



FAU

Dispersed city and urban morphology, the relationship between space and society: case study of Machala

Dayanna Estefanía Riofrío Valdiviezo¹Christian Paúl Zambrano Murillo²1 CZ Arkdesign; ORCID 0000-0001-9219-2828; bridaysd@hotmail.com2 CZ Arkdesign; ORCID 0000-0002-9219-2828; christian.zambranomuri@ug.edu.ec

Received: Oct 22, 2022. Accepted: Nov 15, 2022.

Abstract— The present research work consists of a study and reading of the city of Machala through bibliographic analysis on urban morphology, the dispersed city, the compact city, urban centralities, and the tangible socio-spatial issues. It examines the scale at which a city should be built and the conflicts that arise when an urban development model is not followed. The case study begins with a review of roadways, the urban grid, block development, and land use to identify the errors in current planning and how urban-social segregation has been created due to centralities located in a single area of the city, economically benefiting certain privileged sectors.

Thus, its dispersion is analyzed through a methodology that compares the current state of the city across five axes that constitute the solution to the dispersed city, categorized as a compact city, in order to find a desirable and feasible solution under Machala's current conditions. This approach enhances existing facilities that have historically and representatively impacted the citizens and the city.

Keywords: Dispersed city, compact city, urban planning, urban morphology, urban space.

I. INTRODUCTION

The relationship between space and society is a fact that has been continuously reflected in the influence of the environment, understood as the geographical setting, on human life (Petit, 2014). The lack of proper planning that integrates these two aspects has resulted in spaces with evolutionary limitations. Therefore, it is necessary to focus the process on prioritizing the inhabitant as the central point of study to carry out a theoretical exploration of spatial needs and to project urban planning. We first shape our cities, and then they shape us (Gehl, 2015).

1.1 Dispersion and roadways

Machala is a city that has developed in a dispersed manner, with its major commercial activities and facilities concentrated in specific points of its layout, leaving several areas primarily residential and constrained by the existing road network. Its basic road hierarchy consists of:

- Main road for entering and exiting the city.
- Secondary roads that traverse the city and its parishes.
- Local roads that serve as arteries throughout the entire canton.

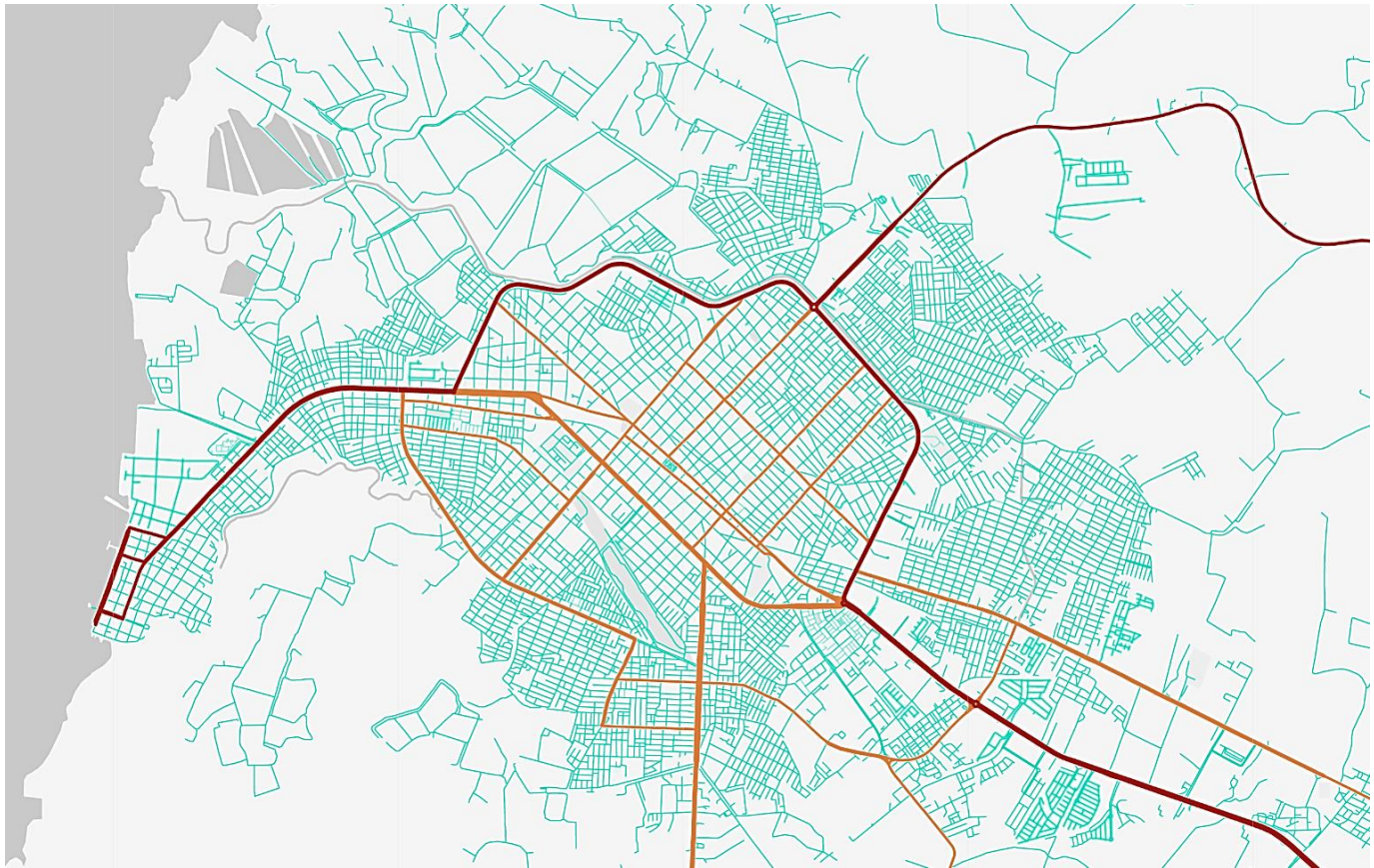


Fig 1. Machala roadways.

Image source: Mapstyle. Elaborated by: Dayanna Riofrío.

A recurring element in various conceptualizations of space relates to the way it has been conceived as something given and "natural," as a container or receptacle for objects, people, or events, and in some cases, merely as a backdrop for human activities. Thus, space is perceived from this perspective as something taken for granted and not as a process resulting from social relations that, in turn, shape these relations (Pineda, 2013).

Scale of intervention in the city

The current issue with the projection of Machala is the perception of citizens as clients detached from daily reality, rather than as residents who enjoy a shared living space that defines their task execution process and is intended to persist for future generations. This results in environments with ephemeral qualities, inefficient flows, or morphological structures that hinder the natural activities of daily life.

Therefore, it is necessary to focus on the actual scale at which the city should be studied, creating a compact urbanism guided by the inhabitants that benefits them, reflecting the aspirations of people in their spaces, and shaping aspects that aim towards inclusion, intimacy, and connection, which are essential for effective design planning.

1.2 Dispersion and morphology

The morphology of the canton concerning its blocks depends on land use and sector. It can be observed by differentiating the size of those located in the central commercial area from those of residential use (generally found in higher density in the periphery). It is crucial to reaffirm that poor planning of the physical fabric also implies deterioration in its social fabric if we understand that the support of the relationships that sustain and give life to community life in cities are the spaces of interaction, where the various realities intersect that enable a community to express itself with its characteristics (Ramos, 2012).



Fig 2. Block morphology.

Image source: Mapstyle. Elaborated by: Dayanna Riofrío.

With this overview, we can establish that land uses are generated in a dispersed manner. Machala has an irregular morphology, and as previously mentioned, activities are concentrated in very specific points in the city, generating traffic despite having wider roads, unlike other sectors of the canton, which are characterized by pinpoint and high-incident areas. This layout does not form a grid because its streets are discontinuous, with various road connections and multiple orientations, resulting in sinuosity in navigation and difficulty in locating a place (Giraldo, 2019).

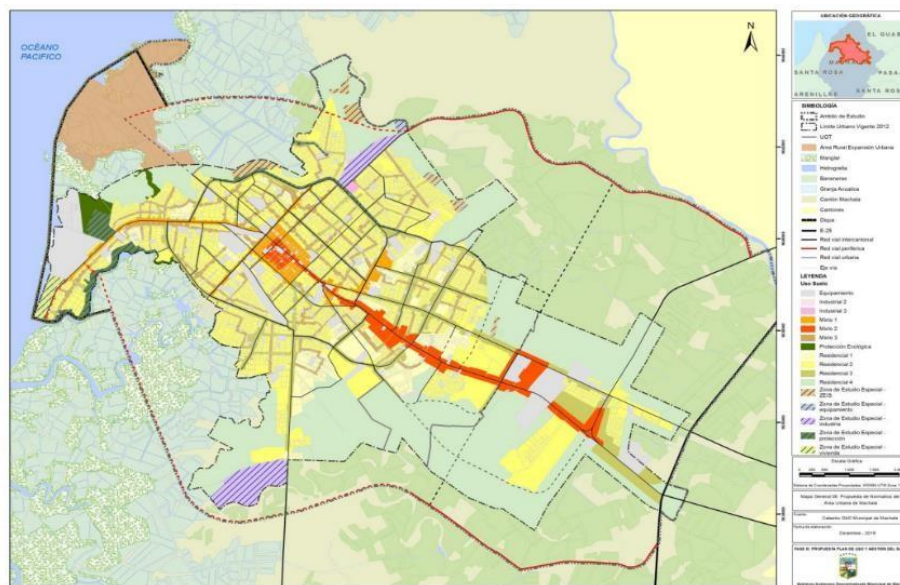


Fig 3. Land uses in Machala.

Image source: PUGS Municipio de Machala.

- Primary commercial use
- Primary recreational use
- Green areas
- Primary residential use

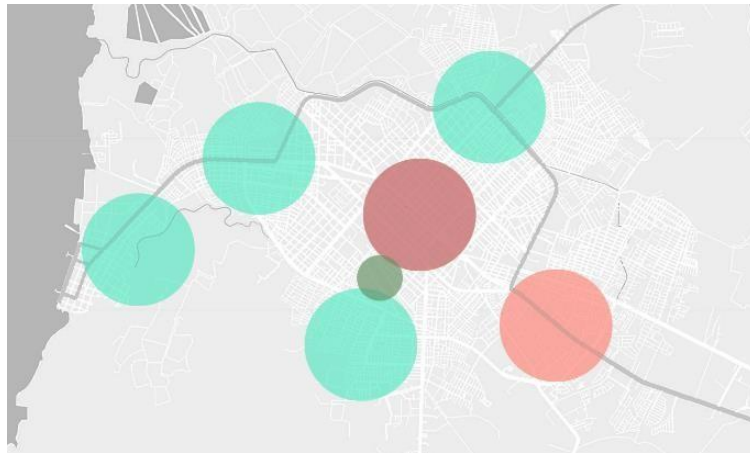


Fig 4. Activity concentration. Image source: Mapstyle. Elaborated by: Dayanna Riofrío.

2. Analysis of centralities in the city

The historic center has a stronger presence along the Puerto Bolívar waterfront, retaining elements that have transcended over time, such as its museums, docks, and church. This can enhance the creation of new centralities by leveraging existing historical and aesthetic resources. The urban center is defined by the streets Arízaga, Palmeras, Marcel Laniado, and Buenavista, which enclose its central commercial and financial activities within a perimeter established as a high-activity commercial and labor grid.

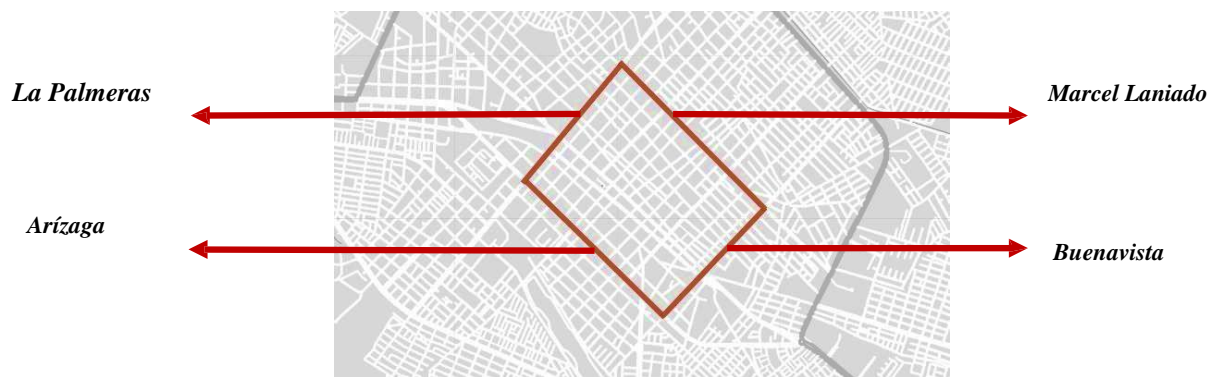


Fig 5. Central and financial area. Image source: Mapstyle. Elaboración: Dayanna Riofrío.

Residential areas are predominantly visible in FIGURE 4, located in the parishes of Puerto Bolívar, Jubones, 9 de Mayo, among other smaller neighborhoods surrounding the canton. Areas of informal settlement are established in sectors that do not yet have registered land use, situated on the outskirts of the city, with less visibility of informal settlement in the more densely inhabited parts of the canton.

Recreational areas with a greater presence of shopping centers and similar facilities are located on the outskirts of Machala, in the eastern sector, near the parish of La Providencia. This area generates a high concentration of social and entertainment activities.

Green areas are few, but the most significant and frequently visited one is Zoila Urgarte Park, also known as “Parque ecológico”.



Fig 6. City recreational sector.
Image source: Mapstyle. Elaborated by: Dayanna Riofrío.



Fig 7. Park of the city.
Image source: Mapstyle. Elaborated by: Dayanna Riofrío.

II. MATERIALS AND METHODS

The research conducted employs a bibliographic methodology on dispersed cities and their solution as compact/polycentric cities, applying the analysis to the case study (Machala). This involves preparing a comparative analysis between the characteristics of cities, the current representation, and potential solutions for the studied city. According to Rueda (2005), there are five axes that characterize and differentiate each city model (compact and dispersed). These are described in TABLE 1 and are presented for comparison, including a comparison of the current characteristics of Machala and those it could possess with improved urban planning.

		Current axes of Machala	Applicable axes of Machala
City	Compactness		*
	Complexity		*
	Efficiency		*
	Socio-spatial integration		*
	Urban green space		*
City	Dispersion	*	
	Simplicity	*	
	Deficiency	*	
	Socio-spatial segregation	*	
	Limited urban green space	*	

Tabla 1. Axes of city types and their comparison with Machala

Elaborated by: Dayanna Riofrío.

Compactness and dispersion determine population density and proximity between facilities; complexity and simplicity influence the diversity of land uses; efficiency and deficiency affect the functional metabolism of the city; Integration and Segregation relate to the socio-spatial entity and the access that population groups have to services; and urban green space refers to the existing green areas.

From this perspective, we can determine that monocentric models are a suitable approximation for the spatial economic structure of small cities. The formation of this urban structure primarily results from the interaction between the positive and negative effects

generated by agglomeration and transportation costs (Rojas Quezada & Olivera, 2009), allowing for more strategic concentrations that minimize distances and enhance access for citizens from all points within Machala.

III. RESULTS

To determine a proposed solution, we start from the comparison of the two established city models and the axes that may subsequently exist in the city. Urban planning represents the achievements of an advanced, organized, and democratic society that actively participates in decisions affecting and concerning it, such as the urban space in which it resides (Bazant, 2014).

Machala has four established centralities (FIGURES 4, 5, and 6), but these are not connected to other sectors and do not interconnect with each other. Therefore, the goal is to establish a compact city that integrates the other areas lacking high commercial activity by enhancing spaces with existing facilities and vacant urban areas. This involves varying land use and creating connections through bike lane networks to establish routes at a scale tangible to residents. Public space is an important element within urban configuration. In addition to providing image and identity to the city, it is in these spaces that residents develop their daily lives through the various experiences and activities they engage in (Martínez, 2020).

- Existing centralities. █
- Centralities that can be enhanced through existing facilities. █
- Centralities that can be created through vacant urban spaces. █



Fig 8. Urban centralities in Machala. Image source: Mapstyle. Elaborated by: Dayanna Riofrío.

The compact city model is best suited for an urban area experiencing growth because it allows for proximity, urban and social diversity, efficient land use, reduced mobility, and mixed uses (Ballén, 2016). As represented, the proposal addresses the need for centralities in the city by utilizing existing land, whether through vacant spaces or existing facilities that need to be enhanced to revitalize areas with lower activity. A decade ago, Machala experienced high foot traffic in parks, spaces that were aesthetically prominent and provided vitality and safety to the neighborhoods. However, over time, these areas deteriorated due to a lack of maintenance. Parks, as gathering centers, can promote the strengthening of family bonds and social networks, as well as a sense of belonging and identity with the place (Martínez, 2020). To achieve a compact and diverse city, it is essential to moderate and manage densities, residential space fragmentation, and urban greenery (Lois, 2020).

In this way, a socio-spatial link can be established across all sectors of the city, including the disconnected areas in the northern and western quadrants of Machala, which are also expected to be enhanced through the planning of the centralities established in FIGURE 7.

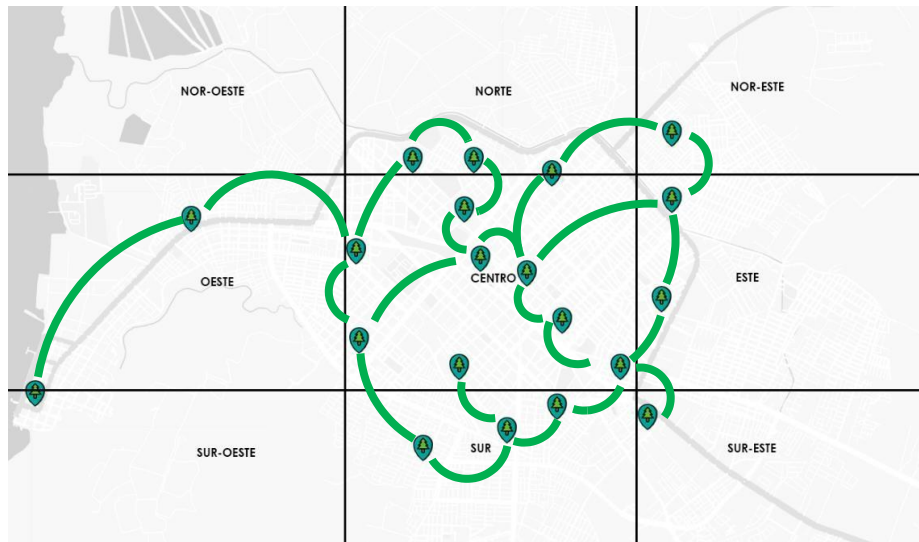


Fig 9. Network of parks and bike lanes among the sectors of Machala. Image source: Mapstyle. Elaborated by: Dayanna Riofrío.

IV. DISCUSSION

The research conducted on the morphology of Machala and the spatial reasons reviewed through its layout, which render it a dispersed city, led to the consideration of two potential resolutions:

1. Enhance the maintenance of existing facilities, utilizing cultural, historical, and representative spaces for the city or vacant land areas.
2. Revitalize parks that previously attracted high numbers of visitors by creating a network of bike lanes that facilitates movement across all quadrants of the city.

The space provided should be characterized by harmonizing areas, adhering to the axes established and estimated for Machala, as reviewed in TABLE 1.

1.To achieve a compact city, public space must be allocated to residents (obtained through the enhancement of POINT 1) and experiences and activities must be generated through these spaces, thereby establishing a connection between space and society (achieved through POINT 2).

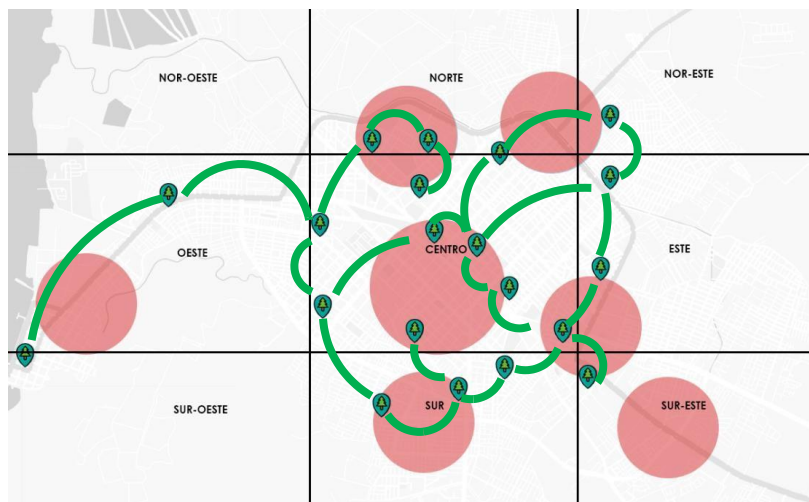


Fig 10. Red de conexión de sectores en Machala. Fuente: Mapstyle. Elaboración: Dayanna Riofrío.

V. CONCLUSION

The compact city model, through the centralities in historical facilities and connections between green spaces via bike lanes, is the most suitable urban planning approach for Machala. It can create the proximity needed for disconnected areas that are distant from centralities, offering the opportunity to reduce daily commuting costs to areas with a high concentration of economic activity and assist marginalized social groups that have grown in these peripheries as a result of dispersion.

Spaces designed for the benefit of citizen well-being and that focus on human scale are those that can effectively serve people and address scenarios with socio-spatial difficulties. On the other hand, urban morphology is a factor that, depending on its establishment, can contribute to generating segregation within the city. It is crucial to determine how we shape our cities and understand how social, economic, political, and cultural consequences can manifest based on the established environment.

VI. REFERENCES

- [1] Ballén, S. (2016). Vivienda y ciudad compacta. Revista Javeriana, 18. Obtenido de <https://revistas.javeriana.edu.co/index.php/cvyu/article/view/19018/15166>
- [2] Bazant, J. (2014). Planeación urbana estratégica. Ciudad de México: Trillas. Obtenido de <https://es.scribd.com/document/469143365/Bazant-J-Planeacion-Urb-Estrategica>
- [3] Gehl, J. (2015). Ciudades para la gente. Buenos Aires: Ediciones infinito. Obtenido de <https://elibro.net/es/lc/uguayaquil/titulos/78891>
- [4] Giraldo, T. (2019). Caracterización de las tramas urbanas de la ciudad de Manízales, Colombia (1849- 2017). Universidad Nacional de Colombia, Colombia, 30-43.
- [5] Lois, R. C. (22 de 11 de 2020). La ciudad y el urbanismo en tiempos de pandemia. Obtenido de <https://criticaurbana.com/la-ciudad-y-el-urbanismo-en-tiempos-de-pandemia>
- [6] Martínez, V. (2020). Parques urbanos: un enfoque para su estudio como espacio público. Intersticios Sociales, 19-30.
- [7] Petit, B. C. (2014). Las relaciones entre sociedad, espacio y medio ambiente en las distintas conceptualizaciones de la ciudad. Redalyc, 183-205.
- [8] Pineda, E. K. (2013). Representaciones y significados en la relación espacio-sociedad: una reflexión teórica. Sociológica México, 78-85.
- [9] Ramos, M. F. (2012). Del tejido urbano al tejido social: análisis de las propiedades morfológicas y funcionales. Universidad de la Salle Bajío, 98-126.
- [10] Rojas Quezada, C., & Olivera, I. y.-L. (2009). Estructura urbana y policentrismo en el área metropolitana de Concepción. Eure, 47-70.
- [11] Rueda, S. (2005). Un nuevo urbanismo para una ciudad más sostenible, I Encuentro de Redes de Desarrollo Sostenible y de Lucha contra el Cambio Climático.



First Author – Dayanna Estefanía Riofrío Valdiviezo, born in Machala, Ecuador, she is currently an architect graduated from the University of Guayaquil with a degree in Architecture, specializing in urban planning. She participated in several university-recognized projects, focusing on architectural design and construction, including the project " Estación autónoma y construida con innovación tecnológica". She also competed in an urban intervention contest on " Rescate de la avenida 9 de Octubre y Casco central" and a heritage preservation competition for the BAQ-2024, based on her thesis project, " Puesta en valor del patrimonio arquitectónico para el bienestar social: Alojamiento temporal en la antigua Cárcel Municipal". She is a professional with experience in BIM, architectural design for residential and commercial projects, and interior design.

Christian Paul Zambrano Murillo, born in the city of Guayaquil, province of Guayas, Ecuador. Architect and builder by profession with a master's degree in territorial planning and urbanism, graduated from the University of Guayaquil. In the professional field with twelve years of experience in the real estate sector, from the development of real estate projects, planning and execution of building and urban projects. In the academic field he has published in high impact scientific journals indexed in Scopus and participated in international conferences on Human Factors in Architecture, Sustainable Urban Planning and Infrastructure. He currently teaches in technical areas of building and theoretical areas within sustainable urban development, as well as being part of the center of excellence of the Faculty of Architecture and Urbanism at the University of Guayaquil. His research is focused on the planning and optimization of decision making for buildings, application of bioclimatic criteria, renewable energy generation, building technologies and land planning, under sustainability criteria.