EVALUATION OF THE SUSTAINABLE MOBILITY PLAN OF THE MUNICIPAL DECENTRALIZED AUTONOMOUS GOVERNMENT OF THE ALAUSÍ CANTON, PROVINCE OF CHIMBORAZO, PERIOD 2014-2020

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Abstract

The objective of this research was to carry out the evaluation of the sustainable mobility plan of the Municipal Decentralized Autonomous Government of the Alausí canton, province of Chimborazo, period 2014-2020., through sustainability indicators such as: economic, social, environmental and specific, which allowed to know if the recommendations made to the plan in the programs have been met, Plans and preliminary projects of the three axes of the Plan: Transit and Mobility, Land Transport and Road Safety. A survey was applied to 381 people distributed to the ten parishes of the canton in order to know the perception regarding the improvement of mobility, likewise the interview was conducted with the professional of the Headquarters Management and Control of Traffic, Land Transport and Road Safety, Director of Mobility, Transit and Land Transport of the Municipal GAD of Alausí, to know their criteria around the plans, programs and preliminary projects corresponding to the Mobility Plan subject to study. 29 indicators were selected for analysis considering the seven programs that make up the plan and the results point to a low investment in projects to improve pedestrian and vehicular mobility, as well as the lack of supervision, monitoring and control of the recommendations, which generates that the perception of the citizenship is moderately satisfactory about the state of the roads, sidewalks, ordering of parking sites, traffic during peak traffic hours, public transport service, horizontal and vertical signage. Therefore, it is concluded that 18 indicators met the objective of the mobility plan, while eleven are to be met in the medium and long term. The main recommendation is to the authorities or those in charge of supervising compliance with the programs, plans and preliminary projects established in the plan, and implementing the improvements suggested in the improvement plan, to meet the proposed goals and contribute to the quality of life of the road users of the canton, by granting them an optimal road system that has traffic and mobility management, Land transport and road safety according to your needs.

Keywords: mobility plan, transit, land transport, road safety, sustainability indicators, evaluation, road users, pedestrian, public transport.

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Introduction

The Sustainable Mobility Plan (PMS) of the Municipal GAD of the Alausí canton developed in 2014, is aligned with instruments that favor the modal shift towards more sustainable means that will improve Mobility and Environmental Quality, focused on solving the needs of urban displacement, improving the interior and exterior habitability of parishes, neighborhoods, and in relation to the whole city, Within the principles of urban sustainability, achieving a healthier, kinder, respectful city for future generations, integrating, and ultimately more humanized.

Taking into account the above, this research work arises to evaluate the Sustainable Mobility Plan during the period 2014-2020, which will allow to know if the recommendations of the programs, plans and preliminary projects that, as a technical and administrative management tool, contribute to improving the mobility and quality of life of the population of the Alausí canton have been complied with. In aspects of traffic, land transport and road safety, giving priority to public transport, using alternative means of mobility (bike cletas, walks), traffic management, better occupation of vehicular parking, education and road safety to citizens.

RESEARCH DESIGN

Type and Approach of Research

The research modality was mixed: qualitative-quantitative, non-experimental, bibliographic, exploratory and descriptive.

Research Methods

The research methods used were: deductive and analytical. The first made it possible to draw logical conclusions based on a series of principles. .(Cegarra, 2012)

The second helped to observe the nature, causes and effects, for which, it is necessary to make an observation to analyze and examine a particular fact (Hernández, 2017). In this case, the documents issued by the Municipal GAD of Alausí related to the Mobility Plan were analyzed; in order to define the progress that the plans, programs and established projects have had.

Collection of Information

Primary data

The information collected through surveys, observation sheets, interviews and other aspects considered in the proposal was considered.

Secondary data

Books, scientific articles, theses and others whose content was directly related to the proposed research were used, in order to duly substantiate the proposal.

Study Population

The study population corresponded to 45,054 road users in the Alausí canton.

Sample size

The sample corresponds to the subgroup of the population that is considered for an investigation, generalize results and define parameters (Hernández, Fernández, & Baptista, 2014). For this case study, the formula for finite populations was used, considering a confidence level of 95%.

$$n = \frac{N * Z^2 * p * q}{e^2 * (N-1) + Z^2 * p * q}$$

Applied the formula gave the following result:

$$n = \frac{45.054 * 1{,}96^2 * 0{,}5 * 0{,}5}{0{,}05^2 (45.054 - 1) + 1{,}96^2 * 0{,}5 \text{ x} * 0{,}5} = 381$$

Therefore, the sample was 381 people.

Primary and secondary data collection techniques

The technique that was used for the collection of primary data was the survey, which ensured the veracity of the information obtained, these were addressed to all road users of the Alausí canton, to know the perception regarding mobility,

observation was made through diagnostic questionnaires to analyze the current state of the Municipal GAD in traffic issues, land transport and road safety, of reports granted by the institution, to know the criteria around the plans, programs and preliminary projects corresponding to the Mobility Plan, the interview was conducted. All this served to tell the pertinent information that founded the evaluation of the sustainable mobility plan of the Municipal Decentralized Autonomous Government of the Alausí canton, province of Chimborazo, period 2014-2020.

Primary and secondary data collection instruments

The instruments used for data collection were the questionnaire, which was applied in a one-person way to road users in the Alausí canton, which was composed of 18 dichotomous questions. A current diagnostic questionnaire of the Municipal GAD

was also used, it was composed of 12 presumed dichotomous. To know the fulfillment of the plans, programs and preliminary projects, an interview guide of 7 questions was made, and finally to assess the state and road characterization an observation sheet was used.

Data processing tools

To process the information, Microsoft office tools were used: Excel and Word that served for the development and presentation of the project.

RESULTS AND DISCUSSION

Survey results

The main results of the survey are:

Table -1. Knowledge of the Mobility Plan.

Variables	Frequency	Percentage
Yes	308	80,80%
No	73	19,20%
Total	**381**	**100,00%**

Source: Direct research

Made by: Galarza, Juan, 2022.

According to the results, it can be determined that 80.80% of respondents indicate that they did know that the Municipal Decentralized Autonomous

Government of the Alausí canton has a Mobility Plan.

Table -2. *Knowledge of the* main axes of work of the Mobility Plan.

Variables	Frequency	Percentage
Yes	186	48,80%
No	195	51,20%
Total	**381**	**100,00%**

Source: Direct research

Made by: Galarza, Juan, 2022.

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It can be seen that these indices show that five out of ten users of the roads of the canton do not know about the axes of work that sustain the Mobility Plan prepared by the Municipal GAD.

Table -3. Perception about the rehabilitation and maintenance of the roads.

Variables	Frequency	Percentage
Excellent	0	0,00%
Very good	77	20,20%
Well	102	26,80%
Regular	99	26,00%
A little	50	13,10%
Very bad	53	13,90%
Total	**381**	**100,00%**

Source: Direct research

Made by: Galarza, Juan, 2022.

They are considered as positive perceptions, since four out of ten road users consider that the roads of the city of Alausí have received maintenance.

Table -4. Perception of vehicular traffic at peak demand times

Variables	Frequency	Percentage
Efficient	58	15,20%
Normal	240	63,00%
Deficient	65	17,10%
Very deficient	18	4,70%
Total	**381**	**100,00%**

Source: Direct research

Made by: Galarza, Juan, 2022.

These indicators show that six out of ten road users in the canton perceive vehicular traffic at peak demand times at the main intersections of the city as normal.

Table -5. Perception of the design and condition of pedestrian zones

Variables	Frequency	Percentage
Strongly agree	129	33,90%
I agree	221	58,00%
Disagree	31	8,10%
Strongly disagree	0	0,00%
Indifferent	0	0,00%
Total	**381**	**100,00%**

Source: Direct research

Made by: Galarza, Juan, 2022

When considering as positive the options of answers very much agree (33.9%) and agree (58.0%), in sum (91.90%) nine out of ten users of the roads of the canton perceive the state and design of the pedestrian areas as adequate.

Table -6. Perception of sidewalk improvement and rehabilitation

Variables	Frequency	Percentage
Strongly agree	69	18,10%
I agree	221	58,00%
Disagree	65	17,10%
Strongly disagree	21	5,50%
Indifferent	5	1,30%
Total	**381**	**100,00%**

Source: Direct research

Made by: Galarza, Juan, 2022.

When considering as positive the response options very agree (18.1%) and agree (58.0%), in sum (76.1%) seven out of ten road users perceive as satisfactory the improvement and rehabilitation of sidewalks in the interior of the city of Alausí.

Table -7. Perception of the management of vehicle parking

Variables	Frequency	Percentage
Strongly agree	225	59,10%

I agree	130	34,10%
Disagree	26	6,80%
Strongly disagree	0	0,00%
Indifferent	0	0,00%
Total	381	100,00%

Source: Direct research

Made by: Galarza, Juan, 2022.

The results show that nine out of ten road users in the canton agree with the ordering of vehicular parking in the urban area of the Alausí canton.

Table -8. Perception about the location of commercial transportation parking lots

Variables	Frequency	Percentage
Strongly agree	126	33,10%
I agree	160	42,00%
Disagree	88	23,10%
Strongly disagree	7	1,80%
Indifferent	0	0,00%
Total	**381**	**100,00%**

Source: Direct research

Made by: Galarza, Juan, 2022.

When considering as positive responses in agreement, it is determined that seven out of ten users perceive as adequate the location of commercial transport parking lots.

Table -9. Perception of the intercantonal public transport service

Variables	Frequency	Percentage
Very satisfactory	38	10,00%
Satisfactory	91	23,90%

Moderately satisfactory	172	45,10%
Unsatisfactory	72	18,90%
Nothing satisfactory	8	2,10%
Total	**381**	**100,00%**

Source: Direct research

Made by: Galarza, Juan, 2022.

These indicators show that four out of ten users of the intercantonal public transport service perceive it as moderately satisfactory.

Table -10. Perception of places of embarkation and disembarkation of passengers

Variables	**Frequency**	**Percentage**
Very suitable	38	10,00%
Suitable	176	46,20%
Regularly suitable	41	10,80%
Not suitable	126	33,10%
Total	**381**	**100,00%**

Source: Direct research

Made by: Galarza, Juan, 2022

These results indicate that, for four out of ten users, the condition and location of the places of embarkation and disembarkation of passengers in the canton Alausí are adequate.

Table -11. Perception of road signs

Variables	**Frequency**	**Percentage**
Very good	129	33,90%
Good	221	58,00%
Regular	4	1,00%
Suitcase	27	7,10%

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Total	381	100,00%

Source: Direct research

Made by: Galarza, Juan, 2022.

These results indicate that for five out of ten users perceive that road signs within the urban areas of the Alausí canton are good.

Table -12. Training on education and road safety

Variable	Frequency	Percentage
Yes	259	68,00%
No	68	17,80%
Not responding	54	14,20%
Total	381	100,00%

Source: Direct research

Made by: Galarza, Juan, 2022.

These indicators show that six out of ten people who live in Alausí know about the training offered by the GADM of Alausí related to road safety issues.

Interview results

The main results of the interview are:

1. Does the Sustainable Mobility Plan of the Alausí canton comply with the minimum guidelines of the National Transit Agency?

These responses make it clear that the Mobility Plan defined by the Municipal GAD of Alausí requires adjustments to comply with the minimum guidelines required by the National Transit Agency, highlighting the areas inherent to urban planning, the promotion of the use of public transport and environmentally friendly means of mobility.

2. Do the products delivered conform to sustainable mobility plan issues?

According to the interviewees, the products delivered conform to sustainable mobility issues and seek to promote citizen participation in issues related to road safety and order in the mobility of the canton.

3. Do you consider that the follow-up and control of the recommendations in the mobility plan have been efficient?

These responses indicate that the Municipal GAD has not been concerned with monitoring and controlling compliance with the objectives and goals proposed in each of the projects proposed in the PMS, which limits decision-making, because it is not known for sure what has been the impact of the implementation of the activities defined in it.

4. How applicable are the programs, plans and projects in the Alausí canton?

These responses ratify that not everything proposed by the PMS is applicable because there are projects that were carried out without taking into account the reality of the canton, in terms of infrastructure and topography, which limits their total compliance.

5. Have the execution of the programs, plans and projects of the mobility plan met the objectives set?

This indicates that indicators cannot be applied to all the projects established in the PMS, because they do not have the data to make an assessment of their scope.

6. What are the main difficulties encountered in meeting the objectives set out in the mobility plan?

This indicates that the failure to meet the goals proposed in the programs and projects established in the PMS is the result of the lack of economic resources to execute the works implicit in them.

7. Do you think that the evaluation of the mobility plan will allow the design of performance indicators to know the percentage of compliance with the recommendations established in it?

In the opinion of the interviewees, the evaluation of the PMS would allow the design of indicators that measure compliance with all the recommendations made to the plans and subplans, to know how much has been executed and how much remains to be executed, which in turn would contribute to decision-making and alternatives for evaluation and monitoring in the short and medium term.

1 Proposal for the evaluation of the Sustainable Mobility Plan of the Municipal Decentralized Autonomous Government of the Alausí canton, province of Chimborazo, period 2014-2020.

Structure of the mobility plan of the Alausí canton.

1.1.1 PHASE I: Introduction and Institutional Organization

From the analysis it can be verified that, in Phase I of Stage 1.- Background. – the guidelines required in the "Methodological Guide for the formulation of mobility plans for GADs", issued by the National Council of Competences, are met, since in Module 1 constant of 48 pages in numeral 1.2. Lines of action of the PMS determine the needs of the realization of the mobility plan, the instruments for the elaboration process are generated, in numeral 6 responsibilities and resources are assigned, as well as the definition of the work plan, methodology and mechanisms to incorporate citizen participation in its formulation.

1.1.2 PHASE II: Pre-Diagnosis and general objectives

In Volume 1. Diagnosis of the Current Situation of traffic, land transport and road safety, the consultant in general identifies the problem of urban and cantonal mobility on the basis of existing information and the verification and identification of the operational dysfunctions of the mobility system.

In this phase, the referential structure is fulfilled since the PMS includes:

1. A diagnosis of the current situation of the canton of Alausí: in all aspects that have to do with all the issues to be addressed: Traffic and Vehicular and pedestrian Mobility, Land Transport (as transport operators, studies of supply – demand of the modalities of school transport, convectional taxi, light load and intra-Cantabrian public transport, studies of a Land Terminal, Collection Centers, etc.) and Road Safety (reduction, training, dissemination, road safety).

2. An analysis of the needs in TTTSV: to be able to draw out the strategic lines of action (Programs, Plans and Projects) in the short, medium and long term, as well as recommendations for each theme and final conclusions for the Canton.

3. Planning and evaluation models duly developed in each of the areas that will be directly or indirectly involved in the preparation of the PMS.

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1.1.3   PHASE III: Analysis and diagnosis

From the analysis of can indicate that Sustainable Mobility Plan of the canton Alausí, if it complied with what was suggested by the National Council of Competences regarding this phase, in Volume 1 that consists of 343 pages, the causes that generate the central problem and the secondary ones and the effects or impacts on operational efficiency and effectiveness are established in a general way.   in the integration of the environment.

However, in this phase the referential methodology for the analysis of the topics is recommended to group them and structure them into 12 components, and in the mobility plan of Alausí only information is shown on the socio-economic, territorial, urban and environmental components, as well as the sub components: public transport, traffic and circulation, existing mobility infrastructure, of parking lots and the transport of goods, macro information that few of them do not correspond to the cantonal reality.

1.1.4   PHASE IV: Development of the plan

Phase IV is considered to be the key to the mobility plan since once the specific mobility problems of the canton have been technically identified and from the problems, the specific objectives of the plan, selection of measures, determination of indicators, determination of scenarios, definition of strategies, formulation and management of financing can be determined. Therefore, analysis was verified in *Volume 1: Recommendations: programs, plans and pre-projects of the components of transit, land transport and road safety* whether or not it complies with what is suggested in the referential methodology and it was possible to show in the recommendations the following:

1.   Transit and mobility

• 5 programs, plans and **projects are established respectively in general 18 sub plans** that mark the course of sustainable mobility, their

goals and operational indicators are defined, however, statistical methods of how to measure them are not established.

• I believe that the achievable projects should have been recommended, considering the diagnosis of the cantonal situation, there are two preliminary projects that are difficult to fulfill, (a fee-based parking building and design and development of the bicycle path infrastructure) knowing that the investment of the same is high, and another take into account the topography of the sector.

2.   Ground transportation

• In this component there are two **programs, five plans, two subplans and two preliminary** projects, for the optimal development of land transport, which although it is true that certain projects are established, operational indicators, but mathematical formulas are not established that allow monitoring and control.

3.   Road safety

• In the study of the recommendations of this component, they establish two programs, eleven plans and a preliminary project, in which their goals and operational indicators are defined, however, statistical methods of how to measure them are not established.

In general, it is evident that there are no mathematical formulas to measure compliance with them, strategies and action measures for control and monitoring are not established.

1.1.5   PHASE   V: Implementation (implementation) of the plan

While it is true that the execution of the plan begins with institutional approval and corresponds to the highest cantonal authority through a reasoned administrative resolution, but also the collection and systematization of the contributions and opinions of the citizens are very important during the development of the plan, which from the verification in the files of the Directorate of

Mobility there is no verifiable that the plan has been submitted to criteria and opinion of the citizenship. The methodology recommends a system for collecting suggestions, meeting formats and debates, so it can be concluded that this phase was not fully fulfilled.

1.1.6   PHASE VI: Monitoring, evaluation and corrective measures

According to the referential methodology, it is established to appoint a technical commission to monitor the general development of the plan and proceed to a devaluation review of the same after the first two years of implementation, the generation of annual reports on the development of the plan, define the technical requirements for the specifications of contracting studies and projects (when required). It also indicates that each year the responsible technical commission will issue an evaluation report through indicators, which must be made known to citizens, from where new contributions and improvement initiatives will be collected.

However, it has been evident that none of the volumes makes count the corrective measures for the monitoring and control of the mobility plan. Also, that the Directorate of Mobility does not generate annual reports on the progress of plans, programs and projects, which allow the redefinition or adjustment of measures to improve the strategy in the following time horizons of the plan.

Component Compliance

It is pertinent to clarify that for the evaluation of the Sustainable Mobility Plan (PMS) of the Municipality of Alausí, the three components of the plan are considered: Transit, Land Transport and Road Safety. Taking into account that the evaluation of this is carried out for the first time, to identify the results of the stipulated programmes, projects and preliminary projects, sustainability indicators are proposed for the areas that can be measured on the basis of existing data; for the others, the reports issued by the DMTTTA are considered; as well as, the results of the survey

and interview applied to the inhabitants of the canton in the field research carried out.

1.1.7   Recommendations on traffic and mobility, land transport and road safety.

The main indicators that evaluate the performance of short, medium and long-term programs, plans and preliminary projects in the transit and mobility, land transport and road safety axes are detailed below:

- **Indicator 1. Length (m) of urban vehicular roads rehabilitated per year. Percentage (%) of rehabilitations over the total.**

The results determine that between 2014 and 2020 75.00% of the roads of the Canton were intervened, 25.00% corresponding to 112,904 m remain to be intervened.

- **Indicator 2. Percentage of urban and rural roads in state: good, fair or bad in the canton.**

The results of the research determine that the percentage of roads in good condition are in 79.17% of the Achupallas road system; in 91.40% of Alausí Central; in 76.47% of Huigra; in 80% of Guasuntos; in 62.50% of Multitude; in 50% of Pistishi; in 90% of Pumallacta; in 64.28% of Seville; 68.19 per cent of Sibambe; in 88.24% of Tixán.

- **Indicator 3. Percentage (%) of improvement of the urban vehicular traffic of Alausí, by roads.**

With the application of the indicators, it is determined that by 2020 there was a 73.04% improvement in vehicular traffic corresponding to roads.

- **Indicator 4. Length (m) and percentage (%) of paved urban roads.**

It is determined that the recommendation was not complied with since the PMS indicates an increase of 5% of the asphalting of tertiary roads and 2% of urban unpaved secondary roads, every three years from the application of the Plan.

- **Indicator 5. Number of points that lowered the level of congestion.**

The results of the investigation indicate that the recommendation was not met, since between 2014 and 2020 the congestion level of six of the seven identified congestion points was reduced and the plan recommended the resolution of 100% of the seven congestion points.

- **Indicator 6. Number of annual accidents in the canton. Percentage (%) of annual change.**

Between 2014 and 2020 there was a positive year-on-year percentage variation of 5% of traffic accidents.

- **Indicator 7. Number of vertical road signs installed and rehabilitated annually.**

When evaluating this indicator, it is determined that the recommendation made in the PMS is not met, since it recommends rehabilitating 100% of the road signage considered urgent, both vertical and horizontal, however, between the evaluation years 2014 – 2020 only 90.40% was reached.

- **Indicator 8. Annual percentage (%) of road signs installed.**

The goal proposed in the PMS contemplates 100% of the installation of the recommended signage in the first two years. What was fulfilled because in 2015 and 2016 the goal was reached with 92.33%.

- **Indicator 9. Annual percentage (%) of painted zebra crossings in the year.**

The goal proposed in the PMS contemplates 100% of the installation of the recommended signage in the first two years. What was fulfilled because in 2015 and 2016 the goal was reached with 94%.

- **Indicator 10. Number of zebra crossings installed and rehabilitated in the year.**

The goal proposed in the PMS contemplates 100% of the installation of the recommended signage in the first two years. This goal was met.

- **Indicator 11. Number of traffic light systems installed, annually.**

No traffic lights were installed between 2014 and 2020.

- **Indicator 12. Complaints received by citizens regarding signage, annual, and**

percentage (%) of resolutions in less than three months.

The goal was met since on average 96% of the total registered complaints were resolved.

- **Indicator 13. Number of "safety and traffic calming kit" installed in educational units, in the city of Alausí and in rural parishes, annually.**

54 safety and traffic calming kits were installed between 2014 and 2020, that is, 60% of the schools in the canton are signposted.

- **Indicator 14. Percentage of the total number of schools duly marked in the canton, annually.**

The goal has not been achieved, since it was proposed to have 100% of educational centers marked through the safety kit and 60% was achieved between 2014 and 2020.

- **Indicator 15: Length (meters) of roads with traffic calming and obligation to reduce to 30 km / h.**

Between 2015 and 2020 it has been possible to increase the number of meters of roads that have calmed traffic with the obligation to reduce to 30 km / h from 1,000 m to 1,300 m.

- **Indicator 16. Length (meters) of roads with traffic calming and obligation to reduce to 50 km / h.**

As can be seen between 2015 and 2020, it has not been possible to maintain the number of meters of roads with the obligation to reduce to 50 km / h.

- **Indicator 17. Number of information and educational campaigns to implement speed-reducing road habits in cities, aimed at drivers (annual).**

According to the registered data, it was possible to comply from 2016 to 2020.

- **Indicator 18. Number of parking spaces in the Tarifa Zone in the city of Alausí.**

The results conclude that the goal was met with the implementation of 166 parking sites with 551.80 linear meters by 2020.

• **Indicator 19. Percentage (%) of the acceptance of citizenship to the fee zone.**

The projected goal of achieving acceptance of the tariff zone by 93.20% of the population was met.

• **Indicator 20. Length (m) of existing and rehabilitated sidewalks.**

There are approximately 9,621.11 m of sidewalks that represent an improvable state of 83% and 17% pending rehabilitation, the goal is to be met.

• **Indicator 21. Percentage (%) citizens who travel in non-motorized transport in the city of Alausí.**

The results indicate that the goal was not met, because it was intended that 20% of citizens travel on foot or by bicycle daily.

• **Indicator 22. Number of information campaigns on non-motorised alternative transport carried out annually.**

The proposed goal is met since they carry out information campaigns once a year.

• **Indicator 23. Length (m) of the bike path built in the Canton of Alausí.**

The results determine that the proposed goal was not met, since there is no infrastructure for cycle path.

• **Indicator 24. Percentage (%) of bicycle use by population in the territory of the canton.**

At present, 0.65% of the inhabitants of the canton travel daily by bicycle. Which indicates that the goal was not met.

• **Indicator 25. Number of passengers in intracantonal transport bus units, annually. Change in number of passengers (%) per year.**

In 2019, 223,688 people were transported and in 2020, 520,168, with a percentage variation of 129%.

• **Indicator 26. Percentage (%) of satisfaction on the part of users of the intracantonal transport service.**

The results determine that the goal was met with 69% satisfaction of the intracantonal transport service.

• **Indicator 27. Variation (%) of traffic accidents in rural areas, annual.**

When comparing the data for 2014 and 2020, a percentage variation of 5% is found, which indicates that the goal proposed in the PMS was not met.

• **Indicator 28. Number of complaints from citizens due to heavy traffic inside the city of Alausí, and the transit of loading and unloading activities of goods inside the municipality, annually. Percentage of complaints resolved.**

On average, between 2014 and 2020, an average of 92% of heavy traffic complaints were resolved in the interior of the city.

• **Indicator 29. Number of road information campaigns developed in the canton through the different media, annually.**

The information campaigns were developed from the year 2017, therefore, from that year it was possible to meet the proposed goal.

• **Indicator 30. Percentage (%) of population receiving road safety education.**

68% of the population has received road safety education, therefore, the goal proposed in the PMS in its recommendation of 50% has been met.

• **Indicator 31. Percentage (%) of satisfaction for training and training campaign.**

The results indicate the training and information campaigns as very satisfactory and satisfactory with 64.80% positive perception, which indicates that the proposed goal was met.

Analysis of budget execution in mobility projects.

For this purpose, the budget efficiency indicator that measures the performance at the level of budget execution in the execution of projects of the mobility plan in the periods 2015 to 2020 was

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considered, so it was determined that a budget execution of 73.67% was achieved.

1.1.8 Proposal of indicators for future evaluation.

Some modal indicators necessary to carry out an adequate and complete control and monitoring of the proposals implemented in the short, medium and long term in the work axes of the sustainable mobility plan of the Alausí canton are proposed. (Ruffo Villa, 2016)

Table -13. Modal indicators with respect to the desired evolution.

No.	INDICATORS	FORMULATION
1	Accessibility on public transport	$\dfrac{\text{Paradas accesibles transporte público}}{\text{Paradas totales}}$
2	Cycling infrastructure	$\dfrac{\text{Km carriles bicicletas}}{\text{Km total red viaria}}$
3	Public transport coverage	$\dfrac{\text{Superficie bajo cobertura}}{\text{Superficie total}}$
4	Traffic violations	$\dfrac{\text{N infracciones}}{\text{N habitantes}}$
5	Mobility investment	$\dfrac{\text{USD Inversión en movilidad}}{\text{N habitantes}}$
6	Investment in bicycle path mobility	$\dfrac{\text{USD Inversión en movilidad ciclovía}}{\text{N habitantes}}$

Source: Sustainable Mobility Plan of the canton La Troncal – 2016, Eng. Ruffo Villa.

Made by: Galarza, Juan, 2022.

Likewise, other indicators are proposed regarding the social and economic effects that the new projects or action and intervention measures have produced in the time of operation and operationality of the plan. These indicators are shown below in the following table:

Table -2. Indicators of social and economic impact.

No.	INDICATORS	FORMULATION
1	Use of pedestrian mobility	$\dfrac{\text{N usuarios movilidad}}{\text{N de habitantes}}$
2	Use of cycling mobility	$\dfrac{\text{N usuarios ciclista}}{\text{N de habitantes}}$
3	Use of public transport	$\dfrac{\text{N usuarios, transporte público}}{\text{N de habitantes}}$
4	Private vehicle use	$\dfrac{\text{N usuarios vehículo privado}}{\text{N de habitantes}}$
5	Stop waiting time	$\dfrac{\sum \text{tiempo de espera parada}}{\text{N usuarios transporte público}}$
6	Travel time	$\dfrac{\sum \text{tiempo de desplazamiento total}}{\text{N de habitantes}}$

Source: Sustainable Mobility Plan of the canton La Troncal – 2016, Eng. Ruffo Villa.

Made by: Galarza, Juan, 2022.

CONCLUSIONS

• For the evaluation of the PMS of the GADM of Alausí the theoretical foundation was considered, therefore, a qualitative and quantitative multicriteria evaluation method was used. A survey was applied to the population of the canton that covered the axes: transit, land transport and road safety. From what was found that most know about PMS; In addition, their perception of the state of the roads, traffic during peak traffic hours, the state of pedestrian areas, the state of sidewalks, the ordering of parking spaces, vertical and horizontal signage in the road system is positive. On the other hand, the perception of the intercantonal public transport service is moderately satisfactory.

• As efficient alternatives to comply with the current PMS based on the proposed indicators, six strategies are presented that contribute to: improving the road condition and level of road interconnection of the urban and rural road group that is in a regular and bad state; optimize road traffic in the canton to improve travel efficiency; raise awareness among the inhabitants of the canton of the use of non-motorized transport for their journeys; and, improve the service offered by public transport in the canton.

• It proposes the indicators of monitoring and control both, modals, energy efficiency, environmental impact, social and economic that allow measuring, so that they are sensitive to changes, both positively and negatively, allowing their evaluation quickly, easily or continuously.

RECOMMENDATIONS

• It is recommended that the authorities of the GADM of Alausí or those in charge of supervising the fulfillment of the projects, plans and programs established in the PMS 2014-2020, implement the improvements suggested in the improvement plan, to meet the proposed goals and contribute to the quality of life of the users of the roads of the canton, by granting them an optimal road system that has a traffic management, land transport and road safety according to their needs.

• The DMTTTA is recommended to carry out a periodic evaluation of the fulfillment of the goals proposed in the PMS so that it has the required

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information that allows making the appropriate decisions in the short, medium and long term, according to the existing priorities in terms of mobility, land transport, transit and road safety. to seek continuous improvement and achieve efficiency in its management.

• It is recommended for the next consultancies to update the mobility plan established in numeral 5.4 of the "Methodology guide for the formation of mobility plans for the Municipal GAD" prepared by the National Council of Competences 2014, as well as to use the indicators of the methodology proposed by the Urban Ecology Agency of Barcelona, (2010). *System of indicators and constraints for large and medium-sized cities. Network of sustainable local development networks* to carry out an adequate and complete follow-up and control of the recommendations of the programs, plans and preliminary projects executed in the short, medium and long term.

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