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7 Strategies for the Distribution of Uses, Occupation and Allocation of Land: Explained with a Case Study of Paseo De Los Cañarís in the City of Cuenca

Carla Siguencia[a,*], Marco Avila[b,*] and Yonimiler Castillo[a]

[a]Master in local development mention planning, development and land use planning, University Catholic of Cuenca, Cuenca, Ecuador
[b]School of Architecture, University Catholic of Cuenca, Cuenca, Ecuador

*Corresponding author: soledad_376@yahoo.com, mavila@ucacue.edu.ec

ABSTRACT

The present research aims to generate strategies for the distribution of uses and allocation of land occupation characteristics, supported by geostatistical analyzes in the search to generate an interaction more adjusted to reality, to understand the dynamics of urban spaces, the forms occupation of space by the population (relationships between human beings and the physical space of their habitat), as well as the dynamics generated by certain elements and the impact on their immediate context.

Keywords: Geostatistics, occupation characteristics, geographic information systems, spatial autocorrelation, corema, diversity index

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1. INTRODUCTION

The uses of the land, and their physical expression, constitute the main element of modification of the landscape, being the socioeconomic structures those that determine the direction and tendencies of land uses that transform the natural environment.[1]– [5].

From the socioeconomic point of view, the land uses of a territory make up the landscape where the secular and current relationships of man with the environment are expressed in a characteristic way [6][7]–[10], on the other hand, the land use patterns derived from the influence of the Human activities, in certain cases constitute a series of threats to natural and productive systems, due to environmental degradation [11], [12].

Factors such as: subdivision (morphology of land occupation), urbanization (construction of urban infrastructure) and building (construction of buildings according to typologies and in response to the activities carried out in it).

They can be analyzed in consolidated areas that experience dynamism such as city occupation, transformation of urban space and its growth and consolidation; in such a way that the city itself becomes a space on which it is possible to carry out several analyzes that support future actions [13]– [16].

The research proposes generate strategies for the distribution of uses and allocation of land occupation characteristics, as specific objectives we seek:

- Identify and characterize the relevant urban elements of the study area.
- Analyze and identify the spatial patterns of land use and occupation in the study area.
- Prepare a synthesis based on the relationship between behavior patterns and relevant urban element.

New form of analysis of land uses, which, although the same results are obtained from traditional analyzes, as an advantage, the deduction that many of the times is obtained empirically, from the application of tools, has been rigorously proven. Geostatistics available in the ArcGIS [17], [18] geographic information system, whose calculation basis is the distance variable, which is different according to the location of one use versus another.

The study area has an area of 150 Ha, around Av. Paseo de los Cañaris, which is an area made up of important road axes such as Av. Huayna Cápac, Max Uhle, Av. Pumapungo and Av. González Suárez, which due to its dynamics allows us to analyze the impact of the use and occupation of land around them. In order to have quality data, the property census of the study area was carried out, using a

form applied to all the properties of the study area to collect information on both land use and occupation characteristics per building, to From the survey, the database is prepared, which contains all the information collected in the field.

The content of the information is presented in four sections, first theoretical references and research related to the subject, then the relevant urban elements of the study area are identified and analyzed, in the third section an analysis of the distribution of the groups of uses is presented. of soil present in the study area and the evaluation of current regulations. Subsequently, the spatial analysis of land use I thus determining the concentration, trend, and existing patterns through the application of methods such as Kriging, the Moran index and LISA. Finally, strategic objectives are established for the balanced development of the area according to the predominant factor that influenced its conformation.

2. METHODOLOGY

This research is of a mixed type that has a qualitative and quantitative, exploitative, descriptive and documentary space. Territorial planning is developed in three stages: diagnosis, territorial planning, and management of the plan. The geographical spaces must be studied to understand the functioning of the territorial system to design adequate plans for the conditions of each region.
This work indicates the procedures used to determine the urban land management categories as a territorial planning mechanism. In the study the following methodology is used, composed of four phases, in the first one a data collection is carried out, in phase two characterization of the relevant elements, in phase three selection of the geostatistical tool and we end with phase 4 that includes the proposed study and system. The methodology that was carried out in the investigation is described through Figure 1.
The main source of information was the in-situ survey of land uses at the farm level in the city of Cuenca. The study is carried out in an area consisting of 150 Ha located to the Southeast of the city of Cuenca, around Av. Paseo de los Cañaris, which is an area made up of major road axes such as Av. Huayna Cápac, Av. Max Uhle, Av. Pumapungo and Av. González Suárez, which due to their dynamics will allow to analyze the impact of the use and occupation of the land around them, in addition this area is characterized by having a homogeneous topography.
Being part of the urban area of the city of Cuenca, the occupation process has been completed almost entirely, presenting particularities in terms of the diversity of land use and occupation. For the delimitation, the following aspects were considered:

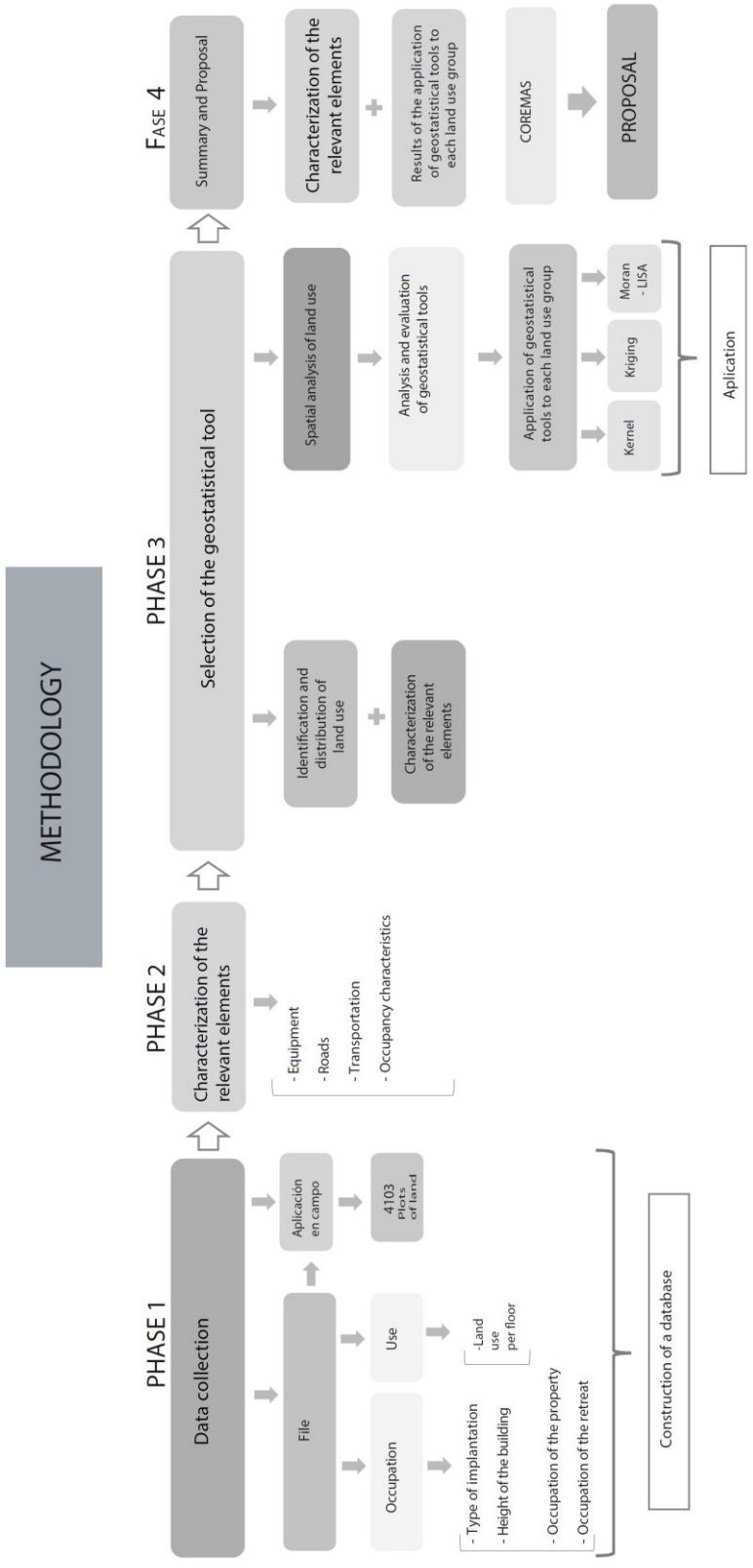


Fig. 1. Research methodological framework

- Incorporate the area of influence of the Paseo de los Cañaris.
- Incorporate the road axes, Av. Huayna Cápac, Av. Max Uhle, Av. Pumapungo and Av. González Suárez.

After defining the limit of the study area, the sectorization of the same is carried out under criteria and conditions of land use, topographic characteristics and road axes, obtaining as a result 6 sectors distributed as follows.

2.1. Facilities

In the study area, 151 facilities were identified distributed throughout the study area, the most numerous being those considered in the classification figure 2: administration and management (51), followed by health facilities (39), social welfare facilities, religious, education, security and supply.

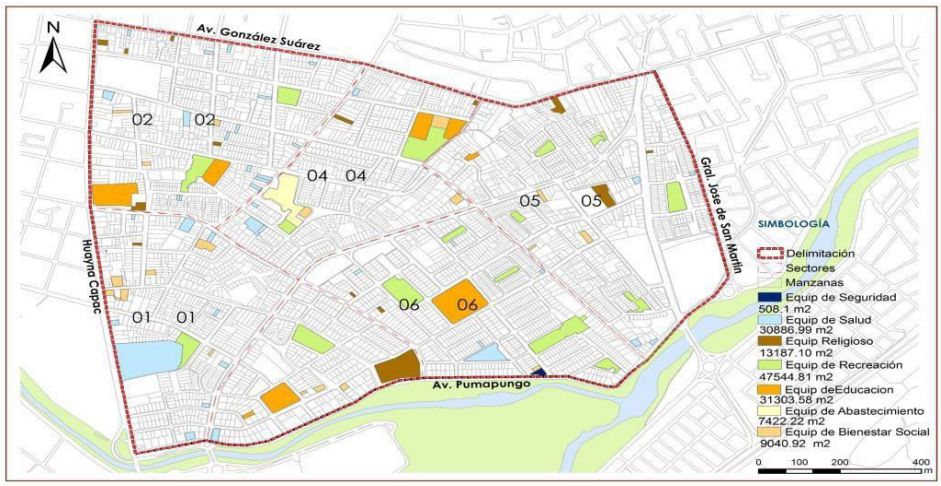


Fig. 2. Equipment of the study area. Prepared by the authors with data from the Property Census, 2015

2.2.1 Education Equipment

This type of equipment is legally governed by the Ministry of Education through the Zonal Directorate 6 of Education of Azuay. For the analysis of the educational facilities located in the study area, the buildings in which the different levels of education work established by the Ministry of Education with regard to the Initial, Basic and Baccalaureate levels and by the SENESCYT were identified as regards the Superior level, figure 3.

2.2.2 Health Equipment

They are mostly for public use and make up the comprehensive public health network, whose policies are attributed to the Ministries of Health. For the

classification of health facilities, the one carried out in the diagnosis phase of the Cuenca Urban Planning Plan (2015) 6 has been considered, where the "typology to standardize Health establishments by levels of National System Care has been taken of Health", corresponding to agreement N ° 001203 of the corresponding Ministry. The study area has both public and private health facilities that are framed within the different levels of care provided by the Ministry of Health.

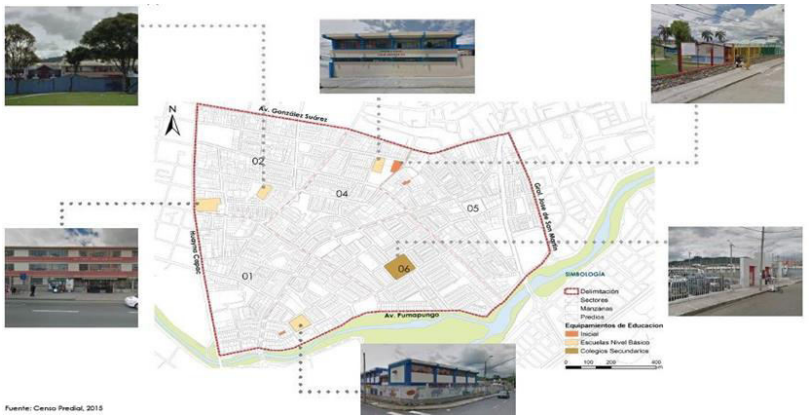


Fig. 3. Location of educational facilities in the study area. Prepared by the authors with data from the Property Census, 2015

2.2.3 Provisioning

The supply equipment is understood as the adequate buildings and infrastructures to promote exchange, where the suppliers (producers or sellers) and demanders (consumers or buyers) enter into a close commercial relationship in order to carry out abundant commercial transactions of perishable products and not perishable In addition, this facility has free parking and security guards. Likewise, it has a Comprehensive Development Center (CDI), so that all children (children of merchants) can do their homework supported by professionals.

2.2.4 Social Welfare Facilities

Governed by the Ministry of Social Welfare or by local governments, in charge of formulating, directing and executing state policies regarding the protection of the most vulnerable sectors of society (minors, youth, older adults, people with disabilities, indigenous people and peasants) with in order to promote good living. Considering the classification defined by the Ministry of Social Inclusion (2010) [8] in the study area, 18 social welfare facilities have been identified, of

which 16 correspond to nurseries, 1 nursing home and 1 Social reintegration centers.

2.2.5 Safety Equipment

Buildings whose objective is to contribute to citizen security and public order. The study area has a Community Police Unit (UPC), located to the south between Av. Pumapungo and José de la Cuadra street. This facility has police on permanent duty, 24 hours a day in 8-hour shifts.Recreation equipment: urban spaces, equipped, preserved and mainly animated for leisure and recreation, which has social importance since they are places of meeting and coexistence.
Based on the information collected in the field, the parks, which are mostly neighborhood and children's parks (17) and the fields (2), have been considered as green areas. Cult equipment: eIn the study area, 13 religious facilities have been identified, which preach various types of religions.

2.2. Roads

After the field review of the road hierarchy carried out by the Municipal GAD of the Cuenca [6] canton, adjustments have been considered, since the hierarchical level does not respond to the reality of the operation of the road system in the study area. Taking into account the above, the road network has been classified as follows:

- Arterial roads: their main characteristic is to carry traffic between different areas of the city, they support a high traffic flow.
- Collector roads: with the function of absorbing the traffic of the local roads, taking the vehicular flows towards the main system. In the study area there are 12 collector routes,
- Local roads: constituted by those roads that give access to adjacent properties, also facilitate local traffic. They are directly connected to the collector and / or arterial routes. These pathways are the most quantity in the study area.

2.3. Transport

The Public Transport Network forms a mesh of transport channels, which allows the flow of users between their places of origin and destination, in an efficient, comfortable and safe way. The proper functioning of the components of this network guarantees the fulfillment of its objective [9]. According to the information available in the Municipal Transit Office (DMT) [10]; The study area has the service of 13 bus lines, which move users to other sectors of the city.

2.4. Spatial Analysis of Land Use

The classification and identification of the land uses that are presented in the study area, was carried out based on the table of land uses existing in the Reform, Update, Complementation and Codification of the Ordinance that sanctions the Land Use Plan of the Cuenca canton [7]. The results are found in Table 1.

Table 1. Land uses according to the codification of the Ordinance that sanctions the Territorial Ordinance Plan of the Canton Cuenca

Code	Code Description
100	Occasional trade in retail housing supply products
200	Artisanal production and manufacture of goods compatible with housing
310	Security services
320	Financial services
340	Transport and communications service
350	Tourism and recreation services
360	Food services
380	Professional services
400	Personal and housing-related services
500	Daily trade of food and non-food supply products for housing
520	Retail trade in inputs for agricultural and forestry production
540	Retail trade in inputs for agricultural and forestry production
540	Trade Of Light Machinery And Equipment In General And Spare Parts And Accessories And Vehicles And Machinery
570	Trade in construction materials and accessory elements
600	Community and neighborhood equipment
700	living place
900	Special uses
1000	Management and administration

Ordinance that sanctions the Territorial Ordinance Plan of the Cuenca Canton, 2011.7

2.5. Analysis and Evaluation of Geostatistical Tools

For the evaluation of the geostatistical tools, the occasional trade land use group is used, since it has a similar amount of data to the other land use groups and above all it exceeds the minimum data required by the tools to be executed.[19]

As a first measure, a preliminary analysis of the data to be studied is carried out, this process is of vital importance since a good result depends on this. For this, different existing tools in ArcGIS are used and compared, such as Kernel and Kriging. Finally, the two tools were analyzed: Kernel Density and Kriging[20] [21][20]

The Kriging method is chosen because this method relies on mathematical and statistical models that include probability. That is, when the prediction is made, it is associated with a probability and the prediction error is calculated. Furthermore, this method allows spatially assessing the trend and concentration of land uses in the study area. Additionally, it was important to study the behavior of the land uses present in the study area, to understand the dynamics they generate. Although it is possible to have a general idea of the dynamics that land uses generate through cartographic representation or simply with data from the field survey, such analysis continues to be subjective, while statistical calculation allows to mathematically determine the behavior of land uses floor.

2.6. Tools used

2.6.1 Kriging tool

This analysis tool allows us to know: • Trend analysis, • Concentration Analysis, •Pattern[22]–[24] The figure 4 below shows the procedure carried out for the evaluation and application of this tool.

2.6.2 Global Moran Index (spatial autocorrelation)

It makes it possible to know if the distribution of land uses in the different categories is shaping patterns of grouped, dispersed or random spatial distribution.Spatial autocorrelation allows a simultaneous analysis of the distance between the location of the uses and the values of the sum of the number of land uses per block.It can be interpreted as a standardized measurement ranging from -1.0 to +1.0.[25]–[28]
Types of patterns that land use groups may be generating shown in Figure 5:

- LISA test (Local Indicators of Spatial Association)

It varies between -1 and +1, representing the degree of correlation. As a result, the index identifies disaggregated territorial units, where high or low analysis values are spatially grouped.

- Evaluation and Application of the LISA Test.
- Land use occasional trade in retail housing supply products.

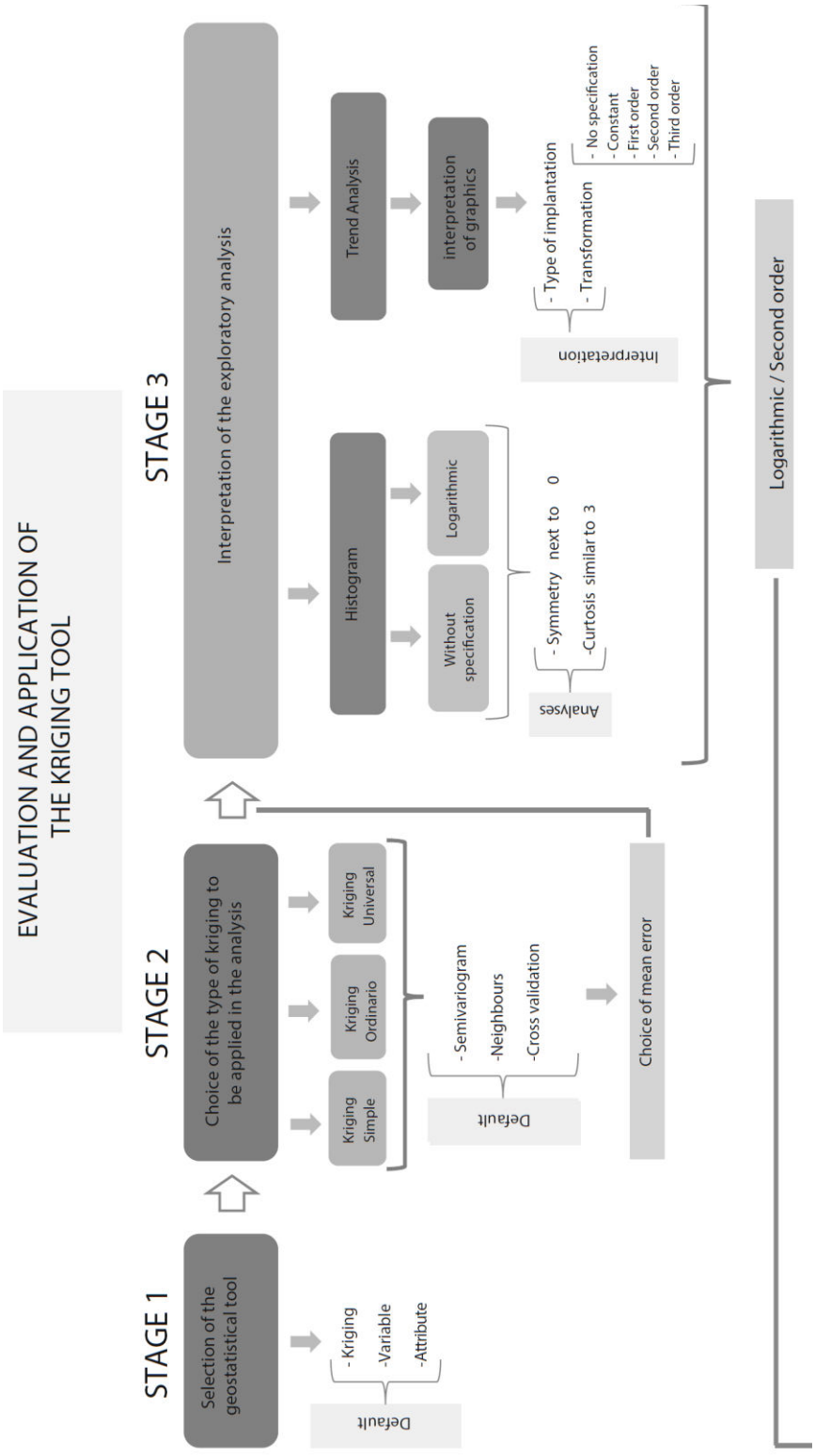


Fig. 4. Calculate Kriging (Stages 1-3)

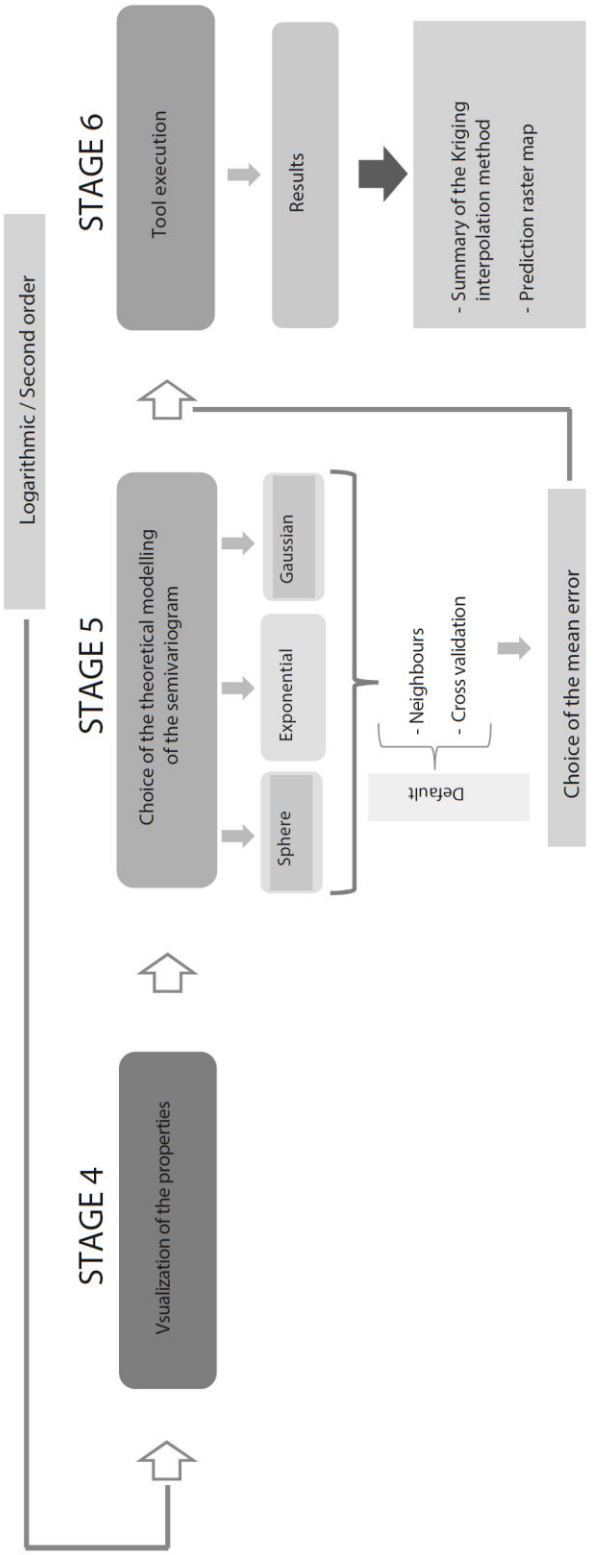


Fig. 4. Calculate Kriging (Stages 4-6)

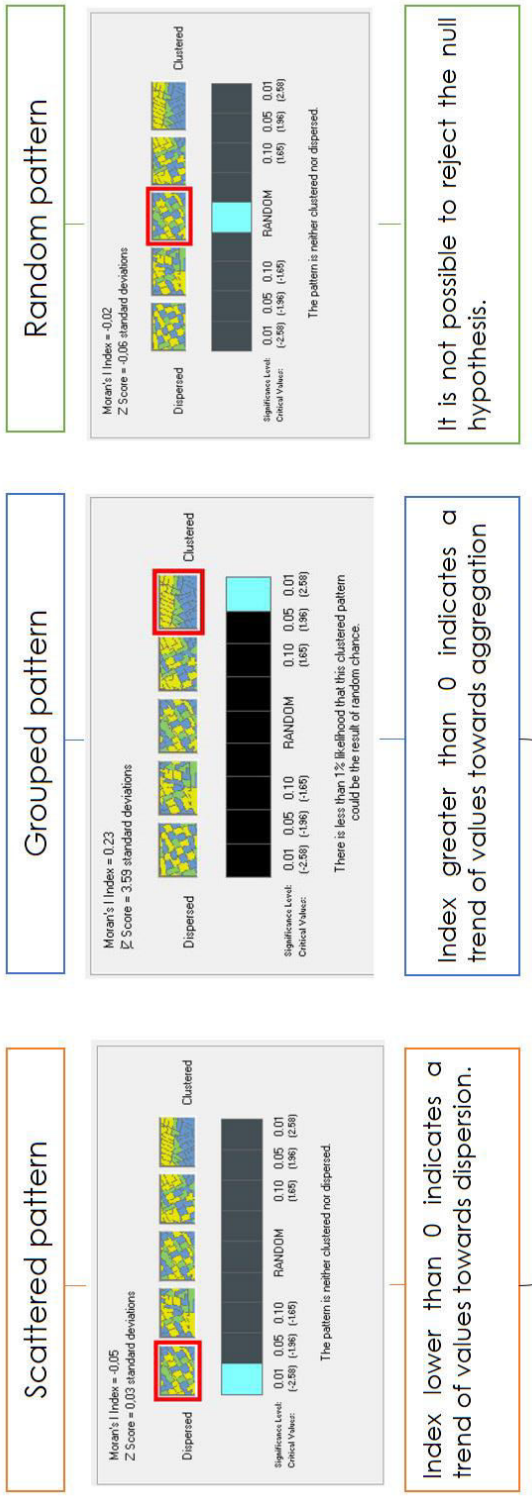
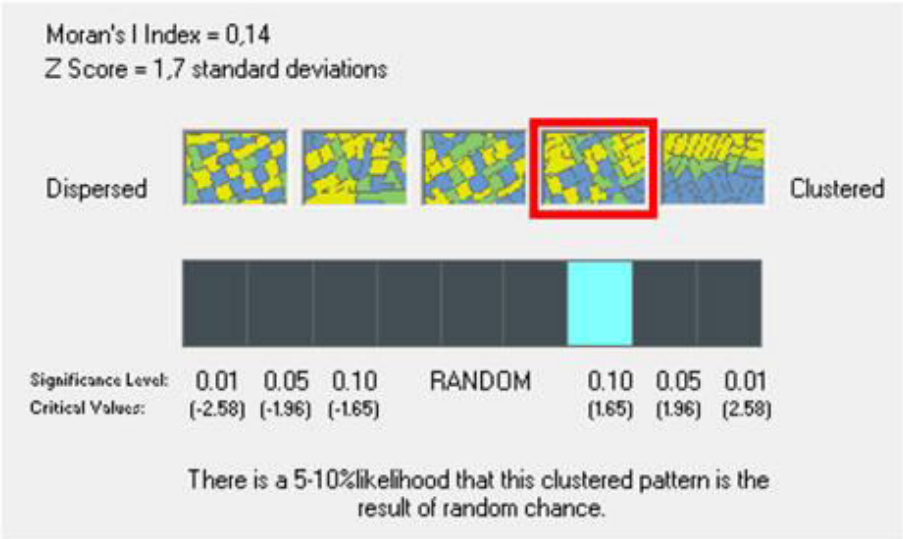


Fig. 5. Calculate global Moran Index

The figure 6 shows Moran's Spatial Autocorrelation Test I of the use of occasional trade in supply products to retail housing. [25], [27]– [29]



Global Moran's I Summary	
Moran's Index:	0,136633
Expected Index:	-0,013333
Variance:	0,007782
Z Score:	1,699977
p-value:	0,089135

Fig. 6. Moran's Spatial Autocorrelation Test I

3. RESULTS

The research generated strategies for the distribution of uses and allocation of land occupation characteristics.

- The relevant elements of the study area that have a direct impact on the behavior of land use and occupation were identified and characterized through diagnoses based on the data obtained from the field survey.
- Land use patterns were analyzed and identified through the application of geostatistical tools such as Kriging, Moran-Lisa, which allowed obtaining results of trend, concentration and distribution of land use patterns based on mathematical bases that make this rigorous. study.

- The synthesis was made from relating the results obtained from the spatial analysis of land use and the relevant urban elements, through the crossing of variables obtaining information on the current situation of the study area in relation to land use and characteristics Of occupation.
- A model was generated based on the graphical application (corema), explicit in the work, which can be complemented with the Shannon diversity index.

Concluding that, the presence of strong urban elements with important road equipment or axis for the city, generate intense dynamics in terms of variety of land uses and in turn these uses maintain a close relationship with certain patterns in terms of occupancy characteristics even above what is established by the regulations; situation that can be made visible from a model resulting from the application of geostatistical analysis with the support of Geographic Information Systems.

Based on the results obtained from the different analyzes carried out to study the behavior of land use and occupation characteristics, the following strategies have been established to generate favorable land use dynamics in the study area:

- Adequate distribution of land uses related to housing, so that the uses of service, commerce, and equipment compatible with housing are diversified and in turn enhance the dynamics that are generated between them. Avoiding in this way reaching an extreme specialization of uses, which increases displacements due to the need for supply. A spatial behavior like that of the study area should be sought, since there is a supply from points of concentration of different land uses or by areas with medium and high diversity indices, which allow the resident to acquire goods and services on foot.
- Maintain the purpose of retreats in a building, through proper use of these spaces, without altering the type of implantation assigned. Thus, avoiding sudden changes in the reading of the urban landscape
- Strategic location of influential facilities in the study area to promote areas with a high diversity of land uses. Similar to what happens, for example, around the supply equipment of the study area, the same that directly influences the concentration, diversification and probable trends in the location of land uses related to each other and to the home, thus avoiding cause incompatibilities.

4. DISCUSSION

Make use of the study of trends in the location of commercial and service land uses to plan a parking system that does not affect the operation of the road system. That is, to identify the roads that host or will host a high number of these types of uses through the Kriging tool that provides information on the likelihood of location of groups of land uses and thus provide parking systems on roads that require it, strategy that could be applied in already occupied areas.

- Promote commercial road axes that have a variety of land uses related to commerce and the provision of services, which supplies an area, without chaotizing vehicular traffic, or altering the characteristics of the road. This strategy is feasible to apply both in occupied areas and in the process of occupation, after carrying out a study of both concentration, location trend and diversity of land uses in their immediate context.
- Locate supply equipment in strategic areas that require diversity of uses related to housing. As a strategy to energize areas where residential use is high and uses need to be diversified. Strategy that was verified in the present study, since as observed in the commerce and service coremas, around the supply equipment, high diversity and dynamics are generated between land uses, without causing incompatibilities.
- Prevent commercial and service uses from replacing the main housing use, since they must be distributed in a balanced way and complement each other, to avoid dispersion, a phenomenon that on a larger scale translates into an unnecessary growth of the cities. Hence the importance of having statistical data that verify the concentration, trend and the conformation of behavior patterns of land uses to take the necessary measures.
- Enhance the dynamism of land use, in areas where densification is required. Because the diversification of land uses increases the population that resides in the surroundings, causing the area to densify, regardless of the height of the building. This could be verified through the coremas of service, commerce, and housing, where in an area with high concentration, conformation of patterns and probability of location of land uses, are causally related to non-compliance with the rules established by the Autonomous Decentralized Municipal Government.

It is necessary to develop the concept of allocation, in a more precise and forceful way, with the social and economic reality of the population without distorting the criteria for the control of impacts, involving concepts of

accessibility, functionality, habitability, security, relation public space, space private, demand, among others.

- Faced with the limitations that exist in certain land uses at the time of applying the Kriging 11 tool, it is recommended to perform the analysis by means of graphs that contain the count of the uses present in the study area, thus, in this way It solved this inconvenience, bearing in mind that this procedure approximates an empirical way, since it is visually determined where they are concentrated and where there is a trend of these land uses.

Finally, it would be important to extend the analysis to the rest of the city, taking different areas of different growth moments and in this way see the changes that have occurred over time, measure the effect of commercial and service concentration on the demand for public and private transport (vehicle flow). Validate if the behavior of land uses is more regular, while they are closer to the city center. Finally, to promote the use of geostatistical tools in studies of land use and occupation, to obtain objective results supported by mathematical relationships, which contribute to the planning of a city and study the relationship of land uses with other factors such as frequencies. of trips, displacements, areas of occupation, among others.

5. CONCLUSIONS

The objective of the research is aimed at transcending the diagnosis of land use and occupation beyond the basic mapping of the characteristics of land occupation, buildability, forms and number of uses, which are usually carried out, for later based on observations and subjective analysis, make decisions to organize the use and occupation of the territory.

This research is a first link towards the search for a methodology that allows studying the behavior of land use and occupation through geostatistical tools that allow to mathematically support the concentrations, dispersions, behavior patterns, occupation trends that support decision-making in matter of policies of ordering, control, and regulation of the ordering of the use and occupation of land.

It could be said that since the use and occupation of land are expressions of human activities in the territory, these actions are changing and complex, so it is necessary to expand the studies looking for methodologies that allow being precise in the diagnosis of the dynamics that are generated in their immediate surroundings to promote or regulate the activities that are concentrated or dispersed in the study area.

It is important that the results of the application of geostatistical tools in the study of land use and occupation are compared with variables of the relevant elements such as equipment, roads, physical environment that complement the diagnoses for land use plans. In addition, initiatives focused on creating ordinances must be rigorous and consistent with the economic, social, and environmental reality of the territory, involving concepts of accessibility, functionality, habitability, security, relationship between public and private space, cultural, among others.

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REFERENCES

1. A. V. Banerjee, “Land Reforms: Prospects and Strategies,” SSRN Electron. J., no. October, 2005.
2. O. Mertz, R. L. Wadley, and A. E. Christensen, “Local land use strategies in a globalizing world: Subsistence farming, cash crops and income diversification,” Agric. Syst., vol. 85, no. 3 SPEC. ISS., pp. 209–215, 2005.
3. J. U. Jepsen, C. J. Topping, P. Odderskær, and P. N. Andersen, “Evaluating consequences of land-use strategies on wildlife populations using multiple-species predictive scenarios,” Agric. Ecosyst. Environ., vol. 105, no. 4, pp. 581–594, 2005.
4. K. T. Geurs and B. van Wee, “Accessibility evaluation of land-use and transport strategies: Review and research directions,” J. Transp. Geogr., vol. 12, no. 2, pp. 127–140, 2004.
5. K. Geurs, B. Zondag, G. de Jong, and M. de Bok, “Accessibility appraisal of land- use/transport policy strategies: More than just adding up travel-time savings,” Transp. Res. Part D Transp. Environ., vol. 15, no. 7, pp. 382–393, 2010.
6. A. Gutiérrez, “Movilidad, transporte y acceso: una renovación aplicada al ordenamiento territorial,” Rev. electrónica Geogr. y ciencias Soc., vol. XIV, no. 331 (86), pp. 1–17, 2010.

7. R. Jordán and D. Simioni, Gestión urbana para el desarrollo sostenible en América Latina y el Caribe. 2003.

8. A. Beuf, “Concepción de centralidades urbanas y planeación del crecimiento urbano en la Bogota de s XX,” XII Coloq. Int. Geocrítica, no. September, pp. 1–21, 2007.

9. M. Pérez, “El desarrollo local sostenible,” Econ. Desarro., vol. 140, no. 2, pp. 60–71, 2006.

10. A. Romeo, C. Menta, E. A. Vázquez, and O. Madoery, “Aspectos Estrategicos Del Desarrollo Local,” Transform. Glob. Inst. y políticas Desarro. local., pp. 1–20, 2001.

11. Naciones Unidas, Indicadores ambientales y de desarrollo sostenible: avances y perspectivas para América Latina y el Caribe manuales 55 Santiago de Chile, diciembre de 2007. 2007.

12. A. E. GUERRA TANA, “Plan de uso y ocupación del suelo del área urbana de la ciudad de San Gabriel provincia del Carchi al año 2031,” no. 593, pp. 1–29, 2017.

13. A. M. Cabeza, “Ordenamiento territorial: experiencias internacionales y desarrollos conceptuales y legales realizados en Colombia,” Perspect. Geográfica, vol. 4, Ordenamiento territorial, Colombia, pp. 7–70, 1999.

14. D.P.D.E. León, “Su desarrollo local sostenible the determining of indicators for evaluating the urban use in the town of san josé de las lajas in the development of local sustainable functions,” pp. 39–48.

15. H. Romero, A. Vásquez, and F. Ordenes, “Ordenamiento territorial y desarrollo sustentable a escala regional, ciudad de Santiago y ciudades intermedias en Chile,” Glob. y Biodivers. oportunidades y desafíos para la Soc. Chil., no. January, pp. 167–224, 2003.

16. J. Soto Cortés, “El crecimiento urbano de las ciudades: enfoques desarrollista, autoritario, neoliberal y sustentable,” Paradig. económico, vol. 7, no. 1, pp. 127–149, 2015.

17. O. Vásquez, “La gestión urbana sostenible: conceptos, rol del gobierno local y vinculación con el marketing urbano,” Provincia, no. 31, pp. 147–171, 2014.

18. A. Monterrubio, “Estado actual del régimen de planeación y ordenamiento territorial metropolitano en México,” Espac. Públicos, vol. 151, no. 0718–0241, pp. 91–118, 2013.

19. M. C. Nicholson and T. N. Mather, “Methods for Evaluating Lyme Disease Risks Using Geographic Information Systems and Geospatial Analysis,” J. Med. Entomol., vol. 33, no. 5, pp. 711–720, 1996.

20. W. J. Fu, P. K. Jiang, G. M. Zhou, and K. L. Zhao, “Using Moran’s i and GIS to study the spatial pattern of forest litter carbon density in a subtropical region of southeastern China,” Biogeosciences, vol. 11, no. 8, pp. 2401–2409, 2014.

21. F. Moral García, F. Carranza Romero, F. Honorio Guisado, J. Rodríguez Bernabé, and J. Cruz Blanco, “Técnicas geoestadísticas aplicadas al análisis de la distribución de capturas de Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae) mediante trampas conferomonas sexuales en una plantación de tomate.,” Boletín Sanid. Veg. Plagas, vol. 30, no. 4, pp. 733– 744, 2004.

22. J. Martínez-Frutos and P. Martí, “Diseño óptimo robusto utilizando modelos Kriging: Aplicación al diseño óptimo robusto de estructuras articuladas,” Rev. Int. Metod. Numer. para Calc. y Disen. en Ing., vol. 30, no. 2, pp. 97–105, 2014.

23. U. D. C. Rica, U. D. C. Rica, S. José, C. Rica, and D. E. L. I. Kriging, “Disponible en: http://www.redalyc.org/articulo.oa?id=43629206,” 2005.

24. M. D. E. Las, V. D. E. La, S. U. Mineralizaci, L. A. Autores, S. B. Martell, and A. M. Romero, “Instituto superior minero metalúrgico,” 2001.

25. C. Guilmoto, “Spatial correlation and demography . To cite this version :,” 2010.

26. J. L. Ping, C. J. Green, R. E. Zartman, and K. F. Bronson, “Exploring spatial dependence of cotton yield using global and local autocorrelation statistics,” F. Crop. Res., vol. 89, no. 2–3, pp. 219–236, 2004.

27. B. Flahaut, M. Mouchart, E. S. Martin, and I. Thomas, “The local spatial autocorrelation and the kernel method for identifying black zones: A comparative approach,” Accid. Anal. Prev., vol. 35, no. 6, pp. 991–1004, 2003.

28. A. Soltani and S. Askari, “Exploring spatial autocorrelation of traffic crashes based on severity,” Injury, vol. 48, no. 3, pp. 637–647, 2017.

29. N. Cressie and L. B. Collins, “Patterns in spatial point locations: Local indicators of spatial association in a minefield with clutter,” Nav. Res. Logist., vol. 48, no. 5, pp. 333–347, 2001.

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