ISSN: 2602-8085
Vol. 8 No. 1, pp. 99 – 121, January – March 2024

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Construcción sostenible de espacio público para la ciudad de Riobamba-Ecuador; caso específico Plaza Abdón Calderón

Sustainable construction of public space for the city of Riobamba-Ecuador; specific case Plaza Abdón Calderón

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Article of scientific and technological research
Sent: 11/14/2023
Reviewed: 12/09/2023
Accepted: 01/03/2024
Published:01/30/2024
DOI:https://doi.org/10.33262/cienciadigital.v8i1.2865

Quote: Cajamarca Dacto, KE, Herrera González, JC, Velastegui Cáceres, LA, & Frías Torres, AX (2024). Sustainable construction of public space for the city of Riobamba-Ecuador; specific case Plaza Abdón Calderón. Digital Science, 8(1), 99-121.https://doi.org/10.33262/cienciadigital.v8i1.2865

*DIGITAL SCIENCE, and*It is a multidisciplinary, quarterly magazine that will be published electronically. Its mission is to contribute to the training of competent professionals with a humanistic and critical vision who are capable of presenting their research and scientific results to the same extent that positive changes are promoted through their intervention. in society.https://sciencedigital.org
The magazine is published by the Ciencia Digital Publishing House (prestigious publisher registered in the Ecuadorian Chamber of Books with Affiliation No. 663)www.celibro.org.ec

ISSN: 2602-8085
Vol. 8 No. 1, pp. 99 – 121, January – March 2024

www.cienciadigital.org

Palabras claves:
Espacio público, sostenibilidad, integración, calidad de vida, diseño, paisaje

Resumen

Introducción: Los estudios realizados por ONU-Hábitat deducen que las ciudades de los países en vía de desarrollo, cuenta con un área reducida destinada al espacio público, áreas verdes y edificaciones. En gran parte los nuevos espacios públicos privilegian al transporte automotor dejándole a la movilidad humana, aceras sin planificar y escasez de áreas verdes. La ciudad de Riobamba no es ajena a esta problemática, presenta un déficit de espacios públicos que mejoren la calidad de vida de las personas. El sector de la Dolorosa en cuestión carece de espacios públicos sostenibles, contando con un ICV bajo, y con una frecuencia de uso de espacio público de 31,52%". **Objetivo:** Plantear una propuesta de espacio público sostenible para la ciudad de Riobamba-Ecuador; caso específico Plaza Abdón Calderón que contribuya de manera económica, social y ambiental al sector de estudio. **Metodología:** El enfoque de la investigación es cualitativa- cuantitativa; cualitativa, ya que es necesario identificar las cualidades del sector, exploración bibliográfica de lineamientos y estrategias sostenibles. Cuantitativa, para evaluar el grado de afectación mediante un diagnóstico al sitio de estudio y dar soluciones eficientes que respondan al contexto y realidad social. **Resultados:** Los espacios planteados en la propuesta se basa en lineamientos de diseño sostenible de: Integración local, Proximidad, Vitalidad, Escala, Nivel de inclusividad, Cantidad y calidad de mobiliario, Inserción de la naturaleza, Materiales, Legibilidad y Visibilidad de un espacio público sostenible. **Conclusión:** Los lineamientos de diseño relevantes sobre el tema de sostenibilidad se hallaron en entidades internacionales como: hábitat III, Sustainable Site y LEED V4 y mediante un análisis global de estas fuentes se generó una tabla de indicadores de diseño para espacio público sostenible que sirvió para el planteamiento y calificación sostenible de la misma. **Área de estudio general:** Arquitectura. **Área de estudio específica:** Espacio público.

Keywords:
Public space, sustainability, integration, quality of life, design, landscape

Abstract

Introduction: The studies conducted by UN-Habitat deduce that cities in developing countries have a limited area designated for public spaces, green areas, and buildings. In large part, the new public spaces prioritize motorized transportation, leaving pedestrian mobility with unplanned sidewalks and a scarcity of green areas. The city of Riobamba is not immune to this problem; it faces a deficit of

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public spaces that could enhance the quality of life for its residents. The Dolorosa sector lacks sustainable public spaces, with a low QLI and a public space usage frequency of 31.52%, according to (Lopez & Deley, 2021). Objective: Propose a proposal for sustainable public space for the city of Riobamba, Ecuador; specific case Abdon Calderon Square that contributes economically, socially, and environmentally to the study sector. Methodology: The research approach is qualitative-quantitative; qualitative, since it is necessary to identify the qualities of the sector, bibliographic exploration of guidelines and sustainable strategies. Quantitative, to evaluate the degree of affectation through a diagnosis to the study site and provide efficient solutions that respond to the context and social reality. Results: The spaces proposed in the proposal are based on sustainable design guidelines, including Local Integration, Proximity, Vitality, Scale, Level of inclusivity, Quantity and quality of furniture, Integration of nature, Materials, Legibility, and Visibility of a sustainable public space. Conclusion: The relevant design guidelines on the issue of sustainability were found in international entities such as: habitat III, Sustainable Site and LEED V4 and through a global analysis of these sources, a table of design indicators for sustainable public space was generated that served for the sustainable approach and qualification of it.

Introduction

The term public space is defined as a multifunctional meeting place where social relations and exchanges between inhabitants are facilitated, which must be designed and adapted to the human scale with inclusive places that facilitate the mobilization of different types of users. In addition to providing security to users and providing pleasant experiences (Amoroso et al., 2015).

However, in recent years' public space has been a victim of the predominant urban model that has sought to make cities out of gated communities, infrastructure at the service of private vehicles, housing areas segregated by social classes, etc. This is how, according to studies carried out by the United Nations Human Settlements Program (UN-Habitat) (United Nations,2017), deduce that the cities of developing countries have a small area dedicated to public space and low economic investment destined for the creation of these spaces, many times the new public spaces privilege automotive transport, leaving paths

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and paths to human mobility. unplanned sidewalks. Therefore, starting from the conjecture that streets, squares and collective spaces are the starting point of city design, only later will buildings and roads come (Borja & Muxí, 2000; Gehl, 2010), it is It is necessary to rethink this space as a material fact that produces meaning, becoming a meeting point in the city oriented towards people and spaces with sustainability characteristics with the aim of reducing the ecological footprint and obtaining lower costs, but always aiming at a " human scale".

That is, a type of urban structure that can easily respond to cultural variety. Understanding that the city should respond, above all, to the people it houses, to communication, to condense the promotion of human activities and to generate and express its own culture. Whether in temperate or extreme climates, in rich or poor societies. (Rogers, 2000, p. 40).

Ultimately, the purpose of a sustainable city is to build human communities that cause the least possible environmental impact. A sustainable city minimizes its emissions of conventional polluting gases and greenhouse gases, uses the smallest amount of non-renewable resources viable, treats its water discharges to eliminate harmful elements before releasing them into water sources, and effectively manages energy. and water, strives to minimize the generation and encourage recycling of waste, in addition to reducing the impact of any necessary waste disposal (Cohen, 2017).

Likewise, "a sustainable city is considered to be one where it is only necessary to walk a distance of 500 meters to carry out any activity." It is important to consider that the conception of an acceptable distance is directly related to the quality of the journey. If the pavement is in an optimal state and the walk is expected to be attractive, this must be taken into account (Gehl, 2010).

In other words, the most sustainable approach to the urban model encompasses a systemic perspective of the relationship between the city and the environment, as well as the elements that make it up. It is organized into seven areas that, in turn, are integrated into the four fundamental objectives of sustainable urbanism: compactness, complexity, efficiency and social stability (Rueda et al., 2012). Since, a sustainable city reduces environmental impacts through its activities and promotes sustainable consumption and production patterns in accordance with its own territorial, geographic, social, economic and cultural conditions. It is a city resilient to the impacts of climate change, reducing the vulnerabilities of its population. The perfect sustainable city would be one that was self-sufficient in energy, managed waste to produce energy, had more sustainable transportation, maintained green spaces, and correctly managed and used its natural resources (Meep, 2022).

Consequently, to the sustainable development of cities,Economic Commission for Latin America (ECLAC, 2022), points out that the concept of sustainable development, on

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which the new international development agenda is based, implies a complex balance between various perspectives on the relationship between the environment and economic development and social. Furthermore, ECLAC emphasizes the use of three pillars or dimensions: economic, social and environmental, as key components of this approach. Guimarães (2003) explains the different dimensions of the concept of sustainability, which include ecological, sociocultural, economic and environmental.

However; In the search for sustainable development of cities worldwide, one of the most latent problems is the lack of public spaces. Ecuador faces a large number of public use areas in poor condition, whether these are parks, squares, streets and sidewalks. So, the city of Riobamba presents a deficit of public spaces to carry out activities that involve and develop an improvement in the quality of life of people, it has been verified that the "La Dolorosa sector has a low ICV, likewise, its frequency of use of public space reaches 31.52%." According to López & Deley (2021), in the same way, the existing public space does not have sustainable characteristics, we see this case more latent in the Dolorosa sector because it has deteriorated buildings and infrastructure, lack of maintenance of the green areas, lack of infrastructure for commercial activities, children's play areas in poor condition and difficult access for people with special abilities.

Therefore, this research aims to put forward a proposal for public space sustainable for the city of Riobamba-Ecuador; specific case Plaza Abdón Calderón that contributes economically, socially and environmentally to the study sector.

Methodology

a. **Design of the investigation:** The research is qualitative-quantitative; qualitative, since it is necessary to identify the qualities of the sector, bibliographic exploration of sustainable guidelines and strategies. Quantitative, to evaluate the degree of impact through a diagnosis of the study site and provide efficient solutions that respond to the context and social reality.
b. **Kind of investigation:** Documentary and field. Documentary: A theoretical foundation is made based on the different aspects related to sustainability in public spaces, corroborating bibliographic documentation in books, research projects, magazines, scientific articles. In a second stage, define indicators for the design of sustainable public spaces, based on knowledge from international certifications on sustainability such as Habitat III (UN-Habitat) (United Nations, 2017), Sustainable Sites (SITES, 1899) and Leadership in Energy and Environmental Design (LEED V4) (Leed, 2015); indicators that can be applicable to the reality and context of the case study. In addition to the research work according to (Amoroso et al., 2015), the development of a table of indicators is proposed that will be the guideline for the proposal to design a sustainable public space for the city of Riobamba.

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Field: A direct interaction is carried out with the object of study, through observation and data collection in the field with the execution of the diagnosis of the Dolorosa sector, Veloz parish of the Riobamba canton; In this way, the reality of the sector, its conditions and problems are identified as a starting point for the proposal.

c. **Research level:** Exploratory and descriptive. The exploratory level starts from the observation of the qualities of the place where information is scarce and interventions are few, since not a large number of studies have been carried out on the place. Likewise, the descriptive level starts from observation to identify the current relationship of the place, covering different systems and identifying the relationship between these variables, which will allow us to have a more precise idea of the existing problems and potentials.
d. **Research modality:** Applied or Practical since it intends to improve the quality of life in the La Dolorosa sector of the city of Riobamba and contribute to the construction of new knowledge in the field of sustainability of public spaces.
e. **Method:** The research is developed with an inductive and analytical method. Inductive, through observation and analysis of the different conditions of the place, which allows the design premises to be formulated according to the needs of the site. And Analytical, starting from the analysis of the theoretical bases of the research, combined with the analysis of problems found, and the conditions of the place, are the starting point to propose solutions that adapt and resolve the needs of the population.
f. **Research procedures and techniques:** This study will carry out surveys of the inhabitants to find out the existing problems and analyze the point of view of the users of these public places. The situation of the place will also be verified visually through field studies to obtain a detailed view of its current state. For data collection, the bibliographic research technique will be used to gather information about the traditions and available materials. As well as, the existing problems in the study area by the local inhabitants. Once the information is obtained, it will be analyzed to design a plan according to the situation and needs of the sector.
g. **Study population:** In accordance with sustainability guidelines (Leed, 2015; Gehl, 2010), the study population is considered within the 500 m radius, giving a result of 6,603 inhabitants according to the projections of the population and housing census of the National Institute of Statistics. and Censuses (INEC, 2010).

Results

Following the suggested methodology, in the diagnosis stage of the study site it is determined that the sector is surrounded by various facilities, including educational facilities. The closest and most relevant is the National University of Chimborazo. The population corresponds to 29% and 23% students from other school and secondary level

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institutions, which corresponds to 52% of a total of 6,603 inhabitants. This establishes that there is a greater number of young people in the sector. There is great commercial and housing activity in the sector, dedicated to the rental of apartments for students and the sale of clothing, groceries, meat, bakeries, fast food and temporary businesses. Likewise, there is predominant traffic during peak hours. Likewise, urban and inter-parish bus routes circulate through the sector, generating a large amount of noise pollution. In addition to the narrowness of the streets, there is no capacity in the Dolorosa park to park the different buses that serve people from nearby parishes.

In addition, it can be observed that the furniture, such as bus stops, garbage cans and children's games, are in poor or fair condition. Also, the lack of public spaces, the scarcity of green areas and narrow sidewalks in some sections translates into a decrease in the time that people stay in the place due to the non-existent shade or protection from the cold that the place has. Likewise, the visual, auditory and water pollution present in the sector has been deteriorating its urban image. However, the sector has several festivities at the neighborhood and local level that are celebrated in the Dolorosa park, generating a milestone for the city and a meeting point to generate commercial, sports and leisure activities that can be improved.

Consequently, in the second stage, a compilation of indicators is carried out that have been found relevant based on the analysis of methodologies for the design of sustainable public spaces, international certifications on sustainability such as Habitat III (UN-Habitat) (United Nations, 2017), Sustainable Sites (SITES, 1899) and LEED V4 (Leed, 2015), and the research work of (Amoroso et al., 2015); indicators what the new sustainable public space design proposals for the city of Riobamba should have, as shown in table 1:

Table 1

Indicators for the design of sustainable public space

Evaluation criteria (Amoroso et al., 2015)	Read V4 (Leed, 2015)	Habitat III (UN-Habitat, 2017)	Sustainable Sites (SITES, 1899)
Vitality	Site development - Protect or restore habitat	Improves social cohesion and cultural interactions as the basis of plural and multicultural societies	Protect and maintain cultural and historical places

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Table 1

Indicators for the design of sustainable public space (continuation)

Evaluation criteria (Amoroso et al., 2015)	Read V4 (Leed, 2015)	Habitat III (UN-Habitat, 2017)	Sustainable Sites (SITES, 1899)
Public space network			
Scale			
Inclusivity level		All inhabitants can freely enjoy all physical spaces	Provide optimal accessibility
Quantity and quality of furniture			
Insertion with nature	Reduction of the heat island	Respect natural resources	Reduce urban heat island effects
	Rainwater management		Use of appropriate plants
			Reduce water use for garden irrigation
Materials	Low emission materials		Design for adaptability and disassembly
Readability		Walking opportunities	Site Security and Guidance
Visibility	Quality views	Public spaces without visual borders	
Local integration	Surrounding density and various uses	Mixed-use spaces within the urban perimeter	Support social connection
Proximity	Quality transit access	favors collective mobility	
	Bicycle facilities		

1. **Vitality:** Public spaces should be generators of animation, dynamism and activity within their proposals, this can be achieved through:

   - The variety of activities located in the fronts of public spaces
   - The variety of land uses other than residential on the ground floor
   - Seek thesocial cohesion and cultural interactions as the basis of plural and multicultural societies

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- Prevail site development - Protect or restore habitat
- Protect and maintain historic cultural sites

1.1 Abdón Calderón Square Proposal: After determining the most representative activities of the intervention area, the project carefully manages four strategies for urban vitality, as shown in figure 1:

- Support mental health: The project has several living areas, most of which are located along the route. These areas are proposed as a distraction alternative that can be used by pedestrians after their work activities. These spaces have furniture which is located in such a way as to encourage social interaction and with trees that provide shade in order to generate quiet and comfortable spaces.
- Support social cohesion: The expansion of sidewalks in the project allows us to rescue the space for pedestrians that was previously being used by vehicles, increasing the points where people can interact and improving the quality of public space
- Support physical activity: The design integrates adults and children, which is why areas are delimited that can be used as spaces to exercise and thus promote the physical activity of the inhabitants.
- Support the diversity of land uses: The project proposes the integration of land uses such as: commerce, food, culture, recreation, sports and combining them with pedestrian circulation it seeks to generate active and dynamic fronts for the sector.
- The design of plant barriers is proposed that direct circulation through all spaces, creating an organic route that energizes the movement of users.

Figure 1

Plaza Abdón Calderón Proposal in Vitality Indicator

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2. **Public space network:** This indicator will take into account whether the project was conceived as part of a public space network or within a public space policy in the city (Amoroso et al., 2015).

   2.1 Abdón Calderón Square Proposal: The project seeks to provide more public spaces to the city of Riobamba, forming part of the network that connects the largest-scale public spaces in the La Dolorosa sector, through the layout of directing axes using the same diagnosis. In this way, the project guarantees the constant flow of users, while improving and increasing the biodiversity of spaces in the city, satisfying the needs of citizens. As shown in figure 2:

Figure 2

Plaza Abdón Calderón Proposal in Public Space Network indicator

3. **Scale:** This indicator refers to the fact that the intervention in the public space is closely related to the field of social vision that allows users to have a general and detailed vision of what is happening, according to the theory proposed by Jan Gehl (2010), in the book Cities for People, about the study of life in the city.

   3.1 Plaza Abdón Calderón Proposal: The project carefully manages the human scale, the delimitation of spaces, the circulation and the furniture of the entire project, they are governed by a modular mesh of 1.75m in diameter, on an orthogonal grid at 90 degrees, of 7m x 7m. In open spaces the distance threshold is 25 to 35 m, a distance at which it is possible to recognize movements and expressions. Similarly, the living areas are articulated with furniture within the threshold of 5 to 7 m, a distance in which it is possible to maintain a fluid and comfortable conversation. Likewise, all spaces must respond to the needs of all types of users. In addition, the project generates a sequence of micro plazas and recreation spaces with the application of vegetation and furniture. It allows for clear visual continuity and provides security in open spaces, coupled with the

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arrangement of furniture that allows social connection between people. As show in figure 3:

Figure 3

Plaza Abdón Calderón Proposal in Escala indicator

4. **Inclusivity level**: this indicator suggests that in the design of public space contemplate:

-Flexible spaces and furniture, that are multifunctional, with a variety of activities
- Spatial flexibility in the possibility of changing the use of space
- Optimal and free accessibility to all public spaces without discrimination of any kind

4.1 Plaza Abdón Calderón Proposal: In the diagnosis of the site, the little or no presence of inclusivity in the areas to be intervened is verified. Therefore, the proposal contemplates:

- The spaces, vegetation and elements merge and demonstrate multifunctionality. It is a design focused on adults and children in the sector.
- Provide optimal accessibility, security and site orientation
- The project is designed by all types of people, among whom the majority are young people and adults who go to their workplaces. In addition, the space at street level has ramps at the entrances, facilitating the entry of users into the public space and allowing them to use its furniture and green areas.
- The multifunctional architectural spaces (cafeteria, reading areas, study areas, meditation spaces, multifunctional basketball and mamona courts, shops, orchards, musical stages) are designed using ramps with a 6% slope to facilitate accessibility for people with disabilities. different capacities in appropriate conditions.

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- The landscape design responds to sensory strategies and contemplation spaces, through the activation of the user's senses: Sight, through the use of color psychology and contrast strategies. Touch through texture contrast of materials present in floors, furniture and vegetative texture contrast so that the user can touch. Smell: vegetation that emanates pleasant odors. Taste: proposal for kiosks to sell local gastronomic products and thus reactivate the economy of the site and ensure the gastronomic identity of Riobamba. Auditory: Through the proposal of outdoor stages to strengthen musical culture. As verified in figure 4:

Figure 4

Plaza Abdón Calderón Proposal in Inclusivity Level Indicator

5. **Amount of furniture:** This indicator analyzes the amount of furniture offered by the space under parameters established by Whyte (1980) in Sauser (2010). There must be a ratio of 1 linear meter of seating space for every 9m2 of area.

5.1 Plaza Abdón Calderón Proposal: The amount of furniture adapts to the area of the proposed spaces and the ergonomics of the different types of users, always maintaining modulation. Likewise, different types of furniture are proposed such as: pet water bowls, garbage cans and information panels, both of simple design and related to the materiality of the project. As visualized in figure 5:

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Figure 5

Plaza Abdón Calderón Proposal in Amount of Furniture Indicator

6. **Furniture quality:** This indicator analyzes the quality of furniture offered by the space under parameters established by Whyte (1980) in Sauser (2010). People avoid seats shorter than 30cm and higher than 90cm.

6.1 Plaza Abdón Calderón Proposal:

- By means of the Modular mesh of 1.75m in diameter, on an orthogonal grid at 90 degrees, measuring 7m x 7m, the furniture is designed for the living areas within the threshold of 5 to 7 m, a distance in which it is possible to maintain a fluid and comfortable conversation. and with durable, low-maintenance materials that adapt to the climatic conditions of the site.

- The project maintains plastic wood as the main material for the furniture, as it reduces the uncomfortable feeling of cold furniture, giving it homey characteristics, and at the same time allows it to adapt to changes in climate.

- In the same way, the rest areas are related to the pots and in turn to the vegetation as a delimitation and providing privacy, without abandoning the social cohesion that may exist between them.

  The different furniture adapts to the needs of the population, without losing scale and uniformity, preserving design coherence. As described in figure 6:

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Figure 6

Plaza Abdón Calderón Proposal in Furniture Quality Indicator

7. **Nature insert:** This indicator makes relevance to:

- The insertion of natural elements in the planning of the project from various aspects such as: contribution of shade; barrier for vehicles, noise or delimitation of spaces; part of a green infrastructure strategy; aesthetic or ornamental value and; if it fulfills a recreational function (Amoroso et al., 2015).
- Reduction of the heat island in public spaces
- Rainwater management and recycling
- Respect natural resources
- Vegetation planning according to climatic conditions, low maintenance and rescue of native vegetation
- Preservation and recovery of existing vegetation, prior to the intervention
- Reduce the parking footprint per green area for public spaces

- **Plaza Abdón Calderón Proposal:**

- The project prioritizes and proposes the preservation of existing vegetation and the application of native and low-maintenance species in each of the intervention areas.

- The spaces are maintained thanks to the collection of rainwater and the collection cisterns for the operation of sanitary batteries and the irrigation of green areas, thus reducing the project's water consumption.
- The project makes pedestrians a priority in the proposal, reducing parking areas as much as possible and allowing green, walkable and car-free areas.

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- Different types of high, medium and low vegetation are used depending on the use and architectural space.
- Reduction of urban heat island effects by reducing hard floors and integrating green spaces.
- Jacaranda trees are proposed in the project with the purpose of generating dynamism in the project throughout the year, since during the flowering season that lasts until summer, it will turn lilac, while the rest of the year it will remain in color. green producing a variable effect.
- Insertion of urban gardens into the project as a proposal to raise awareness and environmental education for the user. As show in figure 7:

Figure 7

Plaza Abdón Calderón Proposal in Insertion of Nature indicator

8. **Materials:** The indicator refers to the type of intervention materials, their durability, ease of maintenance, low-emission materials, whether the materials used are recycled or prefabricated due to their contribution to saving resources and whether it allows adaptability and disassembly in the project.

8.1 Plaza Abdón Calderón Proposal:

- The project integrates the following materials; paint, plastic wood, concrete paving, rubber flooring, brick, in situ concrete. Plastic wood is used in seats, chairs and tables that maintain the modulation of the mesh. In the same way, paving stones are used in outdoor circulation areas, being resistant to the elements and the constant use of the people who circulate there, in addition to reducing the cost of maintenance. Finally, the rubber floor is maintained in the sports areas to reduce the impact at the time of exercise. Brick is used in architectural masonry with thermal characteristics. And in situ concrete is used in flower pots.

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- The project is made up of a mix of materials that are easy to assemble and transport, ease of maintenance, low emission, ease of transportation and mainly that they can be found near the study area to facilitate construction with a reduction in work and investment time.
- The living areas combine plastic wood and stainless steel, which reduces cost and facilitates installation.
- On the other hand, the architectural part of the cafeteria allows natural light to enter all the internal areas and which in turn allows the project to be ventilated through large windows. How it is visualized in figure 8:

Figure 8

Plaza Abdón Calderón Proposal in Materials indicator

9. **Readability:** This indicator refers to the ability to read the space, ease of orientation. It is suggested that the space be clearly identifiable and have coherence in its design and activity and that it provides safety when walking.

9.1 Plaza Abdón Calderón Proposal:

- The project is based on the implementation of milestones that allow you to orient yourself within the project and make use of the mesh and vegetation to create a clear delimitation of each space.
- The project is considered legible due to its easy access to the different spaces, becoming a highly dynamic and pleasant place, as well as comfortable due to the use and preservation of native vegetation.
- The public space is a game between different types of vegetation and furniture, which in turn is crossed by an easily identifiable gray circulation.

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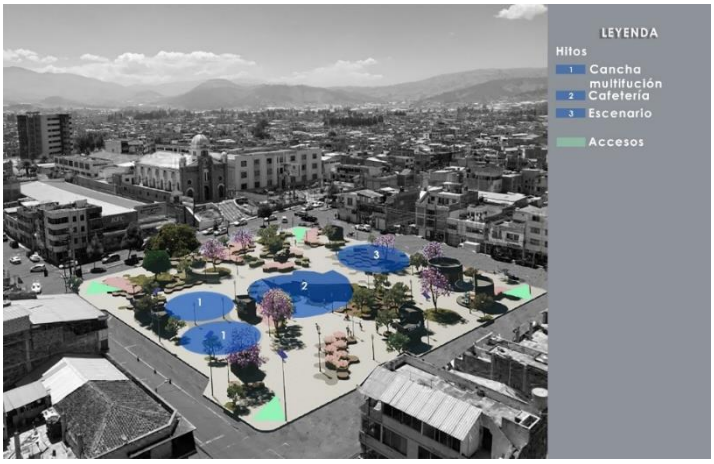
- Design and planning concepts are integrated in the design as recommended (Gehl, 2010). The space of movement formed by the streets and the space of experiences integrated by the plaza are pillars of urban architecture. As described in figure 9.

Figure 9

Plaza Abdón Calderón Proposal in Legibility Indicator



10. Visibility: public spaces must:

- Promote and support natural surveillance, being arranged in such a way as to avoid blind spots that pedestrians might fear to travel through.
- Offer better, more universal visibility, avoiding visual borders
- Offer quality views

10.1 Abdón Calderón Square Proposal:

- The layout within the project is reticular, which benefits the visibility of the project. The circulations intersect and that is where the greatest activity is generated in the generation of multifunctional micro plazas, where they are mostly clear of visual obstacles.
- The public space within the project is easily visible from any of its points, providing security to the place thanks to its open composition. As seen in figure 10.

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Figure 10

Plaza Abdón Calderón Proposal in Visibility Indicator

11. Local integration: refers to:

- The relationship between social organization and urban spatial organization.
- Integration also implies connectivity; High integration areas are highly connected to other parts of the city.
- Approach to mixed-use spaces within the urban perimeter

11.1 Plaza Abdón Calderón Proposal:lThe public spaces have a high percentage of commercial activities, reading areas, study areas, meditation spaces, multifunctional basketball and mamona courts, commerce, orchards, and musical stages. Therefore, activities are also proposed that complement and energize activities both inside and outside public spaces, such as cafeterias and cultural facilities. As represented in figure 11.

ISSN: 2602-8085
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Figure 11

Plaza Abdón Calderón Proposal in Local Integration Indicator

12. **Proximity:** space accessible from all locations, surrounded by a residential and mixed-use area, near a public transportation node easily accessible on foot (Amoroso et al., 2015).

12.1 Plaza Abdón Calderón Proposal: The study area already has a public transportation network within a radius of 500 and 300 m. As well as a cycle path, therefore, for the intervention areas, bus stops are implemented in the surrounding streets that have public transport lines. As show in figure 12.

Figure 12

Plaza Abdón Calderón Proposal in Proximity Indicator

ISSN: 2602-8085
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Conclusions

- This research presents in detail the problems to be resolved in the study sector. Establishing a systemic study of social, economic, demographic, cultural and environmental factors in a study radius of 500 meters of the intervention area.
- The diagnosis establishes a clear vision of the current situation of the study sector. The sector has a population of 6,603, with the majority being primary, secondary, and university students, characteristics that allowed establishing both specific and global strategies focused on responding to the needs of users. Among which stood out the lack of green areas, public spaces in poor condition, disorganization in activities within public spaces and the excessive amount of traffic caused by the presence of the Inter-parish terminal. Coupled with the lack of social activities, inclusive access and security, which has led to the abandonment of these spaces.
- It is concluded that analyzing international entities with specialized certifications in construction methods, design and sustainable objectives was one of the most potential characteristics of the research in order to establish guidelines and guidelines that promote efficiency, the reduction of environmental space and the improvement of quality. of life in urban environments in new research for the design of sustainable public spaces.
- It is imperative to continue with the research proposed in the intervention of other public spaces in the sector to contribute to the public spaces network indicator based on the axes proposed in this research.
- This research opens opportunities to explore new areas of research focused on the field of sustainability directed with the Habitat III, Sustainable Site and LEED V4 recommendations that contribute with the new approach to architecture and the implementation of innovative and multifunctional spaces that encourage dynamism. of the existing spaces and that express in their elements the cultural identity of the place. That is, generating easily accessible public spaces and activities that can be used by people with different abilities. Likewise, using local materials and sustainable construction methods that reduce the environmental impact. Seeking to recover urban greenery through design proposals with native species and low maintenance costs. In such a way that it provides a new perspective to the city in a renewed and more sustainable approach.

Conflict of interests

Authors must declare whether or not there is a conflict of interest in relation to the article presented.

ISSN: 2602-8085
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Bibliographic references

Amoroso, Galvis, & Neira. (2015). Sustainable public space: urban-architectural design of a network of inclusive public space for children in the historic center of Cuenca [Undergraduate thesis, University of Cuenca]. http://dspace.ucuenca.edu.ec/handle/123456789/21986

Borja, J., & Muxí, Z. (2000). Public space: city and citizenship. Electa Editorial Society Spain.

Cohen, M. (2017). Reformulating the urban future: dynamics, imbalances and possibilities. Urban Question, 2017(1), 1-10.https://publicaciones.sociales.uba.ar/index.php/questionurbana/article/view/4991

Economic Commission for Latin America [ECLAC]. (2022, December 20). About Sustainable Development.https://www.cepal.org/es/temas/desarrollo-sostenible/acerca-desarrollo-sostenible

Gehl, J. (2010). Cities for the people. Buenos Aires: Infinito Editions.

Guimarães, R (2003). Land of shadows: challenges of sustainability and territorial and local development in the face of corporate globalization. Sustainable Development and Human Settlements Division. 67, 1-62.https://repositorio.cepal.org/server/api/core/bitstreams/b4c56eaa-1fd2-4d2a-ad22-319db2b8590f/content

National Institute of Statistics and Censuses [INEC]. (2010, December 20). Results of the 2010 Population and Housing Census of the Veloz parish, Riobamba Canton.https://www.ecuadorencifras.gob.ec/censo-de-poblacion-y-vivienda/

Leadership in Energy and Environmental Design [LEED]. (2015, December 20). LEED v4.https://www.usgbc.org/leed/v4

López, k., & Deley, K. (2021) Evaluation and comparative analysis of sustainability [Undergraduate thesis, National University of Chimborazo, Riobamba, Ecuador]. Institutional repository.http://dspace.unach.edu.ec/handle/51000/7837

Meep. (2022, November 29). What is a sustainable city? Smart urban mobility.https://www.meep.app/es/blog-es/que-es-una-ciudad-sostenible

United Nations. (2017). The new urban agenda [New Urban Agenda]. United Nations Conference on Housing and Sustainable Development (Habitat III), Quito, Ecuador. https://habitat3.org/wp-content/uploads/NUA-Spanish.pdf

ISSN: 2602-8085
Vol. 8 No. 1, pp. 99 – 121, January – March 2024

Rogers, R. (2000). Cities for a small planet. Gustavo Gili

Rueda, S., Cuchí, A., Cáceres, R. & Brau, Ll. (2012). Ecological urbanism: its application in the design of an eco-neighborhood in Figueres. Postgraduate blog of the Polytechnic University of Catalonia.https://intervencionurbanasostenible.wordpress.com/2012/01/03/el-urbanismo-ecologico/

Sauser, J. (2010). Measuring the social experience of urban spaces. http://es.scribd.com/doc/32354600/Measu-ring-theSocial-Experience-of-Urban-Spaces.

Sustainable Sites Initiative [SITES]. (1899, December 20). SITES Rating System and Scorecard.https://sustainablesites.org/resources

Whyte, W. (1980). The Social Life of Small Urban Spaces. Project for Public Spaces. https://edisciplinas.usp.br/pluginfile.php/4412118/mod_resource/content/1/the%20social%20life%20of%20small%20urban%20spaces.pdf

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