Multi-criteria evaluation of the resources and tourist attractions of the area adjacent to the Zapotepamba Binational Technical Training Center

Evaluación multicriterio de los recursos y atractivos turísticos de la zona adyacente al Centro Binacional de Formación Técnica Zapotepamba

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Abstract

This research it seeks the sustainable development of the Zapotepamba Binational Technical Training Center (CBFTZ), through comprehensive landscape management. The methodology applied to collect information was through a quantitative and qualitative approach. With this, a situational diagnosis of the adjacent parishes was made; likewise, an inventory of resources and tourist statistics; finally, the multi-criteria evaluation. Once the assessment was carried out, it was identified that in terms of natural and cultural interest, the resources with the greatest tourist potential are found in the Catacocha Parish.

Key words: Tourist potential, multi-criteria assessment, tourist resources, Zapotepamba.
Resumen

La presente investigación busca el desarrollo sostenible del Centro Binacional de Formación Técnica Zapotepamba (CBFTZ) a través del manejo integral del paisaje. La metodología que se aplicó para el levantamiento de la información fue a través de un enfoque cuantitativo y cualitativo. Con ello se hizo un diagnóstico situacional de las parroquias adyacentes; además de un inventario de recursos y atractivos turísticos; por último, la evaluación multicriterio. Una vez realizada la valoración se identificó que en términos de interés natural y cultural los recursos con mayor potencial turístico se encuentran en la parroquia Catacocha.

Palabras clave: potencial turístico, valoración multicriterio, recursos turísticos, Zapotepamba.

Introduction

According to Zuluaga (2006) “Tourism is a mass social phenomenon, which has become for some countries an important and basic factor for their economy” (p. 77). But it is important to manage processes that lead us to adequate planning and proper use of tourist attractions and resources in a sustainable way. On the other hand, it is important to know the tourist development capacity of a territory because it is “directly related to the will of the actors to establish relationships between them, jointly and coordinately involved in improving the conditions of the territory to assume the challenges derived from these processes” (Merinero & Pulido, 2009, p. 174). According to Varisco (2008), the tourist development of a place can be defined as the improvement of services and facilities to satisfy the tourist's needs, as well as the effects such as the generation of employment and therefore the income from tourist activities.

On the other hand, when talking about tourism, it is talking about tourism planning, since it is important to take into account the tools and techniques that help us evaluate and prioritize the resources of a territory to give it potential value. Therefore, for the development of many investigations, multi-criteria evaluations have been taken as a tool, which are a set of instruments that allow evaluating different alternatives in order to arrive at concrete decisions. “This methodology has been widely used in socio-environmental studies, in natural risk assessment and in determining the ideal location for service facilities (among others, those that are linked to the incorporation of services in education)” (Joo & Alvarado, 2013, p. 144). In this research, this methodology will be applied to evaluate the potential of the tourist attractions and resources.
The study area includes Canton Paltas, the same that is one of the cantons of Loja province, which is located in the Inter-Andean Alley of the Ecuadorian Sierra, west of the city of Loja. Paltas, like most cantons, is an agricultural, livestock and commercial producer, which has a great variety of flora, fauna and a wealth of its cultural and natural heritage. It bears this name due to the presence of the pre-Inca Palta ethnic group, which constitutes the fundamental element of ethnography and provincial history.

Through a previous survey, it was quickly identified that Canton Paltas has a wide variety of natural and cultural tourism resources, but lacks tourism promotion and the lack of interest in them generates a limited supply and, therefore, low demand. Another disadvantage found is the lack of proposals for tourism projects; for this reason, it can be formulated as a research question. How does the absence of a multi-criteria evaluation affect the use of the tourist resources of Canton Paltas? Thus, this research aims to make an assessment of the tourism potential of the natural and cultural resources of Canton Paltas, which will later help future research.

The application of the multi-criteria evaluation allowed us to know that in terms of the natural and cultural interest with the greatest tourist potential that Canton Paltas has, it is the Binational Technical Training Center Zapotepamba, since it has all the necessary accesses, adequate infrastructure, basic services and programs or agricultural activities, which tourists can enjoy.

Multi-criteria decision techniques are a rational and objective instrument both to improve the understanding of the decision processes that underlie systemic processes, and to help decision-making centers to address the necessary comparison between alternatives (Cabello, 2017).

According to Chakhar (2003) (quoted in Ramírez, 2007):

> all MCE (Multi-criteria Evaluation) techniques consist of a first stage, of the design of a matrix with the defined criteria and alternatives; the next stage consists in the aggregation of the different scores of the criteria, with the use of a specific aggregation procedure (the application of some MCE technique), taking into account the preference of the decision makers expressed in terms of weights assigned to the different criteria; that procedure or technique allows the decision maker to compare between the different alternatives based on the assigned weights. (p. 36)

According to Franco-Maass et al. (2009):

> The use of this multi-criteria evaluation methodology in the tourism field is little applied, and according to the document reviews it can be affirmed that it has a greater diffusion in terms of evaluating environmental problems, health, territory, among others. Thus, its greatest acceptance is in the Geographic Information System (GIS for its acronym in Spanish. (p. 214)
Below there are some reviews of studies that have addressed topics similar to the purpose of this work. A review classified by country is developed.

Among the multiple works of this type, it is possible to mention the one presented by Franco-Maass et al. (2009) in Nevado de Toluca National Park-Mexico, it was decided to carry out a complete evaluation procedure, elaborating in the first instantiate the inventory and based on the information obtained in the field. Secondly, the intrinsic and extrinsic criteria were defined for each type of resource and a set of analysis attributes was constructed and the decision matrix was prepared. The application of the weighted linear combination led to the final ranking of the resources and the identification of those that had tourism potential. The results obtained reveal that La Peñuela and the crater of the extinct volcano contain the highest rated resources, determined by the weight of the intrinsic attributes.

In Mexico, Arciniega, Osorio & Regil (2016) they carried out a study to evaluate the tourist resources of the municipality of San Pedro Lagunillas in the State of Nayarit, so they applied the multi-criteria evaluation (MCE) methodology since it is precise for these types of studies, it was carried out in phases in this way; the first one made an inventory of the resources that the parish had; subsequently, with the attributes matrix, the evaluation was carried out in order to propose a tourist product based on the resource with the greatest potential. The resource that obtained the best score was the Luis Donaldo Colosio Ecological Park.

Then, another work explores the inventory of attractions by applying the multi-criteria evaluation methodology (MCE) with a focus on a tourist product, from the Sierra de Nanchititla State Park, State of Mexico, for this purpose, a research was carried out to collect information from the field of hierarchical tourist attractions; subsequently, the multi-criteria evaluation methodology was applied, allowing the identification of the resources that stand out over which work must be done to develop tourist products that generate sustainable economic alternatives (Enríquez et al., 2010).

Continuing with the studies, Vanegas et al. (2017) with their research called: Multi-criteria evaluation and inventory of tourist attractions, Case study, at first an inventory of attractions was carried out, using the multi-criteria of decisions method based on the required inputs to design the proposal for a tourist promotion route for the municipality of Itagui. A decomposition of complex structures into their simplest components was made to obtain an assessment of attributes of tourist destinations, both qualitative and quantitative; which were hierarchically ordered to establish logical processes in decision making. From the work carried out, it is corroborated how the evaluation and inventory of tourist resources becomes a relevant tool to direct the planning and tourism development processes of the regions.

In summary, the review of studies from different countries shows that there are many investigations that are based on determining the tourism potential of each region in
order to, through the results, propose a tourism product that helps the development of tourism in the area, for which, an inventory of tourist attractions, field work, interviews, data collection had to be carried out; likewise, the multi-criteria evaluation methodology (MCE) was used, which is based on the intrinsic and extrinsic components. It is worth mentioning that all the aforementioned studies are related to this research and which will be used to base and guide.

**Materials and Methods**

The methodology used was a quantitative and qualitative approach. With this, a situational diagnosis of Canton Paltas was made; likewise, an inventory of tourist resources and attractions and finally the multi-criteria evaluation following the stages it has.

For the development of this research, a bibliographic review of all the tourist attractions of the Canton Paltas was first carried out, in books and in the Ministry of Tourism; as well as general data of the canton. In the same way, a bibliographic review of articles related to multi-criteria evaluation was carried out in order to base the theory on the results found in this research.

For the inventory of the resources and tourist attractions of Canton Paltas, the methodology of the Ministry of Tourism of Ecuador 2018 was used. With this it was possible to demonstrate that there are 27 tourist attractions of which 14 are cultural and 13 natural.

Based on the Multi-criteria Evaluation methodology described above, an evaluation procedure was carried out that included the following stages:

Once the set of alternatives has been defined, the next step to follow is to establish the set of extinct and intrinsic criteria to be used to evaluate tourist resources and attractions. The intrinsic allow the specific characteristics of each resource to be analyzed according to their nature, such as the visual elements linked to the space (vegetation, extension and transparency of water); terrain characteristics (grade, type of surface and degree of difficulty); additional dimensions and attractions. The extrinsic ones instead analyze recreational-tourist variables based on the conditions of use (Bote, 2002). Likewise, Zamorano (2002) refers to the extrinsic criteria: conditions of access, degree of conservation, conditions of use and recreation and security.

These two types of criteria have been adapted to the characteristics of Canton Paltas resources. Table 1 shows the criteria established for the two categories.
Table 1. Intrinsic and extrinsic criteria for the evaluation of tourism resources

| Resource type   | Criterion       | Attribute | Description        |
|-----------------|-----------------|-----------|--------------------|
| Terrestrial     | a) Coverage     | a) Vegetation | Abundant (A)  
|                 |                 |           | Sufficient (S)    
|                 |                 |           | Little (E)        |
|                 | b) Ground conditions | b) Gradient | Very Inclined (MI)  
|                 |                 |           | Inclined (I)       
|                 |                 |           | Something Inclined (AI) 
|                 |                 |           | Plane (P)          |
|                 |                 | b) Surface  | Stony (Pe)         
|                 |                 |           | Dirt Road (T)      
|                 |                 |           | Wet (H)            
|                 |                 |           | Compact (C)        
|                 |                 |           | Grassland (Pa)     
|                 |                 |           | Other (O)          |
|                 | b) Difficulty   |           | High (A)           
|                 |                 |           | Medium (M)         
|                 |                 |           | Low (B)            |
| Aquatic (water flows) | c) Characteristics | c) Width | Meters            |
|                 | c) Transparency |           | Crystalline (C)    
|                 |                 |           | Semi Turbid (S)    
|                 |                 |           | Turbid (T)         |
|                 | c) Visible extent |           | 1 to 3 m. (A)      
|                 |                 |           | 3 to 6 m. (B)      
|                 |                 |           | 6 to 10 m (C)      
|                 |                 |           | More than 10 m (D) |
|                 | d) Additional appeal | d) Fauna | Yes (S)           
|                 |                 |           | No (N)             |
| Cultural manifestations | e) Characteristics | e) Traditional state | Excellent (E)  
|                 |                 |           | Good (B)           
|                 |                 |           | Bad (M)            |
Once the variables and attributes to be considered were defined according to the information obtained in the field, the matrix was obtained with the qualitative or quantitative characterization of each resource for each of the criteria. Table 2 below presents the characterization of the intrinsic criteria based on the type and name of the resources.

| Intrinsic criteria                  | Resource type | Attribute | Description               |
|-------------------------------------|---------------|-----------|---------------------------|
|                                     |               | e₂) Diffusion | Local (L) Regional (R) National (N) International (I) |
|                                     |               | e₃) Community participation | Yes (S) No (N) |
|                                     |               | c) Promotion | f₁) Promotion means Web (W) TV (T) Radio (R) Magazines (Re) |

| Extrinsic criteria                  | Criterion          | Attribute               |
|-------------------------------------|---------------------|-------------------------|
|                                     | Physical access     | g₁) Distance            |
|                                     |                      | g₂) Time                |
|                                     | Possibilities of appreciation | h₁) State of conservation |
|                                     |                      | h₂) Environment quality |
|                                     |                      | h₃) Fragility            |
|                                     |                      | h₄) Contamination        |
|                                     | Infrastructure and services | i₁) Signaling           |
|                                     |                      | i₂) Equipment            |
|                                     |                      | i₃) Recreational facilities |
|                                     | Security             | j₁) Surveillance         |

Source: Franco-Maass et al. (2009, p. 217)
Table 2. Construction of the intrinsic criteria for the analysis

| Means                              | Criteria                        | Vegetation | Gradient | Surface | Difficulty |
|------------------------------------|---------------------------------|------------|----------|---------|------------|
| Terrestrial (Hills, ravines, parks, etc.) |                                 | a<sub>110</sub> | b<sub>1</sub>(2) | b<sub>2</sub>(3) | b<sub>3</sub>(4) |
| (Forest) Bosque Zapotepamba        |                                 | S          | P        | O       | B          |
| (Mount) Cerro Chamba               |                                 | S          | I        | H       | M          |
| (Hill) Loma La Capilla             |                                 | E          | Al       | T       | B          |
| (Hill) Loma Mayor                  |                                 | E          | Al       | Pe      | M          |
| (Forest) Bosque Suquinda           |                                 | A          | Al       | Pa      | M          |
| (Mount) Cerro Guanchuro            |                                 | A          | Al       | H       | B          |
| (Mount) Cerro Padre Hurco          |                                 | S          | MI       | Pe      | M          |
| (Mount) Cerro Tarimbo              |                                 | S          | Al       | H       | B          |
| (Rock) Peña Shiriculapo            |                                 | A          | Al       | Pe      | B          |
| (Mount) Cerro Pisaca               |                                 | A          | Al       | T       | B          |
| Aquatic (Water Flows)              |                                 | c<sub>1</sub> | c<sub>2</sub>(5) | c<sub>3</sub>(6) | d<sub>1</sub>(7) |
| (Stream) Chorro el Almendral       |                                 | 1 m        | C        | B       | N          |
| (Waterfall) Cascada de las Mariposas|                                | 4 m        | S        | A       | S          |
| (Waterfall) Cascadas de las Minas  |                                 | 3 m        | S        | A       | S          |
| Cultural manifestations            |                                 | e<sub>1</sub>(8) | e<sub>2</sub>(9) | e<sub>3</sub>(10) | f<sub>1</sub>(11) |
| Zapotepamba Binational Technical Training Center (Centro Binacional de Formación Técnica Zapotepamba) | | E | R | S | W |
| National Institute for Agricultural Research (Instituto Nacional de investigaciones Agropecuarias) | | R | R | S | W |
Similarly, based on the variables already established and field work, it has been possible to construct the matrix with extrinsic criteria for each of the resources that the Canton Paltas possesses. Table 3 establishes the characterization of the extrinsic criteria.

| Means                                      | Criteria |
|--------------------------------------------|----------|
| Yamana Heritage Houses (Casas patrimoniales de Yamana) | B L S W |
| Yamana Central Church (Iglesia Central de Yamana)    | B L S R |
| Image sharing                               | E L S R |
| Barrial Blanco Petroglyphs (Petroglifos del Barrial Blanco) | B L N W |
| Rinconada Petroglyphs (Petroglifos de la Rinconada) | M L N W |
| Polo Petroglyphs (Petroglifos Polo)          | B L N W |
| Fatima Lookout (Mirador de Fátima)           | B L S W |
| Catacocha Heritage Houses (Casas Patrimoniales de Catacocha) | E N S W |
| Matriz Catacocha Church (Iglesia Matriz Catacocha) | B L S W |
| Joaquin Leiba brothers museum (Museo de los hermanos Joaquin Leiba) | B L S W |
| Indio Paltense                               | M L N W |
| Tasines de Playas alto                       | B L N W |

Source: author’s own elaboration.
| **Table 3. Construction of extrinsic criteria for analysis** |
|-------------------------------------------------------------|
| **Resources** | **Physical access** | **Possibilities of appreciation** | **Infrastructure and services** | **Security** |
| **Terrestrial (Hills, ravines, parks, etc)** | | | | |
| (Forest) Bosque Zapotepamba | 26.7 km | 35 m | R | B | A | S | I | A | A | 5 | Mo |
| (Mount) Cerro Chamba | 26.7 km | 35 m | B | B | M | N | I | N | B | 4 | Mo |
| (Hill) Loma La Capilla | 24.5 km | 29 m | R | R | M | N | N | N | B | 1 | I |
| (Hill) Loma Mayor | 19.9 km | 23 m | B | O | M | N | N | N | B | 4 | I |
| (Forest) Bosque Suquinda | 19.6 km | 26 m | B | O | M | N | A | I | B | 3 | S |
| (Mount) Cerro Guanchuro | 4.3 km | 15 m | E | O | A | N | I | I | B | 2 | Mo |
| (Mount) Cerro Padre Hurco | 7.1 km | 13 m | R | B | M | N | I | I | B | 1 | I |
| (Mount) Cerro Tarimbo | 14.3 km | 17 m | B | B | M | N | N | I | B | 1 | I |
| (Rock) Peña Shiriculapo | 0.35 km | 4 m | E | O | M | S | S | S | M | 3 | M |
| (Mount) Cerro Pisaca | 12 km | 20 m | E | B | M | N | I | I | M | 2 | I |
| **Aquatic (Water Flows)** | | | | | |
| (Stream) Chorro el Almendral | 19 km | 29 m | B | B | MA | S | A | I | B | 1 | I |
| (Waterfall) Cascada de las Mariposas | 19.6 km | 26 m | R | B | MA | S | A | N | B | 1 | I |
| (Waterfall) Cascadas de las Minas | 19 km | 20 m | R | R | MA | S | N | N | B | 1 | I |
| **Cultural manifestations** |
| Zapotepamba Binational Technical Training Center (Centro Binacional de Formación Técnica Zapotepamba) | 26 km | 29 m | E | O | A | N | A | S | M | 7 | M |
| Resources                                                                 | Physical access | Possibilities of appreciation | Infrastructure and services | Security |
|--------------------------------------------------------------------------|-----------------|-------------------------------|-----------------------------|----------|
| National Institute for Agricultural Research (Instituto Nacional de investigaciones Agropecuarias) | 26.9 km 29 m    | B B                           | MA S I A A 1 M              |          |
| Yamana Heritage Houses (Casas patrimoniales de Yamana)                  | 18.5 km 15 m    | B B                           | A S N A M 1 S              |          |
| Yamana Central Church (Iglesia Central de Yamana)                       | 18.9 km 15 m    | B R                           | A S N A B 2 S              |          |
| Image sharing                                                           | 21.7 km 31 m    | B O                           | B S N I B 1 I              |          |
| Barrial Blanco Petroglyphs (Petroglifos del Barrial Blanco)             | 21.7 km 31 m    | B B                           | A N I N B 2 I              |          |
| Rinconada Petroglyphs (Petroglifos de la Rinconada)                    | 19km 20 m       | B B                           | M S A I B 2 I              |          |
| Polo Petroglyphs (Petroglifos Polo)                                     | 19.4 km 26 m    | R R                           | MA S A I B 1 Mo            |          |
| Fatima Lookout (Mirador de Fátima)                                      | 1.7 km 10 m     | B O                           | B S I I B 2 I              |          |
| Catacocha Heritage Houses (Casas Patrimoniales de Catacocha)            | 1 km 5 m        | E O                           | MA S A S B 3 S             |          |
| Matriz Catacocha Church (Iglesia Matriz Catacocha)                      | 1 km 10 m       | E O                           | MA N A S M 2 S             |          |
| Joaquin Leiba brothers museum (Museo de los hermanos Joaquin Leiba)    | 3 km 2 m        | B B                           | M N A A B 3 S              |          |
| Indio Paltense                                                          | 2 km 3 m        | B R                           | B N I I B 1 I              |          |
Resources Criteria

Physical access Possibilities of Infrastructure and Security
appreciation

Tasines de Playas alto 10 km 5 m R R M S N N B 2 I

E = [1] Excellent O = [2] Optimum MA = Very Y = Yes S = [4] Sufficient A = Some
B = Good G = Good H = High I = Insufficient N = None
R = Regular M = Moderate B = Low
M = Bad L = Low

Source: author’s own elaboration.

Once the criteria tabulation was done, it was proceeded to transform them on a scale between 1 and 10. The value of each attribute represents the degree to which each alternative meets the assessment objective, with 10 being the maximum possible value and 1 the minimum value, thereby obtaining the matrix.

Table 4. Decision matrix with normalized values

| Resources               | Intrinsic attributes | va1 | vb1 | vb2 | vb3 | Summation | Average | 40 % |
|-------------------------|----------------------|-----|-----|-----|-----|-----------|---------|------|
| Terrestrial (Hills, ravines, parks, etc.) |                      |     |     |     |     |           |         |      |
| (Forest) Bosque Zapotepamba |                      | 9.0 | 8.0 | 2.5 | 3.0 | 22.5      | 5.6     | 2.3  |
| (Mount) Cerro Chamba     |                      | 9.0 | 6.0 | 3.5 | 7.0 | 25.5      | 6.4     | 2.6  |
| (Hill) Loma La Capilla   |                      | 5.0 | 7.5 | 8.0 | 6.5 | 27.0      | 6.8     | 2.7  |
| (Hill) Loma Mayor        |                      | 5.0 | 7.5 | 7.0 | 6.7 | 26.2      | 6.6     | 2.6  |
| (Forest) Bosque Suquinda |                      | 10.0| 9.0 | 5.0 | 5.0 | 29.0      | 7.3     | 2.9  |
| (Mount) Cerro Guanchuro  |                      | 10.0| 8.0 | 4.0 | 3.0 | 25.0      | 6.3     | 2.5  |
| (Mount) Cerro Padre Hurco|                      | 9.0 | 6.0 | 7.5 | 6.5 | 29.0      | 7.3     | 2.9  |
| (Mount) Cerro Tarimbo    |                      | 9.0 | 7.5 | 4.0 | 3.0 | 23.5      | 5.9     | 2.4  |
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| Resources Intrinsic attributes | va1 | vb1 | vb2 | vb3 | Summation | Average | 40 % |
|--------------------------------|-----|-----|-----|-----|-----------|---------|------|
| **Terrestrial (Hills, ravines, parks, etc.)** |     |     |     |     |           |         |      |
| (Rock) Peña Shiriculapo | 10.0 | 10.0 | 9.0 | 3.0 | 32.0 | 8.0 | 3.2 |
| (Mount) Cerro Pisaca | 10.0 | 10.0 | 8.0 | 1.0 | 29.0 | 7.3 | 2.9 |
| **Aquatic (Water Flows)** |     |     |     |     |           |         |      |
| (Stream) Chorro el Almendral | 4.0 | 8.0 | 6.0 | 15 | 19.5 | 4.9 | 2.0 |
| (Waterfall) Cascada de las Mariposas | 6.0 | 6.5 | 8.5 | 10.0 | 31.0 | 7.8 | 3.1 |
| Cascadas de las minas | 5.0 | 6.0 | 8.0 | 8.5 | 27.5 | 6.9 | 2.8 |
| **Cultural manifestations** |     |     |     |     |           |         |      |
| Zapotepamba Binational Technical Training Center (Centro Binacional de Formación Técnica Zapotepamba) | 10.0 | 5.0 | 10.0 | 10.0 | 35.0 | 8.8 | 3.5 |
| National Institute for Agricultural Research (Instituto Nacional de investigaciones Agropecuarias) | 6.0 | 5.0 | 8.0 | 8.0 | 27.0 | 6.8 | 2.7 |
| Yamana Heritage Houses (Casas patrimoniales de Yamana) | 8.0 | 1.0 | 10 | 10 | 29.0 | 7.3 | 2.9 |
| Yamana Central Church (Iglesia Central de Yamana) | 8.0 | 1.0 | 10 | 5.0 | 24.0 | 6.0 | 2.4 |
| Image sharing | 10.0 | 1.0 | 10 | 10 | 31.0 | 7.8 | 3.1 |
| Barrial Blanco Petroglyphs (Petroglifos del Barrial Blanco) | 8.0 | 1.0 | 1.0 | 10 | 20.0 | 5.0 | 2.0 |
| Rinconada Petroglyphs (Petroglifos de la Rinconada) | 4.0 | 1.0 | 1.0 | 10 | 16.0 | 4.0 | 1.6 |
| Polo Petroglyphs (Petroglifos Polo) | 8.0 | 1.0 | 1.0 | 10 | 20.0 | 5.0 | 2.0 |
| Fatima Lookout (Mirador de Fátima) | 8.0 | 1.0 | 10 | 10 | 29.0 | 7.3 | 2.9 |
| Catacocha Heritage Houses (Casas Patrimoniales de Catacocha) | 10.0 | 8 | 10 | 10 | 38.0 | 9.5 | 3.8 |
| Matriz Catacocha Church (Iglesia Matriz Catacocha) | 8.0 | 1.0 | 10 | 10 | 29.0 | 7.3 | 2.9 |
### Resources

#### Intrinsic attributes
| Terrestrial (Hills, ravines, parks, etc.) | va1 | vb1 | vb2 | vb3 | Summation | Average | 40 % |
|------------------------------------------|-----|-----|-----|-----|-----------|---------|------|
| Joaquin Leiba brothers museum (Museo de los hermanos Joaquin Leiba) | 8.0 | 10  | 10  | 10  | 29.0 | 7.3     | 2.9  |
| Indio Paltense                            | 4.0 | 10  | 10  | 10  | 25.0 | 6.3     | 2.5  |
| Tasines de Playas alto                     | 8.0 | 10  | 10.0| 10.0| 29.0 | 7.3     | 2.9  |

Source: author’s own elaboration.

#### Table 5. Decision matrix with normalized values

| Resources                  | Extrinsic attributes |
|----------------------------|----------------------|
| **Terrestrial**            |                      |
| (Forest) Bosque Zapotepamba | 7.0  8.0  6.0        |
| (Mount) Cerro Chamba       | 7.0  8.0  8.0  7.0  5.0|
| (Hill) Loma La Capilla     | 7.5  8.0  6.0  3.0  5.0|
| (Hill) Loma Mayor          | 8.0  8.0  8.0  10.0 2.0|
| (Forest) Bosque Suquinda   | 10.0 8.0 10.0 10.0 2.0|
| (Mount) Cerro Guanchuro    | 9.0  9.5 10.0 10.0 5.0|
| (Mount) Cerro Padre Hurco  | 8.5  8.6 6.0 7.0 5.0 2.0|
| (Mount) Cerro Tarimbo      | 8.0  8.0 8.0 7.0 5.0 2.0|
| (Rock) Peña Shiriculapo    | 10.0 9.5 10.0 10.0 8.0|
| (Mount) Cerro Pisaca       | 10  8.0 10 7.0 5.0 5.0 8.0 5.0 2.0 4.0 1.0 71.5 6.5 3.9 |

### Aquatic (Streams)

| (Stream) Chorro el Almendral | 8.0 | 8.5 | 8.0 | 7.0 | 10  | 10  | 8.0 | 5.0 | 2.0 | 4.0 | 1.0 | 71.5 | 6.5 | 3.9 |

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| Resources                                    | Extrinsic attributes |
|----------------------------------------------|-----------------------|
| **Terrestrial**                              | vg1  vg2  vh1  vh2  vh3  vh4  Vi1  Vi2  Vi3  Vi4  vj1  Summation  Average  60 % |
| (Waterfall) Cascada de las Mariposas         | 8.0  8.9  6.0  7.0  10.0  10.0  8.0  1.0  2.0  4.0  1.0  65.9  6.0  3.6 |
| (Waterfall) Cascadas de las minas            | 8.3  9.0  6.0  3.0  10.0  10.0  1.0  1.0  2.0  4.0  1.0  55.3  5.0  3.0 |
| **Cultural manifestations**                  |                       |
| Zapotepamba Binational Technical Training Center (Centro Binacional de Formación Técnica Zapotepamba) | 10.0  9.0  10.0  9.0  6.0  9.0  10.0  9.0  105  10.0  9.5  5.7 |
| National Institute for Agricultural Research (Instituto Nacional de investigaciones Agropecuarias) | 8.0  8.0  8.0  6.0  9.0  5.0  8.0  2.0  8.0  77  7.0  4.2 |
| Yamana Heritage Houses (Casas patrimoniales de Yamana) | 8.0  8.0  8.0  7.0  8.0  10.0  5.0  1.0  5.0  4.0  6.8  70.8  6.4  3.9 |
| Yamana Central Church (Iglesia Central de Yamana) | 9.0  9.0  8.0  3.0  8.0  10.0  5.0  1.0  2.0  5.0  1.0  75  67.5  6.1  3.7 |
| Image sharing                                | 8.0  9.0  8.0  10.0  10.0  1.0  2.0  4.0  1.0  55  5.0  3.0 |
| Barrial Blanco Petroglyphs (Petroglifos del Barrial Blanco) | 8.0  8.7  8.0  7.0  8.0  10.0  5.0  5.0  2.0  5.0  1.0  58.7  5.3  3.2 |
| Rinconada Petroglyphs (Petroglifos de la Rinconada) | 8.5  8.6  6.0  7.0  5.0  10.0  8.0  7.0  2.0  5.0  1.0  68.1  6.2  3.7 |
| Polo Petroglyphs (Petroglifos Polo)           | 8.5  9.0  8.0  3.0  10.0  8.0  7.0  2.0  4.0  7.5  77  7.0  4.2 |
### Results

Because there were four different groups of intrinsic criteria such as: terrestrial, aquatic (water flows), aquatic (lakes) and cultural manifestations; the evaluation involved applying, for each of the groups, the weighted linear summation. Based on the combination procedure, the final evaluation of each of the tourist resources was obtained based on their relevance for the tourist development of Canton Paltas.

### Table 6. Results obtained from the linear combination of attributes (standardized criteria)

| Resources | Linear Sum of Intrinsic Resources | Linear Sum of Extrinsic Resources | Weighted Sum of Intrinsic Criteria | Weighted Sum of Extrinsic Criteria | Final Value of Weights | Preference order |
|-----------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|------------------------|-----------------|
| (Forest) Bosque Zapotepamba | 22.50 | 85.00 | 2.3 | 4.6 | 6.89 | 7 |
## Multi-criteria evaluation of the resources and tourist attractions of the area adjacent to the Zapotepamba Binational Technical Training Center

| Resources | Linear Sum of Intrinsic Resources | Linear Sum of Extrinsic Resources | Weighted Sum of Intrinsic Criteria | Weighted Sum of Extrinsic Criteria | Final Value of Weights | Preference order |
|-----------|-----------------------------------|-----------------------------------|------------------------------------|------------------------------------|------------------------|------------------|
| (Mount) Cerro Chamba | 25.50 | 56.50 | 2.6 | 3.1 | 5.63 | 21 |
| (Hill) Loma La Capilla | 27.00 | 38.50 | 2.7 | 2.1 | 4.80 | 27 |
| (Hill) Loma Mayor | 26.20 | 51.00 | 2.6 | 2.8 | 5.40 | 22 |
| (Forest) Bosque Suquinda | 29.00 | 78.00 | 2.9 | 4.3 | 7.15 | 4 |
| (Mount) Cerro Guanchuro | 25.00 | 70.80 | 2.5 | 3.9 | 6.36 | 12 |
| (Mount) Cerro Padre Hurco | 29.00 | 52.10 | 2.9 | 2.8 | 5.74 | 19 |
| (Mount) Cerro Tarimbo | 23.50 | 49.00 | 2.4 | 2.7 | 5.02 | 25 |
| (Rock) Peña Shiriculapo | 32.00 | 97.50 | 3.2 | 5.3 | 8.52 | 3 |
| (Mount) Cerro Pisaca | 29.00 | 64.00 | 2.9 | 3.5 | 6.39 | 11 |
| (Stream) Chorro el Almendral | 19.5 | 71.5 | 1.95 | 3.9 | 5.85 | 17 |
| (Waterfall) Cascada de las Mariposas | 31 | 65.9 | 3.1 | 3.6 | 6.69 | 10 |
| (Waterfall) Cascadas de las minas | 27.5 | 55.3 | 2.75 | 3.0 | 5.77 | 18 |
| Zapotepamba Binational Technical Training Center (Centro Binacional de Formación Técnica Zapotepamba) | 35 | 105 | 3.5 | 5.7 | 9.23 | 1 |
| National Institute for Agricultural Research (Instituto Nacional de investigaciones Agropecuarias) | 27 | 77 | 2.7 | 4.2 | 6.90 | 6 |
| Yamana Heritage Houses (Casas patrimoniales de Yamana) | 29 | 70.8 | 2.9 | 3.9 | 6.76 | 9 |
| Yamana Central Church (Iglesia Central de Yamana) | 24 | 67.5 | 2.4 | 3.7 | 6.08 | 16 |
| Image sharing | 31 | 55 | 3.1 | 3.0 | 6.10 | 15 |
| Recursos                     | Suma linear de recursos intrínsecos | Suma linear de recursos extrínsecos | Peso sumado de criterios intrínsecos | Peso sumado de criterios extrínsecos | Valor final de pesos | Orden de preferencia |
|-----------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------------------|---------------------|
| Petroglifos del Barrial Blanco | 20 | 58.7 | 2 | 3.2 | 5.20 | 24 |
| Petroglifos de la Rinconada | 16 | 68.1 | 1.6 | 3.7 | 5.31 | 23 |
| Petroglifos Polo     | 20 | 77 | 2 | 4.2 | 6.20 | 14 |
| Mirador de Fátima       | 29 | 63 | 2.9 | 3.4 | 6.34 | 13 |
| Casas Patrimoniales de Catacocha | 38 | 96 | 3.8 | 5.2 | 9.04 | 2 |
| Iglesia Matriz Catacocha | 29 | 76 | 2.9 | 4.1 | 7.05 | 5 |
| Museo de los hermanos Joaquín Leiba | 29 | 72.5 | 2.9 | 4.0 | 6.85 | 8 |
| Indio Paltense              | 25 | 45.9 | 2.5 | 2.5 | 5.00 | 26 |
| Tasines de Playas alto    | 29 | 50.5 | 2.9 | 2.8 | 5.65 | 20 |

Fuente: elaboración del autor.

Una vez que se realizó la evaluación, se identificó que en términos de interés cultural, el recurso que tiene mayor potencial turístico es el Centro Técnico Binacional Zapotepamba, perteneciente a la Universidad Nacional de Loja, que cuenta con todos los accesos necesarios, infraestructura adecuada y servicios básicos y ofrece programas agrícolas, ya que está en la ruta principal que conecta el cantón con los demás cantones. Como se puede observar en la tabla, los criterios extrínsecos tienen un puntaje más alto, lo que muestra que tiene gran potencial para el desarrollo turístico. Además, gracias a su ubicación, este recurso turístico está a la vista de todos los turistas que visitan el Cantón Paltas. Sin embargo, existen otros recursos que podrían ser utilizados para fines turísticos, tal como es el caso de las Casas Patrimoniales de Catacocha, un lugar que se encuentra en la cabecera cantonal, cuenta con la infraestructura necesaria para promover el turismo en el área, servicios básicos, entre otros, es importante dar buena utilización que beneficie a la comunidad; por otro lado, en la tercera fila se encuentra el Peña Shiriculapo, es
a well-known attraction but it is not enough to have a good promotion, but it also has all the facilities for tourists to access it.

Likewise, with the evaluation it was possible to determine that, the tourist resource that obtained a low score is (Rock) Peña de los Espíritus, since it did not meet all the proposed criteria, since it does not depend only on its potential, but also on its state of conservation, community participation and promotion.

A general analysis of the results obtained makes it possible to establish that the extrinsic criteria exert the most determining influence on the evaluation. Likewise, what causes an attraction to have a low score is also due to the lack of equipment, infrastructure and security, it is a fundamental part of any attraction to have these requirements, since tourists visit places that make them feel safe and preserve their landscaping beauty. It should be noted that the ranking made it possible to appreciate that many tourist resources and attractions of the aforementioned parishes are sites that, with good administration, can carry out undertakings and therefore help in a process of tourist development, taking advantage of them in the best way, without causing any impact.

**Discussion**

The Yamana, Casanga and Catacocha parishes have natural and cultural tourist attractions, to carry out different activities according to their preference, it is worth mentioning that there are 27 inventoried attractions, most of them correspond to cultural manifestations, this group is important as people are interested for knowing the culture of a town, its customs, traditions and ways of living together; all this makes it unmatched in value, making the place more attractive. The inventory reflects the variety of tourist attractions and with this, tourism activity can be further promoted, always towards a sustainable vision. On the other hand, inventoried natural resources are undoubtedly important elements which have characteristics that anyone would be interested in visiting. Despite the lack of maintenance of the same and the disinterest on the part of the authorities, people do not have the spirit to know these places and choose to look for other destinations.

The appropriate selection of an inventory of tourist resources and a multi-criteria evaluation become a guide that allows us to identify the current tourist offer and the actions that are still to be carried out in the destination; it will allow designing strategies or proposals for the development of tourist products, generating a minimum impact.

The evaluation carried out has made possible to clearly differentiate the resources with the greatest attributes for recreational use based on their own characteristics. However, it is important to mention that the evaluation carried out has as a limitation the lack of consideration
of the social actors linked to the resources, since they are an important part of establishing future projects or ventures.

Conclusions

Therefore, it is considered that the evaluation of tourist resources and attractions are a necessary tool to guide decision-making in the tourist planning and development processes carried out for any destination. The contribution of this article lies in the application of multi-criteria evaluation as a very useful method to obtain a hierarchy of resources according to the proposed criteria. For this reason, obtaining an adequate inventory allowed defining the attributes and analysis criteria used in the MCE, resulting in an appropriate strategy to qualify them quantitatively. Likewise, it allowed obtaining favorable results, which will later serve as a basis for establishing or proposing future tourism products, increasing the supply and therefore the demand.

References

Arciniega, D., Osorio, M. & Regil, H. (2016). Evaluación de los recursos turísticos naturales del municipio de San Pedro Lagunillas, Nayarit, México, a partir de la metodología multicriterio. Caderno Virtual de Turismo, 16(3), 43-60.

Bote, V. (2002). Planificación económica del turismo. Ciudad de México, México: Editorial Trillas.

Cabello, A. (2017). Métodos de decisión multicriterio y sus aplicaciones. Retrieved from https://biblioteca.unirioja.es/tfe_e/TFE002504.pdf.

Enríquez, M. et al. (2010). Evaluación multicriterio de los recursos turísticos del Parque Estatal Sierra de Nanchititla, Estado de México. El Periplo Sustentable, 18, 7-35.

Franco-Maass, S. et al. (2009). Evaluación multicriterio de los recursos turísticos: Parque Nacional Nevado de Toluca-México. Estudios y Perspectivas en Turismo, 18(2), 208-226.
Joo, J. & Alvarado, V. (2013). Evaluación multicriterio/multiobjetivo aplicada a datos sobre educación: una primera aproximación. Revista Educación y Tecnología, 3, 112-123.

Merinero, R. & Pulido, J.I. (2009). Desarrollo turístico y dinámica relacional. Metodología de análisis para la gestión activa de destinos turísticos. Cuadernos de Turismo, 23, 173-193.

Ramírez, A.M. (2007). El proceso de análisis jerárquico con base en funciones de producción para planear la siembra de maíz de temporal (Graduate Thesis). COLPOS, Universidad Autónoma Chapingo, Texcoco, México.

Vanegas, J. et al. (2017). Evaluación multicriterio e inventario de atractivos turísticos: estudio de caso. Espacios, 38(23), 1-6.

Varisco, C. (2008). Desarrollo turístico y desarrollo local: la competitividad de los destinos turísticos de Sol y playa. Retrieved from http://nulan.mdp.edu.ar/550/1/varisco_c.pdf.

Zamorano, F.M. (2002). Turismo alternativo. Servicios turísticos diferenciados. Ciudad de México, México: Editorial Trillas.

Zuluaga, P. (2006). Una mirada al paisaje como recurso turístico. Revista Interamericana de Ambiente y Turismo, 2(1), 76-82.