.5565/rev/grafica.302

Lynch, K. (1964). *The Image of the City*. MIT Press.

Lynch, K. (1984). Reconsidering The Image of the City. En L. Rodwin y R.M. Hollister (Eds.), *Cities of the Mind: Images and Themes of the City in the Social Sciences* (pp. 151-161). Springer US. https://doi.org/10.1007/978-1-4757-9697-1_9

Maron Curasi, J.L. (2023). Contaminación visual y lumínica, en relación con la salud de los pobladores de las vías principales de la Ciudad de Ilave-2022. *Universidad Privada San Carlos*. Retrieved July 23, 2024 from https://alicia.concytec.gob.pe/vufind/Record/UPSC_996bc59020e5b10ac64c1ef361ddcb1d/Details

Moreno, L.A. y Acosta, C. (2015). El espacio público como fenómeno complejo: Diseño e interacción no unidisciplinar en la construcción del entorno

humano. *Taller Servicio* 24 Horas, 11(22BIS), 7-16. Retrieved November 17, 2024 from https://www.researchgate.net/profile/Leonardo-Moreno-Toledano/publication/294597659_El_espacio_publico_como_fenomeno_complejo_Diseno_e_interaccion_no_unidisciplinar_en_la_construccion_del_entorno_humano/links/56c28b8808aeedba0567f7de/El-espacio-publico-como-fenomeno-complejo-Diseno-e-interaccion-no-unidisciplinar-en-la-construccion-del-entorno-humano.pdf?__cf_chl_f_tk=mt9MH4NxppFZZfgDT6QhAmPdZ8bboRoWY8TS4pcD5Ok-1783086067-1.0.1.1-4tEgke_0C_jBRRPJ5npjgj4f7RwCdvblVSp2WWGm7Q4

Peláez, J.M.L. (2018). Kevin Lynch: the image of the city. *Proyecto, Progreso, Arquitectura*, 19, 154-155. https://doi.org/10.12795/ppa.2018.i19.10

Pérez Manrique, M. (2022). La contaminación visual como afectación del paisaje urbano. REJIE: *Revista Jurídica de Investigación e Innovación Educativa, 27*, 61-100. Retrieved November 2, 2024 from https://dialnet.unirioja.es/servlet/articulo?codigo=855894

Renovación urbana en el centro histórico de Santiago, Chile: El caso de la manzana de la Casa Colorada. *EURE (Santiago),* 49(147), 1-25. https://doi.org/10.7764/eure.49.147.11

Sánchez Álvarez, M. del C. (2021). Paisaje urbano y contaminación visual: A propósito del centro histórico y turístico de Córdoba (España). *En El turismo en Córdoba: escenarios, tendencias y perspectivas: libro homenaje a los profesores José María Manjavacas Ruiz y Martín Torres Márquez (in memoriam)* (pp. 409-427). Retrieved September 28, 2024 from https://dialnet.unirioja.es/servlet/articulo?codigo=8962793

Santamaría Freire, E.J.S., Cusco, E.J.S., Garcés, L.E.G. y Díaz, E.C.S. (2024). Determination of the level of visual pollution in the academic environment. *Medwave*, 24(S2), eUTA39. https://doi.org/10.5867/medwave.2024.S2.UTA39

Universidad Nacional Autónoma de México (unam). (2019). *Los daños por la contaminación visual | Fundación unam.* Retrieved July 5, 2024 from https://www.fundacionunam.org.mx/unam-al-dia/los-danos-por-la-contaminacion-visual/

Valdivia, A., Peña, L. y Huaco, M. (2020). Instrumento de medición del Índice de Calidad de Vida Urbana: Barrios Urbano Marginales, *Perú. Revista de Ciencias Sociales* (Ve), 26, 355-375. Retrieved July 23, 2024 from https://dialnet.unirioja.es/servlet/articulo?codigo=7599951

Vinuesa, M.Á. (1998). Turismo y desarrollo sostenible en ciudades históricas. *Ería: Revista cuatrimestral de geografía, 47,* 211-228. Retrieved July 7, 2024 from https://dialnet.unirioja.es/servlet/articulo?codigo=34882

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