

Research perspectives at TESVB in the face of Industry 5.0

Proceedings T-I

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ISBN: 978-607-8948-22-2

ECORFAN Publishing Label: 607-8948

PST Control Number: 2023-02

PST Classification (2023): 301223-0102

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Proceedings

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ECORFAN Research perspectives at TESVB in the face of Industry 5.0

Volume I

The Proceedings will offer volumes of selected contributions from researchers who contribute to the scientific dissemination activity of the Knowledge Society for their area of research in the role of the institution to the challenges of the Knowledge Society. In addition to having a total evaluation, in the hands of the directors of the Knowledge Society collaborates with quality and timeliness in their chapters, each individual contribution was refereed to international standards (RENIECYT - LATININDEX - DIALNET - ResearchGate - DULCINEA - CLASE - Sudoc - HISPANA - SHERPA - UNIVERSIA - REBID -e REVISTAS - Scholar Google - DOI - Mendeley), the Proceedings thus proposes to the academic community, recent reports on new developments in the most interesting and promising areas of research on the role of the institution in the challenges of the Knowledge Society.

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*Research perspectives at TESVB in the face
of Industry 5.0*
Proceedings *T-I*

Tecnológico Nacional de México/TES Valle de Bravo

December 2023

DOI: 10.35429/P.2023.2.1.127

Prologue

Within higher education institutions, one of the most relevant activities to be developed is research, in addition to teaching and networking. But research would not be relevant if its results were not disseminated. However, the processes of dissemination of research work often lead to a tortuous path that ends up discouraging many who are dedicated to this work. Therefore, it is beneficial for novice researchers to be motivated by those who already have more experience in such work, as shown in this compilation. A work of dissemination of knowledge, which concentrates the efforts of a group of collaborators dedicated to research at the Tecnológico de Estudios Superiores de Valle de Bravo, is the result of years of this practice that today is materialized in this work. Undoubtedly, it lays the foundations for the consolidation of research work where some researchers see that their results are disseminated and serve for the training of professionals who form in the classrooms of this institution in the first order, and secondly, to encourage teachers who have not yet explored these paths, to venture to do so for the benefit of the entire community of the Tecnológico Nacional de México campus Valle de Bravo mainly and certainly for those dedicated to this noble work that allows the advancement of humanity.

GONZALEZ-FLORES, Adalberto

It contains nine refereed chapters dealing with these issues in Social Sciences.

As the first chapter, *GONZÁLEZ, HERNÁNDEZ* and *VARGAS*, review the bibliographic study of some values contrasting them with some biblical passages obtained from the Latin American Catholic Bible, addressing moral aspects that can be applied in organizations, *MANDUJANO, SANTILLÁN, MENDOZA* and *MENDOZA*, design and trace a route of Mazahua handicrafts in the municipalities of Donato Guerra and Valle de Bravo, State of Mexico, Mexico; In order to promote the cultural richness of the ethnic group, generating new expectations and socio-economic resources, *CASTELÁN*, designed and created a prototype of an ecological block using recycled materials such as PET, uncel and natural ocoxal fibers, *MENDOZA, MANDUJANO, MENDOZA* and *ECHAVARRÍA*, develop and design an Ecotourism Route focused on the monarch butterfly species in the town of El Capulín, with the objective of generating an economic benefit to the local population, *ECHAVARRÍA, MANDUJANO, MENDOZA*, and *MENDOZA*, elaborate a guide that fulfills the necessary requirements to carry out an adequate inventory control of adventure tourism equipment, which is a necessity for the Bachelor's Degree in Tourism of the TESVB, *HERNÁNDEZ, SANTOS* and *GONZÁLEZ*, identify the causes of school desertion among the students of the Bachelor's Degree in Administration of the Tecnológico de Estudios Superiores de Valle de Bravo, *VARGAS & GONZÁLEZ*, analyze the tax situation of individuals in the wages and salaries regime in the municipality of Valle de Bravo, with the objective of proposing strategies that generate an economic benefit derived from the management of personal deductions, analyzing the factors and problems that have led to little or no filing of the annual tax return, *SANTILLÁN, MORACHIS, SAUCE* and *DUBLÁN*, disseminate knowledge about cannabis cuisine among culinary students, professionals and the general public. The methodology employed a combination of quantitative and qualitative approaches to analyze the perception and understanding of cannabis gastronomy within the population studied, *MARTÍNEZ, NEPAMUCENO, GUERRERO* and *LEÓN*, seek to develop different routes focused on gastronomy, agriculture and the environment of San Lucas. Likewise, as a means of dissemination, a website was implemented that will contribute to the promotion, to strengthen the strategies and thus encourage tourism in the study area.

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Foundations for the design of values in business management

Fundamentos para el diseño de los valores en la gestión empresarial

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DOI: 10.35429/P.2023.2.1.10

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A. González, D. Castelán, A. Santillán, R. García and L. León (AA. VV.). Research perspectives at TESVB in the face of Industry 5.0 - Proceedings-©ECORFAN-México, México, 2023.

Abstract

Aspects to be considered such as justice, kindness, equity, mercy and piety are not common in the business world, especially when the market is perceived as a jungle where the law of the strongest prevails, where what is pursued is to obtain a larger share of the market at any cost, with immoral practices affecting employees, suppliers and customers. There are few, or perhaps none, when an organization is managed considering these values. Therefore, the present study aims to review the bibliography of some values contrasting them with some biblical passages obtained from the Latin American Catholic Bible, addressing moral aspects that can be applied in organizations, whether for-profit or not, with the intention of improving their performance that allows them to remain in highly competitive markets or serve their customers in an assertive and empathetic way.

Equity, Piety, Mercy, Perception, Aims

Resumen

Aspectos a considerar como la justicia, la bondad, la equidad, la piedad y la misericordia, no son algo común en el mundo empresarial, sobre todo cuando se percibe al mercado como una selva en la que la ley del más fuerte es la que prevalece, donde lo que se persigue es la obtención de una mayor porción del mercado a costa de lo que sea, con prácticas inmorales afectando a sus empleados, proveedores y clientes. Son pocas las veces, o quizás nulas, cuando se administra una organización considerando dichos valores. Por ello, el presente estudio tiene por objetivo el revisar la bibliográfica de algunos valores contrastándolos con algunos pasajes bíblicos obtenidos de la Biblia Católica Latinoamericana, abordando aspectos morales que puedan ser aplicados en las organizaciones, ya sea con fines de lucro o sin ellos, con la intención de mejorar su desempeño que les permita permanecer en mercados altamente competidos o atender a sus clientes de forma asertiva y empática.

Equidad, Piedad, Misericordia, Percepción, Objetivos

1. Introduction

Aspects to be considered such as justice, kindness, equity, mercy and mercy are not common in the business world, especially when the market is perceived as a jungle where the law of the strongest prevails, where what is pursued is to obtain a larger share of the market at any cost, with immoral practices affecting employees, suppliers and customers. There are few, or perhaps none, when an organization is managed considering these values.

Therefore, the present study aims to review the bibliography of some values contrasting them with some biblical passages obtained from the Latin American Catholic Bible, addressing moral aspects that can be applied in organizations, whether for profit or not for profit, with the intention of improving their performance that allows them to remain in highly competitive markets or serve their customers in an assertive and empathetic way. Therefore, this paper highlights some important aspects in the business environment such as foresight, work, days of rest, poverty and equality and organizational values from a theoretical perspective, contrasting them with some biblical verses obtained from the above-mentioned document.

2. Provision

The issue of foresight in the economic-administrative and social sciences is not specific to their development, but has been mentioned before as a way of avoiding risks and losses with the intention of preserving or maintaining a situation into the future; without it having been necessary to have an academic background related to these disciplines.

The principle of foresight refers to the act of preventing an event or fact that will not necessarily bring unpleasant consequences. For Campos (2018) the concept of foresight used in liability can be understood as "the conduct aimed at anticipating the damages that may come from a behavior or an event, in the face of future but normal contingencies that should have been forewarned".

In the economic-administrative sciences, the term forecasting has a great deal of usability, since emphasis is continually being placed, for example, on the forecasting of the exchange rate, which is one of the most frequently dealt with topics in financial research, due to its importance in international economic activity. Due to the complexity of the problem of predicting the behavior of exchange rates and with the objective of obtaining the best results (De la Oliva de Con, Molina Fernández, & Díaz Rodríguez, 2022).

The truth is that economists are often identified with the magic of knowledge, that is, with the fear of the unknown. They are also often linked to the nuclei of greater power within social organizations. Consequently, they are asked to look into the crystal ball to divine the future, especially in times of crisis. That is precisely where the problem arises, because the economy has hardly any predictive capacity (Nieto Solís, 2016).

In the first book of the Bible, Genesis, there is an allusion to foresight, in chapter 41, verses 34 to 36: it points out:

Let Pharaoh appoint, moreover, intendants throughout the land, to collect the fifth part of the harvest during these seven years of plenty. They shall collect all the provisions of these seven years of plenty, and shall store the grain in the cities, where they shall keep it under Pharaoh's authority. In this way there will be reserves in the country for the seven years of scarcity that will affect Egypt, and the people will not die of hunger.

Therefore, this divine recommendation has been valid for more than three thousand years when considering that it is good to save, recommending here the fifth part of the product of the good years to face the periods of scarcity that could occur in the future. In this biblical passage, it must be emphasized that what should be saved from the good years for possible future years of scarcity is the product of human labor, not what could come providentially, by chance or stolen, such as an inheritance, a draw, a robbery, etc.

So to make provision for the future with the fruit of labor is good, but to do so with gifts or not stolen.

3. Work

Thus, the means to obtain fruit or wealth is work, understood as the process of transforming nature. For Cristancho Giraldo (2022), work is considered as "an activity that allows man to produce goods and services to satisfy his material needs. Therefore, it is a means to obtain utility and well-being at the same time, without necessarily considering work exclusively as paid work; work in the community is also contemplated".

Work, the provision of productive labor, has always constituted a factor of opposition or conflict in any form of society: masters and slaves, lords and serfs, employers and workers, have been protagonists and assumed in their respective historical contexts opposing statuses in relation to the binomial provision of work-appropriation of the fruits or results thereof (Palomeque & Manuel, 2022, p. 46).

On the other hand, the Mexican General Labor Law (2023) states that decent work should be understood as: work in which the human dignity of the worker is fully respected; there is no discrimination based on ethnic or national origin, gender, age, disability, social status, health conditions, religion, migratory status, opinions, sexual preferences or marital status; there is access to social security and a remunerative salary; continuous training is received to increase productivity with shared benefits, and there are optimal safety and hygiene conditions to prevent occupational hazards. That is to say that all human effort, whether paid or unpaid is called work, this is not new since the following biblical passage states the following in the book of Exodus chapter 20, verses 9 and 10:

Work six days, and in them do all your work. But the seventh day is a day of rest, holy to the LORD your God. Let no one work: neither you, nor your sons, nor your daughters, nor your male and female servants, nor your female servants, nor your animals, nor the strangers who live in your country.

Or as noted in the book of Ecclesiastes, chapter 3, verses 12 and 13: I saw then that your true good is joy and doing good during your life. If one can eat and drink, if he finds happiness in his work, that is a gift from God. Likewise, in the Book of Acts, chapter 20, verses 34 and 35: Look at my hands: by them I have obtained what is necessary for myself and for my companions, as you well know. By this example I have clearly taught you that you must work hard to help the weak. Remember the words of the Lord Jesus: 'It is more blessed to give than to receive. Or as stated in Proverbs chapter 14, verse 23: Every labor has its reward, but that which remains in words leads to misery.

In this way, if the means for man to obtain the satisfactions for his life is given through physical effort where they do all their work; that after that, it is pointed out as having to keep periodically a day of rest or rest, which serves to replenish and recover the energies. In this way the rest or rest is also necessary for the man who works.

4. Days of rest or vacation

Nowadays it seems that the failure to heed this mandate leads people to stress and the problems that this evil brings, so it is also necessary to heed this biblical recommendation.

For Castaño (2022), work entailed in itself a destabilizing potential tied to the frenzy of daily activities and the needs of survival, concentration, intensity, physical and mental demands. Tranquility, happiness and exercise were erected as suitable bastions to protect against the harmful effects of work discipline. Rest was established as an imperative conquered through a system of continuous learning, respecting the rhythms and cycles of the body and mind. This imperative was established in the midst of a national context characterized by a labor legislation relatively favorable to these spaces of rest.

These benefits were incorporated into the legislations of the countries of the world despite the fact that it was already a divine recommendation disclosed more than two thousand years ago. And that now, as a result of not paying attention to this mandate is reflected in the detriment of human health represented by occupational stress, which is defined in Cruz-Zúñiga, Alonso, Armendáriz-García & Lima (2022) as:

Result of the relationship between the individual, the work environment and the individual perception of threatening factors derived from work, which endangers physical, psychological and social well-being and increases the probability of alcohol consumption. Reflected in the set of worries, mortifications and nervousness that the worker has as a result of the high demands of his job, the work environment, job insecurity and the worker's ability to respond to the demands or requirements of his job.

The situation seems new, but in the biblical wisdom of more than two thousand years ago, at least one day of rest was already recommended, but nowadays this is not the case since many people carry out work activities at home on their days off and even during vacation periods, which causes an imbalance in human health.

5. Poverty and equality

The human being seeks a utopia in relation to the distribution of goods, it always seems a search to achieve equality or balance among human beings in such a way that the distribution of wealth in the world seems equitable; however, the Bible points out that this is not possible, therefore, although it is an end that humanity pursues, it will not be achieved. In Matthew chapter 26, verses 6 to 11

"Jesus was in Bethany, in the house of Simon the leper. A woman came to him while he was at table with a precious marble jar filled with very expensive perfume, and poured it on his head. Seeing this, the disciples protested, 'Why so much waste?' This perfume could have been sold very dearly to help the poor. Jesus noticed this and said to them, 'Why do you trouble this woman? What she has done with me is really a good deed. You will always have the poor with you, but you will not always have me.

However, human beings aim to end poverty and inequality as noted in Henriquez (2018):

A theory of justice is that part of the philosophy of law whose purpose is to study the problems concerning the fair distribution of goods, rights, duties or burdens among the members of a community. Following Bobbio's reflections, justice refers to a harmonious or balanced order in which each party is assigned that which corresponds to him, for which equality appears as a condition for the preservation and achievement of this state. It is for this reason that the concept of equality is closely linked to justice. Since equality is a concept that, in order to make sense, must be expressed in relational terms, that is, between two or more subjects with reference to something, the various theories have constructed arguments aimed at justifying that which is to be equalized, although they have differed in nature. Thus equality has been postulated in relation to goods, rights, income, freedoms, resources, opportunities, results, welfare or capabilities. It is the problem of the object of distribution.

In another of the books of the Bible it is pointed out how in a divine way the product of human labor was distributed, as it is pointed out in the Book of Genesis chapter 47, verses 23 to 26:

Then Joseph said to the people, 'You see, I have bought you and your land for Pharaoh. Here is seed for you: sow the land. When the time of harvest comes, you shall give the fifth part to Pharaoh, and the other four parts shall be for yourselves, as seed for sowing, and as food for you, your family, and those in your household. They replied, 'Since you have saved our lives, please accept us as Pharaoh's slaves. Thus Joseph imposed as a law, that the fifth part of the produce of the land of Egypt should be given to Pharaoh, and that rule endures to this day. Only the land of the priests did not pass into Pharaoh's possession.

With this it is biblically patented that there will never be equality in the distribution and distribution of wealth and consequently the end of poverty is an unattainable utopia as the concept of distributive justice that is "a more equitable and complete access to the fruits of economic growth" (Sandel, 2020, p. 209), which before the Bible can be pointed out that until today it lacks support.

6. Organizational values

Every organization in operation determines its values that allow it to comply with a set of statutes that it calls values that it sets when it implements and consolidates a business proposal; however, how they arise or how they are determined. Thus, those who lead or participate in an organization, have the need to design a framework of values that should be part of its corporate image, which includes the mission, vision and organizational values. As organizations and companies consolidate, they also generate a framework of values that govern their internal and external performance; that is to say, all the actors where the company has influence must reflect those values. But how they are designed, what they are based on or what is the basis for their development, is unknown or unclear.

At present, the determination of these corporate values has no legal, let alone moral, basis.

There may be 500 ways of shopping and even more, but 500 ways of conceptualizing the term family, confronts us with the eclipse of family education, by the very fact that it is justified to understand 500 ways of conceptualizing the construct "parents". The company itself would eclipse its strategies if each individual is left to express his ethical conduct as he sees fit, and the word corruption, theft, bribery and fraud, would have a thousand ways of justified conceptualization and no one would be able to sanction it if it were simply a matter of tolerating everyone expressing their subjectivity in such a monstrous way.

And yet the company is not safe if the moral values of the household are destroyed in a million little crystals..... This is a strong signal that morality cannot also be diluted into a million justified behaviors because it simply represents the free expression of each person, even if this sounds out of tune with a natural culture. And in order to have firm and strong values that build civilization and stop this tide of worldliness, it is necessary to return to God, symbol of unity and strength and not of dispersion and weakness. Another alternative confronts us with cultural destruction, the essence and strength of civilization, and also the expression of successful business conduct (Santos Gutiérrez, 2016).

The foundation for the design of business values should be the Bible, concepts such as piety and mercy are not considered; generally, when an organization is created, it is assumed that it intends to address a problem or a need identified in a market. Therefore, the answer through the proposal should be based on organizational values. However, most of the time they arise from merely empty concepts, without background and much less foundation, which leads to operate pursuing money and wealth, without paying attention to them; that is to say that wealth becomes an end to achieve, when what organizations should focus on achieving are the satisfaction of their customers, employees and society.

This leads organizations to various situations that go against morality such as offering products or services of lower quality than they claim to have, selling products and services deceiving those who buy them, promising to deliver them that do not fulfill what was promised; in short, defrauding, hiding defects, errors or vices.

The source of values must be based on concepts such as piety, mercy, among others, concepts that are little considered in business organizations. But what is piety, Rousakis (2022) exposes that Euthyphro identifies piety with that which pleases the gods and is loved by them. Socrates accepts that piousness is something loved by them, but objects that it is not pious because it is loved. Similarly, he tries to show that the pious is a part of the just, but that not all justice coincides with piety, just as respect does not coincide with all fear, although all respect presupposes a certain fear. As respect is part of fear, and when there is fear there need not be respect, so when there is justice there need not be piety, because piety is part of justice.

Thus piety has a part of justice, but not everything that is just is pious, in this sense to carry out an entrepreneurial venture within the framework of the law, can be just, but not pious.

In "Man and the Divine", Maria Zambrano writes that piety is "that which deals with the unjust and the just". In her words, it is "knowing how to deal adequately with the other". Dealing adequately with the other in situations of injustice refers to a commitment to coexistence in the symbolic order of the mother. In fact, representations of women embodying this figure are frequent and piety has been and is a universal sexed in feminine (Yago Alonso, 2014, p. 38).

In the dictionary of the Royal Spanish Academy, piety is defined with several meanings, which in the order they are presented are the following:

- a) Virtue that inspires, for love of God, tender devotion to holy things, for love of neighbor, acts of love and compassion.
- b) Intimate love that is devoted to parents and venerated objects.
- c) Pity, mercy, commiseration.
- d) Representation in painting or sculpture of the pain of the Virgin Mary when holding the corpse of Jesus Christ descended from the cross (Real Academia de la Lengua Española, 2023).

Mercy is defined as a virtue that inclines the spirit to sympathize with the sufferings and miseries of others. Following St. Thomas, one has mercy when the subject considers the misery of others as his own; hence the proper act of this virtue is to remove the misery of others (Zamora, 2017, p. 298).

Mercy "expresses God's behavior towards the sinner, offering him one more possibility of repentance, convert and believe" (Maceratini, 2017, p. 68).

In this way, mercy is a verb in action, it is an experience full of joy, as an action detached and carried out in absolute freedom to accentuate the attitude of compassion that a person should feel towards another. Finally, every attitude of human mercy has its foundation in the mercy of God, since he is the subject of the passive verb (Zúñiga, 2019).

In the same way as defined by the Royal Academy of the Spanish Language, mercy is defined as:

- a) Virtue that inclines the spirit to sympathize with the sufferings and miseries of others.

- b) Piece in the seats of the choirs of the churches to rest disguisedly, half seated on it, when one should be standing.
- c) Attribute of God, by virtue of which he forgives the sins and miseries of his creatures.
- d) A small portion of something, as that which is usually given in charity or alms.

In both definitions, both of piety and mercy, it can be observed that they are a virtue and in both they are related to love and devotion to one's neighbor. In the Bible, it turns in relation to it, that it is necessary to consider in a business, of which some verses are quoted:

In the book of Exodus chapter 21, verses 33 and 34:

If one leaves a well open, or if he does not cover the well he is digging, and then an ox or a donkey falls into it, the owner of the well shall pay the owner of the animals the price in money, but the dead animal shall be his.

Although in this passage it seems that it does not have to do with mercy and mercy, love or devotion to one's neighbor is present; as well as justice among men: as in the book of Exodus chapter 23, verses 1 to 5, 8, 10 and 11:

Do not bear false witness or help the wicked by bearing unjust testimony. If you see the donkey of the one who is evil to you fallen with the burden, do not pass over him, but help him to lift him up. Receive no gifts, for gifts dazzle the prudent and harm the rights of the righteous. Six years thou shalt sow thy fields and bring forth their fruits; in the seventh year thou shalt not cultivate them and shalt let them rest. The poor of your people shall eat what they find there, and if there is any left over, the animals of the field shall eat it. You shall do the same with your vineyard and your olive grove.

Reference is also made to mercy and pity in the book of Leviticus chapter 19 verses 33 to 36; and in chapter 23, verse 22 of the same book:

When a stranger lives with you in your land, do not molest him. You shall regard the stranger who lives with you as one of your own, and you shall love him as yourself, for you also were strangers in Egypt: I am Yahweh your God. Do not commit injustice in judgments, nor in measures of length, weight, or capacity; use just scales, just weights, just measures, and just sextuaries: I am Yahweh, your God, who brought you out of the land of Egypt! When you reap the produce of your fields, you shall not reap to the edge of the fields, nor gather the stray ears, but leave them for the poor and for the stranger: I am Yahweh, your God.

Mercy, mercy and justice are evident in the book of Deuteronomy chapter 1, verses 16 and 17:

Then I gave the judges the following instructions: 'You shall hear the complaints of your brothers, and you shall decide, whether the dispute is between an Israelite and his brother, or between an Israelite and one of the foreigners who live among us. When they judge, they will not be influenced by anyone, but will listen to the poor and the rich, to the powerful and the weak, and will not be afraid of anyone, for judgment is God's business. If a problem is too difficult for them, they will pass it on to me, and I will see it.

Another important concept to consider for entrepreneurs is that of restitution, which is nothing more than returning what was asked for, used or wasted; the definition comes from the word restituir, which comes from the Latin word restituere and means "to return something to the one who had it before". Its lexical components are the prefix re- (backward) and statuere (to park, stop, place) (Diccionario Etimológico, 2023). It is in this sense that the word restitute in essence is to return something to the one who had it before, some testimonies of the restitutions will be able to shed light on the appropriations and not the other way around, because -as Lacan points out- "(...) the true original can only be the second by constituting the repetition that makes the first an act, since it introduces there the après-coup proper of the logical time". Thus, we will be able to enter into what is necessary to repair, to restore, even to heal for each one (Domínguez, 2019).

Thus restitution in the Bible appears in countless passages among them is in the book of Exodus chapter 6, verses 1 to 56:

If a thief, caught at night breaking into a house, is mortally wounded, the one who killed him will not be blamed. But if he does so at sunrise, he shall be blamed. If someone does not have to return what he has stolen, he shall be sold himself to pay for it. If what he has stolen is found alive in his possession, whether it is an ox, a donkey or a sheep, he must pay back twice as much. If one lets his cattle loose to graze in his field or in his vineyard, and the cattle graze in another's field, he shall return with the best of his own field or of his own vineyard. If a fire is set in the bushes and it spreads to fruit trees or crops in the field, the one who set the fire shall pay for the damage. When one gives to another money or jewels in deposit, so that he keeps them, and they are stolen from the house of this one, the thief, if found, will return double.

On the other hand, workers have the right to receive remuneration for the work performed, this is called salary, which is defined in Article 83 of the Federal Labor Law of Mexico as the remuneration to be paid by the employer to the worker for his work; it also states in Article 84 of said Law that the salary is made up of the payments made in cash for daily fees, bonuses, perceptions, housing, bonuses, commissions, benefits in kind and any other amount or benefit that is given to the worker for his work. Article 88 of this Law states that the terms for the payment of wages may never be longer than one week for people who perform material work and fifteen days for other workers (Justia México, 2023). From what is established in the law, it must be emphasized that most people work for a salary and that this salary must include all the benefits indicated at the time of the contract; likewise, that the term agreed upon for the payment of the salary in the contract must be complied with by the employer, never to the detriment of the worker.

In the Bible this is also established in a forceful manner as it is pointed out in the book of Deuteronomy chapter 24, verses 14 and 15:

You shall not exploit the lowly and poor day laborer, whether he be one of your brothers or a stranger in your land, in some of your cities. You shall pay him every day before sunset, because he is poor, and because he is watching for his wages. Lest he cry out to Yahweh against you, for you would bear a sin.

That is to say that the act of paying the salary to a person according to the agreed and worked is an act of justice, but not to do it besides being unjust is constituted in an act that demonstrates impiety and mercilessness; because undoubtedly every wage earner has the hope that at the end of the working day agreed to receive his salary, if it is not realized, he will be in a condition of urgency, because surely with it he will bring sustenance to his family. Not to do so is to not feel compassion for him.

In business, the common thing is to try to get the greatest advantage between the disbursements made, with respect to the price at which a product or service is sold, although it is never indicated if it should be in an environment of justice, but rather that in most of the times it is sought to reduce the costs when acquiring inputs of lower price, demeriting the quality of the final product or service, but the most serious thing happens when it is indicated to sell a quantity or quality and to deliver another demerited one to the consumer.

The Bible also makes reference to this in the book of Deuteronomy chapter 25, verses 13, 14 and 15:

Thou shalt not have in thy bag different weights, some greater and some lesser, neither shall there be in thy house one great measure and one lesser. You shall have a just and exact weight, and likewise a just and exact measure, that your days may be prolonged in the land which Yahweh your God gives you.

Undoubtedly, business owners or entrepreneurs do not follow this recommendation, since in many occasions we see practices in which they deliver less than the amount they say they give, that is to say that their saying does not support their actions when selling a product or service, that will sooner or later bring discredit to their business or enterprise. This is confirmed in the book of Proverbs, chapter 11, verse 1:

Yahweh hates false scales, he is pleased with just weights Proverbs chapter 20, verse 10:

Double weight and double measure: ¡two things that Yahweh hates!

Conclusions

Every organization has within its organizational or business culture the definition of values that allow its collaborators to act inside and outside the organization where they work. Many times these corporate values are designed without considering a solid foundation that allows their implementation and above all the objective for which they were formulated. Generally, their postulation comes from a review of the values of some representative companies in the sector or of some global organizations, which constitute entities to be followed, but which do not have any criteria for their implementation.

On the other hand, there is a moral foundation where human values are enunciated and founded from a biblical perspective, being this the main foundation of human values that exist. Among these values are justice, mercy, kindness, among others. However, when it comes to defining business values, they are totally disregarded in the business world.

Therefore, when identifying and formulating the values of an organization, it is recommended to follow the moral values coming from the Bible, despite the fact that in the business world competition, positioning, leadership and competitive advantage are promoted; instead of sharing, offering products and services without pursuing personal advantage and satisfaction, but as if they were for consumption or personal use.

Undoubtedly the basis in the definition and implementation of values in an organization or company considering biblical foundations, will lead to a better status to the company, since acting without consideration of these biblical values, failure will be the destiny in the medium or long term.

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Tourist Route of Mazahua Crafts in the municipalities of Donato Guerra and Valle de Bravo, State of Mexico, Mexico, 2021-2023

Ruta Turística de las Artesanías Mazahuas en los municipios de Donato Guerra y Valle de Bravo, Estado de México, México, 2021-2023

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DOI: 10.35429/P.2023.2.11.21

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A. González, D. Castelán, A. Santillán, R. García and L. León (AA. VV.). Research perspectives at TESVB in the face of Industry 5.0 - Proceedings-©ECORFAN-México, México, 2023

Abstract

The project is carried out with the participation of a student (thesis student) belonging to the Mazahua Ethnicity, from the town of San Antonio de La Laguna, municipality of Donato Guerra, State of Mexico, Mexico; which is currently marketing it. The Tourist Route is marked from the entrance to the communities of San Antonio de La Laguna and San Simón de la Laguna, both with a significant participation of the ethnic group (INEGI, 2021); until reaching the municipality of Valle de Bravo, where crafts are sold in three predominant points: Plaza Mazahua, Valle de Bravo Crafts Market and La Estrella Crafts Market. The predominant activities in the towns of San Antonio de La Laguna and San Simón de La Laguna are: agriculture and livestock (on a smaller scale), and the production of crafts; The main problem is that crafts do not have a market considered sufficient payment; The route aims to attract a market to the aforementioned locations; Therefore, the objective of the project is to design and trace a Mazahua Crafts Route, in the municipalities of Donato Guerra and Valle de Bravo, State of Mexico, Mexico; with the purpose of promoting the cultural wealth of the ethnic group, generating new expectations and socio-economic resources. The methodology that has been used is mixed: quantitative (surveys and statistical data); qualitative (data generated in “focus group”); descriptive (the key elements of the project are described); in addition to possessing a socio-critical/reflexive critical paradigm (the individual constructs his reality, and from there transforms it as a reflective critical creative subject). The results reflect the viability and profitability of the project (Market study and financial study among others). The project begins to be put into practice, the elements that needed to be evaluated have passed the test, the Mazahua Ethnicity needs to place their products (handicrafts) on the market, at prices that are profitable for them. The academic value is significant, the project provides information about the tourist elements implicit in the Mazahua Ethnicity, and the practical implications will generate an economic benefit.

Participation, Ethnic, Municipalities, Reflexive, Viability

Resumen

El proyecto se lleva a cabo con la participación de una estudiante (tesista) perteneciente a la Etnia mazahua, de la localidad de San Antonio de La Laguna, municipio de Donato Guerra, Estado de México, México; la cual se encuentra actualmente comercializando la misma. La ruta turística se marca a partir de la entrada a las comunidades de San Antonio de La Laguna y San Simón de la Laguna, ambas con una participación significativa de la etnia (INEGI, 2021); hasta llegar al municipio de Valle de Bravo, donde se comercializan las artesanías en tres puntos predominantes: Plaza Mazahua, Mercado de Artesanías de Valle de Bravo y Mercado de Artesanías La Estrella. Las actividades predominantes en las localidades de San Antonio de La Laguna y San Simón de La Laguna son: agricultura y ganadería (a menor escala), y la elaboración de artesanías; el problema principal es que las artesanías no cuentan con un mercado considerado en pago suficiente; la ruta pretende atraer mercado a las localidades mencionadas; por lo que el objetivo del proyecto es diseñar y trazar una ruta de las Artesanías mazahuas, en los municipios de Donato Guerra y Valle de Bravo, Estado de México, México; con la finalidad de fomentar la riqueza cultural de la etnia, generando nuevas expectativas y recursos socio-económicos. La metodología que se ha utilizado es mixta: cuantitativa (encuestas y datos estadísticos); cualitativa (datos generados en *focus group*); descriptiva (se describen los elementos actores del proyecto); además de poseer un paradigma sociocrítico/crítico reflexivo (el individuo construye su realidad, y desde ella la transforma como sujeto creativo crítico reflexivo). Los resultados reflejan la viabilidad y rentabilidad del proyecto (Estudio de mercado y estudio financiero entre otros). El proyecto se inicia para llevarse a la práctica, los elementos que se necesitaban evaluar han pasado la prueba, la Etnia mazahua necesita colocar sus productos (artesanías) en el mercado, en precios que les resulten rentables. El valor académico es significativo, el proyecto aporta información acerca de los elementos turísticos implícitos en la Etnia mazahua, y las implicaciones prácticas generarán una derrama económica.

Artesanías mazahuas, Ruta turística, Donato Guerra, Valle de Bravo, Estado de México

Introduction

Mexico stands out as a nation with a wide cultural and social diversity, evidencing a multiplicity of customs, traditions and beliefs that arise from the presence of diverse ethnic groups. This cultural richness contributes to the country's unique identity. When examining the State from a social and cultural perspective, specific characteristics can be identified that define similarities and differences with the surrounding regions. Throughout history, human beings have preserved, transformed and even adopted these particularities as an integral part of their identity (Alonso Martínez and García Téllez, 2020).

The Mexican Republic is a country rich in culture, its 32 States that comprise its present characteristic cultural richness, reiteratively dissimilar from one another, but in the end belonging to the same geographical space.

"The importance of ethnic identity lies in the fact that it is a way of being, seeing and acting creating a close relationship between its territory and the use of its resources as a means of subsistence for a sustainable development model" (Núñez González, 2017).

The characteristic identity of the Mazahua ethnic group in the municipality of Donato Guerra, settled mainly in the towns of San Antonio de La Laguna and San Simón de La Laguna, is marked, and they create a correlation between their community and the use of the resources of their region for its development. An ethnic group that definitely defends its distinctive elements (especially women).

Donato Guerra is a municipality in the State of Mexico, characterized by an important Mazahua population, where in recent years some tourism and ecotourism activities have been implemented; groups were formed, mainly artisan and commercial, and the production of local products has increased, among which handicrafts are the most important, mostly by women's groups (Torres Limas, Cruz Jiménez and Castillo Nechar, 2022).

Mazahua women are the protagonists of the elaboration of local handicraft products in the municipality of Donato Guerra; they are the drivers of the domestic economy of the region, the problem lies in the fact that the product of their efforts is not fairly remunerated; their handicrafts are acquired in the market at lower prices.

The research project is carried out with the support of a thesis student of the Bachelor's Degree in Tourism of the Tecnológico de Estudios Superiores de Valle de Bravo (TESVB); since in these municipalities there is a great variety of handicrafts, and the possible economic impact that they would have within these municipalities would be important. According to INEGI (2021), in the localities of San Antonio de la Laguna and San Simón de la Laguna, there are substantial settlements of the Mazahua ethnic group; these two localities boast the development of their community based on agriculture and cattle raising on a low scale, and the elaboration of handicrafts typical of their culture; The Mazahua ethnic group is usually located in rural areas, and their economy is based on agriculture; they cultivate using the rain-fed irrigation system that is common, and rudimentary artificial irrigation systems, since they do not have an important economy that provides sophisticated irrigation systems.

For their own consumption and for sale to the public, they grow beans, corn, squash, chili peppers, sunflower flowers, some vegetables and fruit trees. It is important to mention that they are also artisans, since they make tablecloths, napkins, purses, purses, Mazahua costumes, headbands, and various products made from ocoxal (waste from some varieties of pine), among others.

All these products are offered in neighboring communities, so that they can buy in turn, products of the basic basket; it could be mentioned that, in the month of August of each year for eleven years, the famous "Regional Fair of the Mushroom" has been carried out, where local handicraft products are offered. The main objective of the project is to elaborate and outline a tourist route for Mazahua handicrafts in the municipalities of Donato Guerra and Valle de Bravo, State of Mexico, Mexico, in order to promote their cultural richness, generating new expectations and socioeconomic resources.

It is important to mention that in order to achieve the main objective, the secondary objectives must be fulfilled. To achieve the strategy, the following tactics must be followed: to carry out the mapping of the tourist route with the Global Positioning System (GPS), in such a way that the important points in the route are covered. Promote the development of handicrafts in the tourism sector of these municipalities. Another objective is to conduct a market survey to determine whether the project is feasible and profitable in some Mexican states.

Conduct a market survey to know close impressions of the market segment among others in Valle de Bravo. The main problem is the commercialization of Mazahua handicrafts through a tourist route in the municipalities of Donato Guerra and Valle de Bravo, State of Mexico, Mexico; to achieve the commercialization of their local product, generate fair income and employment for local communities, decreasing social, cultural and ecological impacts in the locality.

A theoretical framework is presented with a contextualization of the research project that is appropriate to it. The implementation of the Mazahua Handicrafts Route is intended to contribute to the social welfare of the region, which is the main task of the research project presented. The hypothesis of the project is focused on knowing if it is really feasible and profitable to put this route into practice, if it will help to improve the economic flow of the region.

The strategy used in the project includes quantitative approaches, which include market research and surveys; qualitative approaches, with focus groups; and descriptive approaches, where the facts and elements of the project are detailed. This approach is based on a reflective sociocritical/critical paradigm, where the individual constructs his or her perception of reality and transforms it as an active and creative agent.

Methodology

The methodology that the project implements is quantitative (a market research and a market survey are carried out), qualitative (focus groups are carried out), and descriptive (the facts and elements representing the project are described); which has a reflective sociocritical/critical paradigm (the subject constructs his reality from his perspective, and transforms it as an active and creative subject).

The thesis student of the Bachelor's Degree in Tourism of the Tecnológico de Estudios Superiores de Valle de Bravo (TESVB); carries out a first reconnaissance on the route that should be implemented in the tourist route in the municipalities of Donato Guerra and Valle de Bravo. Quantitative research was carried out through a market research and a market survey, to know the perspectives of the market segment according to the tourist route; the results obtained were positive, it is revealed that the project is profitable and feasible. The market research is carried out through Google forms, by Google drive, with a previously determined market segmentation; with a sample size calculated in a specific way; with a minimum margin of error and a significant level of confidence. Also a market survey in Valle de Bravo as a general and representative universe. The methodology is quantitative due to the use of surveys, but it is not only this information gathering instrument, but there are others to be implemented such as: leading questionnaire, observation and interview.

For the collection of information, the market research methodology of Miguel Santasmases Mestre (2011) is followed.

The research plan comprises a set of activities that start with the identification of the problem to be investigated, go through the definition, classification and measurement of the variables and their expression in a form or questionnaire, and end with the analysis of the data and interpretation of the results. Specifically, it includes the following stages:

1. Identification of the problem to be investigated.
2. Definition of the research objectives.
3. Determination of the type of research design.
4. Specification of the study hypotheses.
5. Definition, classification and measurement of the study variables.
6. Selection of the sources of information.
7. Design of the questionnaire or form for data collection.

8. Design and selection of the sample (if applicable).
9. Data collection and processing.
10. Data analysis and interpretation of the results.
11. Preparation of the research report (Santesmases Mestre, 2011).

The methodology of Santesmases Mestre (2011) provided the guidelines to carry out the market research of the project, as well as the market survey, which will give the guideline to know if the project is feasible and profitable.

The qualitative methodology essentially constituted the focus groups carried out with the people involved in the development of the tourist route.

The descriptive methodology allowed the development of the tourist route, since it describes the layout of the route (with coordinates). Subsequently, the data is fed into Google Earth for route marking at satellite level, which results in a link to visualize the route and a QR code. A first route layout was carried out, and then an adjustment was made to it.

A Social Media 5.0 is carried out to promote the route at reduced costs, with the generation of a "free" content marketing, through digital applications (Apps) and digital platforms, which according to the market segment are suitable.

Impact of the project on the community. The generation of economic benefits for Mazahua artisans in the towns of San Simón de La Laguna and San Antonio de La Laguna, in the municipality of Donato Guerra, and Valle de Bravo downtown area, with the implementation of the tourist route of Mazahua handicrafts.

Results

The research project has been accepted in the Department of Science and Technology Research of the TESVB; with registration code INVES0521-17. It has main results, secondary results and results to be performed; and everything is registered in a Thesis, based on a schedule of activities starting on September 1, 2021 and ending on August 31, 2023.

The main results are the following:

1. Marking and mapping of the tourist route of the Mazahua handicrafts with Global Positioning System (GPS) and Google Earth (satellite mapping).
2. Market survey through Google forms by Google drive, for some states of the Mexican Republic as a market segment.
3. Market survey in the municipality of Valle de Bravo, State of Mexico.
4. Design of Social Media 5.0 about the tourist route, to promote it at affordable prices (traditional advertising is expensive compared to digital advertising), to the specific market segment.
5. Design of a catalog of handicrafts of the Mazahua ethnic group from the town of San Antonio de La Laguna, San Simón de La Laguna and the municipality of Valle de Bravo, central zone.
6. Training to local people, about the management of the tourist route, by specialized personnel.
7. Tour the tourist route to carry out adjustments within the route, if so determined.
8. Simulation of tourist route.
9. Focus group meetings.

The results mentioned above are the main ones, but there are others:

1. Current regulations for commercialization of the route of the Mazahua handicrafts.
2. Search for investors interested in contributing capital to the tourist route.
3. Application of questionnaires to the locality involved in the route of the route, to know the impressions in this respect.
4. Identify problems and solutions about the tourist route, for its implementation and commercialization.
5. Adjustments in the layout of the tourist route.

6. Visits to places where a tourist route similar to that of the research project is being carried out for benchmarking purposes.
7. Design of a catalog of tourist attractions that are adjacent to the tourist route, to encourage the affluence of tourism in the same one.
8. Financial plan of the tourist route, for profitability purposes.
9. Marking and layout of the tourist route with the Global Positioning System (GPS) and Google Earth (satellite mapping) (see Image 1. Layout of the Mazahua Handicrafts Route, in the municipalities of Donato Guerra and Valle de Bravo, State of Mexico, Mexico).
10. Conduct a market survey through Google forms by Google drive, for some States of the Mexican Republic as a market segment.

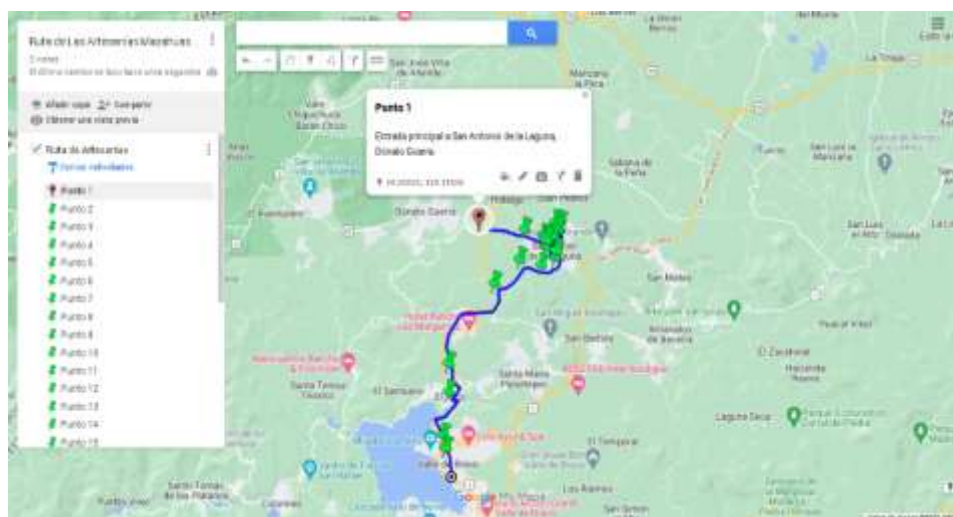
The main results developed are as follows:

Target market. In the first instance, the municipality of Valle de Bravo, State of Mexico for local market survey purposes (Market Survey); and the real target market, some States of the Mexican Republic.

Market segmentation. Men and women between the ages of 22 and 55, socioeconomic level C-, D+, D according to AMAI (Mexican Association of Market and Opinion Intelligence Agencies) (AMAI.org, 2020; AMAI.org, 2022), no schooling, no nationality, who wish to take a tourist route and wish to experience convivial tourism (rural tourism approach).

Sample size. It is based on the principle of equiprobability, which means that all individuals in the selected sample will have the same probability of being chosen. This assures us that the sample drawn will be representative. We will calculate the sample size, knowing the size of the unsegmented population, since we have statistical data provided by the National Institute of Statistics and Geography (INEGI) 2021.

Figure 1 Route of the Mazahua Handicrafts Route, in the municipalities of Donato Guerra and Valle de Bravo, State of Mexico, Mexico



Source of Reference: Google Maps

Market survey States of the Mexican Republic.

Calculation of the sample size for the market segment, when the size of the segmented population is not known, or the size of the unsegmented population is known. In the intercensal survey 2020, conducted by the National Institute of Statistics and Geography (INEGI, 2021), 126 million 014 thousand 024 inhabitants were counted in the Mexican Republic (INEGI.org.mx, 2021), but the size of the target market population is not known. With a margin of error of 4%. No knowledge of the size of the population. Confidence level of 95%. Sample size: 601 surveys.

Results of the surveys applied in the market research:

It is worth mentioning that the first two questions is to delimit the market segment, people who do not belong to the market segment, the system is programmed so that it does not advance.

1. Sex of respondent.

Male: 50.8%

Female: 49.2%.

2. Resident of Valle de Bravo, Donato Guerra or outside these municipalities.

No: 39.9%

Yes: 60.1%.

3. Age ranges.

5-21 years: 40%

22-60 years: 55.4%

61-75 years and older: 4.6%.

4. Price willing to pay for the tourist route service.

From \$500.00 to \$1,000.00: 81.1%

More than \$1,000.00: 13%

Less than \$500.00: 5.9%.

5. Types of handicrafts you would like to know and buy along the tourist route.

Ceramics, wood, vegetable fibers: 61.4%

Marble, stone, glass: 26.6; metal, leather: 11%

Embroidery and textiles: 1%.

6. Preferred time of day to visit the tourist route.

Morning: 55.9%

Midday: 31.6%

Afternoon: 12.5%.

7. Activities to be carried out along the tourist route.

Handicraft workshop of loom, painted fabrics and embroidery: 45.5%

Exhibition of the elaboration of handicrafts: 22.3%

Creation of handicrafts by tourists: 32.2%.

8. Time they would like to invest in the tour of the tourist route.

1-2 hours: 33.9%

2-4 hours: 46.1%

More than 4 hours: 20%.

9. Type of tourist route.

Car: 29%

Walking: 50.5%

Horseback: 20.5%.

10. Would you like the tour guide to explain the origin of each craft?

Yes: 89.8%

No: 10.2%.

11. Have you heard about the handicrafts of Valle de Bravo and Donato Guerra, made by Mazahua artisans?

Yes: 63.5%

No: 36.5%.

12. Would you like to go on the Mazahua Crafts Route of Donato Guerra and Valle de Bravo?

Yes: 74.2%

No: 10%

Maybe: 15.8%.

13. To conduct a market survey in the municipality of Valle de Bravo, State of Mexico, Mexico.

Market survey in the municipality of Valle de Bravo. Calculation of the sample size for the market segment, when the size of the segmented population is not known, or the size of the unsegmented population is known. In the intercensal survey 2020, conducted by the National Institute of Statistics and Geography, 61,590 inhabitants were counted in the municipality of Valle de Bravo, but the segmented population size is not known. With a confidence level of 95%; margin of error of 10%. Sample size is: 97 surveys.

14. Age ranges.

15-21 years: 24%

22-60: 72%

61-75: 4%

15. Do you know what a Mazahua Handicrafts Tourist Route is?

Yes: 31%

No: 55%

Maybe: 14%.

16. Do you consider that if the tourist route is implemented within the municipalities of Donato Guerra and Valle de Bravo, the community would benefit from it?

Yes: 95%

No: 5%.

17. Do you consider that the increase in the number of tourists due to the implementation of the tourist route will affect the way of life in the municipalities?

Yes: 44%

No: 56%.

18. Do you consider that the implementation of the tourist route within the mentioned municipalities is important?

Yes: 96%

No: 4%.

19. What benefits do you consider for the municipalities with the implementation of the tourist route?

Job creation: 37%

Income: 19%

Economic: 20%

Attracting more tourists: 24%.

20. Would you like to participate in the development of the tourist route?

Yes: 81%

No: 19%.

21. Activities that you propose to make the tourist route attractive to tourists.

Workshops: 57%

Exhibitions: 35%

Galleries: 8%.

22. When the tourist route is implemented, would you be interested in acquiring one of the handicrafts offered along the route?

Yes: 92%

No: 8%.

10. Do you know the elaboration process of Mazahua handicrafts?

Yes: 51%

No: 49%.

Social Media 5.0 about the Tourist Route of Mazahua Handicrafts, as a tourist element of the municipality of Donato Guerra and Valle de Bravo, State of Mexico, Mexico.

"Advertising is that activity that uses a series of creative techniques to design persuasive and identifiable communications, transmitted through different media" (Fisher, 2017). "The different media"; it is considered that this could be the dilemma: traditional media or digital media; traditional media (television, radio, printed magazines, newspapers, journals, flyers, leaflets, leaflets, banners, non-digitized billboards) or digital media or Social Media 5.0 (Facebook, Instagram, Twitter, YouTube, LinkedIn, Tik Tok).

Traditional advertising is that which has been used until the irruption of the internet and new technologies in our lives. That is, we are talking about a time or stage that would cover from 1920 to 1990 (date in which it is considered that the internet caused a revolution worldwide, and in all known sectors approximately), this traditional advertising persists, because today it is still used by many companies or organizations to advertise in: advertisements for mass media, posters in public spaces, merchandising, mailing or commercial mail at home, attendance at fairs and events) (Cabello, 2019). Traditional advertising is in clear decline, in clear disuse; even though it has not completely disappeared from the marketing jargon, it has some significant disadvantages compared to digital advertising, but the most important one is considered: "the cost". The cost of digital advertising is lower than the cost of traditional advertising, and this is one of the points of its boom, the other of course, is the emergence of new generations focused on Information and Communication Technologies (ICT). Other elements can also be pointed out:

With a wide penetration of the use of cell phones (67%) and the use of social networks (54%), an infinite number of opportunities open up for brands to be able to surprise consumers wherever they are, react at the same instant that customers make their complaints and even be able to adapt their offers in a personalized way according to the profile, location and social links that each one of them has. Connection speeds and the number of connections have an intimate relationship with the economic development of countries (Zuccherino, 2018).

Digital advertising or better known as: social media 5.0 (digital marketing campaign); is the tool in vogue par excellence, since it has significant advantages over traditional advertising. Currently, as mentioned in the preceding paragraph, the indiscriminate use of mobile devices due to the easy access to them (cell phones, tablets); and the excessive use of social networks worldwide (due to lower costs in communication plans); have caused a surge in everything related to the digital field; here is where traditional advertising "loses" the battle against digital advertising.

The elements that have been mentioned give the guideline to determine without fear of error, that traditional advertising has its days numbered, since the technological era of information opens its way without reticence of any kind, giving room only to digital advertising. Times are changing, and so is the way of advertising.

A social media 5.0 or digital marketing campaign should be carried out to advertise the Mazahua Handicrafts Tourist Route. According to the market segment, the social media should contain digital platforms: Facebook, Instagram, YouTube, and Twitter.

Conclusions

The research project has not yet concluded, the market surveys delimited that it is feasible and profitable; the layout and delay of the tourist route has been carried out; as well as a Social Media 5.0 for promotion and sales; a catalog of Mazahua Handicrafts of San Antonio de La Laguna and San Simon de La Laguna has also been carried out; as well as a catalog of tourist attractions inherent to the route; a financial study has been carried out, which has resulted with positive numbers; a new financial study with adjustments is still required.

The thesis has implemented the Mazahua Handicrafts Tourist Route in the municipalities of Donato Guerra and Valle de Bravo, State of Mexico, Mexico. The focus of the project in the socio-critical/critical reflective paradigm, leads the individual to be a key factor in the real transformation of their environment to improve the quality of life conditions of this and the region.

In recent years, tourism routes have tried to innovate in terms of tourism products, which has led to greater demand from the demand for diversification of supply. Therefore, it is necessary to give added value to the products in order to achieve a better positioning of the tourist destinations. Internationally, cultural tourism has shown a growing demand, since this activity provides great development benefits to local communities, since it appears as an economic alternative, favoring new income, which is developed through its enhancement.

In the research, national and international experiences were studied, from this, it was possible to confirm that the cultural tourist routes allow energizing different sectors of the economy, also showing the potentialities and resources with which a given area has, in this case the municipalities offer cultural wealth, also allowing the use of these.

- The market study indicates that there is a high degree of acceptance by the market segment, it is intended that the route can be carried out, it is feasible, profitable and marketable.
- Those involved in the project consider that it is an option that will increase the social wellbeing of the region.
- That there are sources of financing for the route to be implemented, by the Ministry of Tourism in the city of Toluca de Lerdo.
- That the Financial Plan determined that the project is profitable.

From this study, it can be affirmed that there is a close relationship between tourism and local development from the interpretation and enhancement of the state, the need for diversification of the tourist offer by visitors is a requirement towards a greater tourist approach to the territory, this is how the search and enhancement of potentially tourist resources are part of the activity of interpretation and enhancement from a local development approach.

This being the essence of the research, a local study was made to the Mazahua ethnic group, as well as to the inhabitants of the municipality of Valle de Bravo and an analysis of the potentialities of the territory they occupy, being able to determine that it has great cultural resources of a high level of exploitation. In addition, data collection instruments were applied to the inhabitants who have a direct relationship with the study area, obtaining as a response the ratification of the need to design a route that shows and revives the cultural richness of the Mazahua communities for the promotion and local development of both municipalities.

The cultural heritage and its interpretation highlights the relationships within a state, thus, knowing and interpreting the autochthonous and indigenous heritage becomes a way to recover the collective identity, reinforcing the social cohesion of the inhabitants. This is one of the keys to the success of local development.

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Ecoblock prototype, with recycled pet, styrofoam and ocoxal fibers

Prototipo de ecoblock, con materiales reciclados de pet, unicele y fibras de ocoxal

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DOI: 10.35429/P.2023.2.22.37

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A. González, D. Castelán, A. Santillán, R. García and L. León (AA. VV.). Research perspectives at TESVB in the face of Industry 5.0 - Proceedings-©ECORFAN-México, México, 2023

Abstract

Eco-Blocks have become a low-cost construction material and a valid recycling method to reduce waste disposal in regions where industrial recycling is not yet available. Design and create a prototype of an ecological block using recycled materials such as PET, Styrofoam and natural ocoxal fibers, to increase the resistance to axial compression. The methodology was quasi-experimental, descriptive. Two prototypes of ecoblocks were designed, containing the same amount of materials such as cement, gravel, sand, varying the volume of the PET, Styrofoam and ocoxal fibers. Prototype 1 had the highest resistance to axial compression, achieving a result of 41.2708 kgf/cm², prototype 2 achieved a resistance of 32.8125 kgf/cm².

Sustainable, Ocoxal, Compression

Resumen

Los Eco-Blocks, se han convertido en un material de construcción de bajo costo y un método válido de reciclaje para reducir la disposición de basura en regiones donde el reciclaje industrial no está aún disponible. Diseñar y crear un prototipo de block ecológico utilizando materiales reciclados como el PET, el unisel y fibras naturales de ocoxal, para incrementar la resistencia a la compresión axial. La metodología fue cuasi experimental, descriptiva. Se diseñaron dos prototipos de ecoblocks, que contenían la misma cantidad de materiales como cemento, grava, arena, variando el volumen del pet, unisel y fibras de ocoxal. El prototipo 1 fue el que mayor resistencia a la compresión axial al lograr un resultado de 41.2708 kgf/cm², el prototipo 2 logró una resistencia de 32.8125 kgf/cm².

Sostenible, Ocoxal, Compresión

Introduction

The project arises from the Interinstitutional Program for the Strengthening of Research and Postgraduate Studies in the Pacific (DELFIN Program), during the stay of the XXVII Summer of Scientific and Technological Research in the Pacific, at the Tecnológico de Estudios Superiores de Valle de Bravo (TESVB). , in the Architecture Program, with students from the National Polytechnic Institute (IPN) at the high school level and a degree in Architecture and Civil Engineering, supported the design and construction of the ecological block prototype, with Materials and Technologies as their line of research. Alternatives for Bioclimatic Construction and Architecture.

The UN General Assembly adopted the 2030 Agenda for Sustainable Development, an action plan for people, planet and prosperity, which also intends to strengthen universal peace and access to justice. The member states of the United Nations recognize that the greatest challenge in the world today is the eradication of poverty and affirm that without achieving it there can be no sustainable development (UN, 2015). Within the 2030 Agenda for Sustainable Development, 17 objectives were established to achieve sustainable development, and in this specific case the aim is to collaborate in the development of objective 11: Sustainable cities and communities, which establishes: “Ensure that cities and human settlements are inclusive, safe, resilient and sustainable.”

Aczel, (2023), comments that sustainability has become one of the most powerful social movements of the last 40 years. However, many find it difficult to clearly articulate the meaning of sustainability due to its diverse applications. Sustainability in developed countries tends to focus on actions that generate small changes in existing behavioral patterns rather than fundamental social changes.

Cities around the world are developing strategies to deal with heat waves, extreme cold, floods, wildfires, hurricanes, earthquakes, droughts, pandemics and other disasters caused by climate change. To this end, a theory of resilience is being expanded and applied as a methodology to ensure social and spatial systems that respond to climate change while providing habitats and ecological spaces for more diverse human activities (Jun and Song, 2023).

Rajagopal, (2023), in his research comments that creative entrepreneurs build and shape their business activities within their competencies and abilities consistent with their personalities. This synchronization in entrepreneurial mindset and competitiveness in entrepreneurial traits stimulates entrepreneurial growth within the industry. Creative entrepreneurs invest in value co-creation with their key partners to promote circular entrepreneurship in the agricultural and non-agricultural sectors to address key environmental challenges.

Ismail, (2023), comments in his research that less economically developed countries (LDCs) are struggling to meet the demand for affordable housing in their growing cities. There are several reasons for this, but an important limitation is the high cost of construction materials, these challenges with a set of strategies for the design and analysis of materially efficient concrete elements that can reduce the economic and environmental costs of urban construction.

Various authors have investigated ecoblocks such as their importance and different physical and mechanical characteristics, Ortiz-Castellanos et al. (2020), Núñez Crisanto (2021), Sánchez (2019), Puchoc Amaya and Laguna Pilla (2020), Maure et al. (2018), Hossain et al. (2021).

Chaka et al., (2023) investigated the use of natural false banana fibers and sisal fibers, in recycled plastics, resulted in the production of cheaper and more effective tile composites, and a reduction in environmental pollution.

Barragán-Alturo et al., (2017), analyzed how to reduce the costs caused by a conventional block when it is produced, through comparison with an eco-block made with PET bottles.

Sriprom et al., (2022), successfully developed a novel composite of reinforced recycled expanded polystyrene foam (r-EPS) and natural fiber. EPS was recycled by dissolution method using accessible commercial mixed organic solvent, while natural fibers, i.e., coconut shell fiber (coir) and banana stem fiber (BSF), were used as reinforcing materials.

Li, (2022), investigated plastic bottle bricks, the most popular type of ecobricks, are created by putting filled inorganic materials such as sand into polyethylene terephthalate (PET) plastic bottles.

Triyono et al., (2023), investigated the properties of the resulting solid polystyrene products from recycled polystyrene waste and determined the optimal temperature of the thermal extrusion treatment process to be carried out compared to the characteristics of the original polystyrene based on in the results of traction and impact tests.

Zakharov, (2023), investigated the use of polystyrene as an effective thermal insulating material in three-layer load-bearing and enclosing structures of reinforced concrete residential buildings.

Bedanta et al., (2022), analyzed polystyrene aggregate concrete was produced by partially replacing coarse aggregate in reference concrete mixes (normal weight) with an equal volume of chemically coated crushed polystyrene granules.

Currently, new ways of doing Architecture are changing so as not to sacrifice nature, beginning to not only see the comfort of users but also taking into account biodiversity; This leads architects to look for ways to be responsible with the environment and be able to adapt projects to the new trends that are innovating architecture. We can understand the environment as the union of natural, social and cultural values that exist in a given place and time, which influence the material and psychological life of man and the future of generations. That is, it is not only about the space in which the life of living beings develops. It also covers human beings, animals, plants, objects, water, soil, air and the relationships between them.

Approach to the problem

The environment is increasingly deteriorated by the human activities that take place daily. Which leads to a deterioration in the planet's ecosystems, as well as in the health of the living beings that occupy the earth. This is why concern about environmental problems is increasing and becoming widespread.

In addition to the above, in recent years the planet has experienced the scientific and technological advance of humanity, science has been able to provide us with new alternatives in different areas of daily life but it also brings with it certain negative consequences such as the pollution produced. due to the excessive use of materials that do not have biodegradable characteristics and that after their use end up in places that affect public health and biodiversity.

For this reason, many organizations have begun to take actions in order to implement sustainable alternatives that help conserve our planet. One of them is the well-known sustainable development. To achieve sustainable development, certain definitions must be taken into account, such as sustainability itself, which consists of a process that aims at the responsible use and exploitation of natural resources, avoiding their depletion. Sustainability is a process that can be applied within different areas of daily life, one of them is construction. Various options have been taken into account that could implement materials such as PET, where its use would focus on the area of recycling. PET recycling has multiple advantages that can be used in different materials or construction processes in the construction industry.

Bioclimatic architecture in conjunction with sustainability seeks to create alternatives that lead us to the use of materials that, due to their excess production and single use, affect the environment, taking into account the climatic and physical conditions of the region, seeking solutions to factors that affect constructions such as humidity. Currently there are various alternatives in terms of construction processes which provide practical and viable solutions for the environment where they are applied, helping the environment, in addition to the construction advantages they have. One of these alternatives is the construction of blocks that seek to take advantage of various materials that are commonly wasted, including them in their composition so that they resist and comply with the specifications provided by the regulations. This alternative is known as ecoblock. Eco-Blocks have become a low-cost construction material and a valid recycling method to reduce waste disposal in regions where industrial recycling is not yet available.

Industrial processes are usually the largest polluters on the planet, either due to the emission of gases that are produced during the process or due to the waste they generate. Although the construction industry is the engine of economic development, it is also the main source of environmental pollution. One of the most polluting industries is block production, which uses a lot of coal and materials such as rubber to generate energy. According to the United Nations Environment Programme, the production of construction materials contributes up to 30% of global greenhouse gas emissions and consumes 40% of all energy.

In Mexico, as in other regions around the world, there are natural factors that affect construction in various ways, one of them and the most important is the climate, which is why various options have been implemented that take these conditions into account. One of them is bioclimatic architecture, which proposes solving problems such as humidity. This, together with sustainability, seeks to create alternatives that give us advantages when creating new construction materials and that at the same time meet the criteria that current regulations require for it to function correctly. An increase in the waste of materials such as plastic has also been observed. Alternatives have been thought of to take advantage of these products within different areas, thus promoting sustainable development, so that we can satisfy current needs, but at the same time conserve the future of generations that will share the same space that we currently enjoy.

The implementation of alternative technologies or ecotechnics are technological innovations that seek to guarantee the care and preservation of the environment through the design, creation and implementation of devices, to preserve and restore the balance between the environment and human activity. They focus on solving environmental problems that must necessarily be addressed. Taking these problems into account, this project proposes a block prototype that provides great help to the environment, trying to take care of the ecosystem by recycling polluting materials in a combination of organic materials from the region. This project seeks to design and manufacture a block based on cement, a crushed product of PET (polyethylene terephthalate), Styrofoam (expanded polystyrene) as well as natural fibers (ocoxal), the main purpose is to study various compositions, varying the percentages of the materials additional tests and perform different compression resistance tests and know their physical properties.

Justification

The purpose of this project is to make the most of materials such as PET, ocoxal and Styrofoam, materials that are normally destined for landfills and only a minimum percentage is recycled correctly. The proposal to create an ecoblock prototype is a great opportunity to solve the regional environmental problems that we face today.

On the other hand, the construction field needs innovative and sustainable products to face natural phenomena such as climate, earthquakes, among other factors. Therefore, elements are sought that have adequate resistance and that have the appropriate physical properties to satisfy the needs of the industry. With the creation of new construction methods, proposals for construction materials for sustainable housing are sought, which also meet the physical and mechanical characteristics necessary to support the necessary loads to which they will be subjected according to their structural use.

Background

Bioclimatic architecture can be defined as architecture that focuses on the design and construction of buildings taking into account the climatic conditions of the region or country in which it is being built, and also focuses on the use of available natural resources (sun , vegetation, rain, wind) to reduce as much as possible the environmental impact generated by construction and energy consumption. The objective of bioclimatic architecture is to design buildings that are capable of changing their environmental behavior according to the conditions of each season of the year. This in order to provide greater comfort to its occupants.

This type of architecture is based on the importance of providing the construction with thermal and acoustic comfort, as well as controlling CO2 levels.

Its main features are:

- The orientation: it is designed taking into account the position of the sun to make the most of sunlight.
- Sunlight and sun protection: at this point and depending on the region in which it is being built.
- Cross ventilation: with the aim of creating good ventilation in all areas of the building.

For the construction of a project, a wide variety of materials are taken into account; these are chosen according to the project requests, the conditions of the place, among other factors. Construction materials are used in large quantities, so the raw materials must be low-cost and easily acquired. One of their main characteristics is that they must last over time and environmental conditions. In addition, they must meet other requirements, such as mechanical resistance, fire resistance or ease of cleaning.

Bricks are currently considered a polluting material since, among other things, they require a lot of energy to manufacture, which is why they generate a significant environmental impact. On the other hand, this does not happen in those ecological bricks also called ecobricks. However, its use today is very rare, even though historically ancient civilizations have used sustainable materials in construction. Therefore, ecological bricks are those bricks manufactured from materials or through processes that do not have as significant an environmental impact as conventional bricks. Within ecological bricks, there are some that are more ecological than others according to their sustainability in various aspects. These bricks can offer us the same or greater resistance than conventional bricks and even offer the same advantages in comfort and safety, depending on the materials chosen for their construction.

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Due to the benefits that the ecoblock offers us, the natural resources found in the region were implemented, taking advantage of the existing polymers without affecting biodiversity, which is why ocoxal was implemented, a material discarded by the pine trees themselves and that if removed from its place of origin does not affect the region or its inhabitants.

Theoretical framework

PET is a plastic resistant to microbiological attack, due to this characteristic in PET there is no proliferation of bacteria, fungi or parasites related to putrefaction. Being non-biodegradable, it maintains its characteristics over time, which provides it with a long useful life (Muñoz, 2012).

UNICEL is a petroleum derivative, whose scientific name is expanded polystyrene. It is a plastic to which air is introduced into its mass, forming bubbles, a process known as foaming, so its composition is 5% raw material 5/7 and 95% air. It is identified by an equilateral triangle and the number 6 in the central part, in addition to the letters PS. It is important to clarify that this material is 100% recyclable.

In Mexico there are already alternatives and technologies for the proper management of this waste. Expanded polystyrene (EPS) geofoam is a lightweight material that has been used in engineering applications since at least the 1950s. Its density is about one-hundredth that of soil. It has good thermal insulation properties with stiffness and compressive strength comparable to those of medium clay. It is used to reduce settlement under embankments, dampen sound and vibrations, reduce lateral pressure on substructures, reduce stresses in buried rigid conduits and related applications. Expanded polystyrene waste in granular form is used as lightweight aggregates to produce lightweight structural concrete with unit weight varying from 1200 to 2000 kg/m³ (Bedanta et al., 2022).

OCOXAL is a very Mexican material, in fact the word “Ocoxal” comes from the Nahuatl “ocotl”: ocote and “Xalli”: sand, it can be said then that ocoxal means ocote sand. This material is also known as: acochal, ocojal, cochal, coxal, acoxal, cojal and is called “xibatji” in Mazahua. It comes from leaves or needles that come off some varieties of pine. The most suitable and used variety is white pine (*Pinus montezumae* Lamb.). However, red pine (*Pinus patula*) and straight pine (*Pinus pseudostrobus* Lindl.) are also used. They are collected from the ground, when they have completed their cycle once they have their characteristic brown color. Generally, dry pine leaves are collected between November and March (Artesanal, 2021).

Hypothesis

The ecoblock with recyclable materials such as PET and Styrofoam, together with the natural ocoxal fibers, will increase its resistance to compression stress, as well as provide acoustic and thermal properties.

Objectives

General

Design and create a prototype of an ecological block using recycled materials such as PET, Styrofoam and natural ocoxal fibers to improve and take advantage of its mechanical characteristics, complying with current regulations on the resistance of materials and being able to use it as an alternative construction material.

Specific

- Implement a way to recycle excessively used materials that have a late degradation time, such as PET and Styrofoam.

- Take advantage of the region's natural fibers such as ocoxal for the construction of an ecological block prototype
- Evaluate the materials that will be the components of the ecoblock in order to enhance the characteristics of the prototype and know the advantages that the additional materials give it.
- Design a prototype of an ecological block using recycled materials with the intention of improving their physical and mechanical properties, so that they can be used effectively in construction.

Materials

The materials that were used for the construction of the prototypes were from the region of the Municipality of Valle de Bravo, State of Mexico.

- Portland cement.
- Gravel.
- Sand.
- Water.
- PET.
- Unicel (extended polystyrene).
- Ocoxal.

Tools

- Weighing machine
- Test tube
- Flat shovel
- Trowel
- Vernier
- Plastic buckets

Machinery

- Vibro-Blocquera Machine
- Universal Machine

Methodology

The methodology is quasi-experimental since it will adhere to the Mexican standard NMX-C-441-ONNCCE-2013 (ONNCCE, 2013), Construction Industry - Masonry - Blocks, partitions or bricks and partitions for NON-structural use - Specifications and test methods; for the realization of variables of the ecoblock prototype. This Mexican standard establishes the specifications and test methods to be met by non-structural blocks, partitions or bricks and partitions.

The classification of pure experiment is chosen because the results of this work will be based on the tests that will be carried out on the prototypes to be carried out. Thus, experimentation will be carried out controlling the quantity variables of materials (PET, Styrofoam and Ocoxal) in a control group. The classification of the standards of the Ministry of Communications and Transportation (SCT); of cement blocks, partitions and partitions described in N-CMT-2-01-002-02; the dimensions of the ecoblock prototype made from PET, Styrofoam and natural fibers from Ocoxal.

Length: 40cm;
Width: 12cm;
Height: 20cm.

Entering the following description: Solid cement block of Quality Grade “A”; Suitable for non-structural interior and exterior walls.

Likewise, the product must comply with the resistance values described in the Mexican standard NMX-C-441-ONNCCE-2013:

Medium Resistance: 35 kg/cm²;

Minimum resistance: 28 kg/cm²

Results

Dosage (concrete block)

The dosage was taken 1:5:2 (cement, sand, gravel), taking these data into account, the development of 4 prototypes was contemplated; 2 of these were made with ocoxal from which the leaf bearing was removed, the percentage added of this material to one of the prototypes was 0.54%, which is equivalent to 72 grams. For the other 2 prototypes, complete ocoxal was chosen; each of the prototypes in this section corresponds to a percentage of 0.8% equivalent to 106.6 grams of this material. For both sections, 3/4" gravel was used; For a block, a gravel percentage of 24.962% (3,319.9 grams) is taken into account.

Finally, regarding PET, 214.5 grams were used for each of the prototypes, a percentage of 1.6%.

Unit quantities:

Cement = 1.66 kg + 10% waste = 1.826 kg

Sand = 8.31 kg + 2.286% waste = 8.5 kg

Gravel = 3.32 kg

Unicel = 0.02765 kg

Pet = 0.2145 kg

Percentages of each block

Cement = 12.5%

Sand = 62.5%

Gravel = 24.962%

Unicel = 0.208%

Pet = 1.6%

Of the 4 prototypes made, 2 of them have the following amounts of water and ocoxal, while the amounts of the other elements remained the same.

Prototype 1

Water = 4 liters.

Ocoxal = 213.2 gr.

Prototype 2

Water = 5 liters.

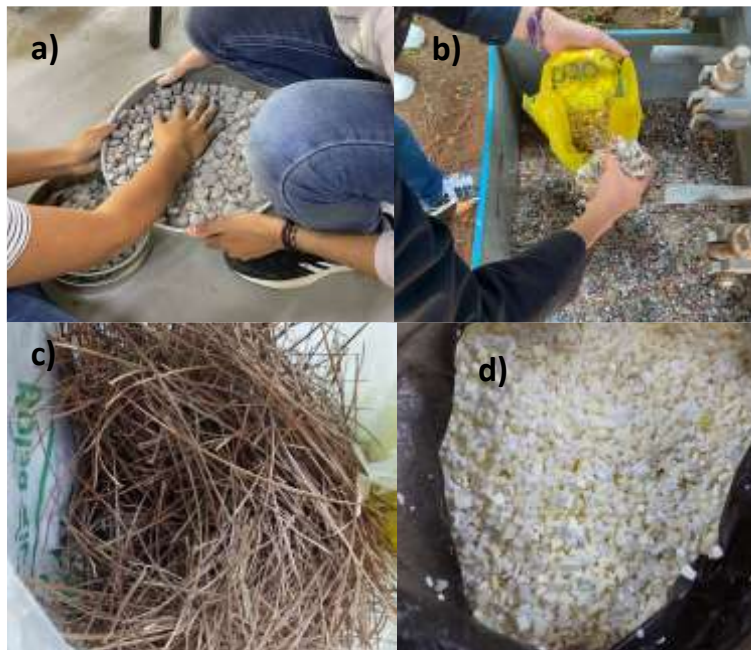
Ocoxal = 144 gr.

Experimental development

The experimental process consists of several stages which allow the elaboration of the ecoblock prototypes, from the dosage of the materials for the mixtures, the weight of the materials, preparation of the mixtures, compaction and preparation in the vibrobloc of the ecoblock and the tests. absorption and compression stresses.

Figure 1 shows the selection of the different materials used to make the ecoblock, coarse aggregate materials (3/4" gravel), sand, crushed pet flakes and Styrofoam (expanded polystyrene).

Figure 1 Materials collection process: a) aggregate materials, b) Pet, c) Ocoxal, c) Unicel (expanded polystyrene)



Source: Own Elaboration

Figure 2 shows how the different materials were weighed on the scale for the dosages of the two ecoblock prototypes.

Figure 2 Materials weighing process



Source: Own Elaboration

Preparation of mixtures of ecoblock prototypes.

The surface where the mixture was made was moistened so that it did not absorb water from the mixture. Gravel, sand and cement were added first, and then a homogeneous mixture was made to add the PET materials, Styrofoam and the natural ocoxal fibers. the amount of water calculated for each ecoblock, in Figure 3, the preparation of the mixture of the first prototype is shown and in Figure 4, the preparation of the mixture of the second prototype.

Figure 3 Mixing process for the first prototype



Source: Own Elaboration

Figure 4 Mixing process for the second prototype



Source: Own Elaboration

After preparing the mixture for each ecoblock prototype, the mixture was poured into the molds of the vibro-block maker for compaction as shown in Figure 5.

Figure 5 Production process of the two ecoblock prototypes in the vibroblock machine



Source: Own Elaboration

In Figure 6, the first prototype that contains the ocoxal fiber without leaf bearing is presented. The physical characteristics of the prototype can be observed, which shows pores and rough surfaces.

Figure 6. Ecoblock with ocoxal leaf bearing.



Source: Own Elaboration

In Figure 7, the second prototype that contains the ocoxal fiber with leaf bearing is presented. The physical characteristics of the prototype can be observed, which shows few pores and uniform surfaces.

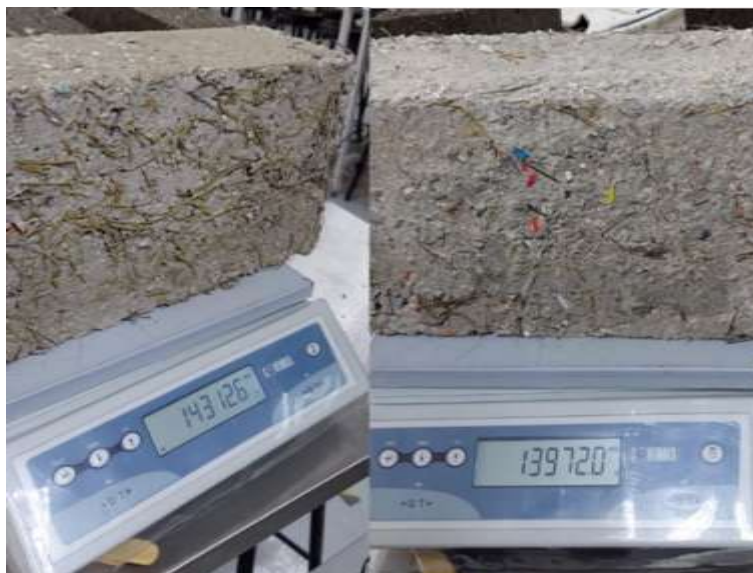
Figure 7 Ecoblock with ocoxal leaf bearing



Source: Own Elaboration

In Figure 8, you can see how the different prototypes of ecoblocks were weighed on the scale, the first being denser than the second prototype.

Figure 8. Ecoblock weight measurement process.



Source: Own Elaboration

Figure 9 shows the application of water to cure the ecoblocks, for their subsequent compression stress test.

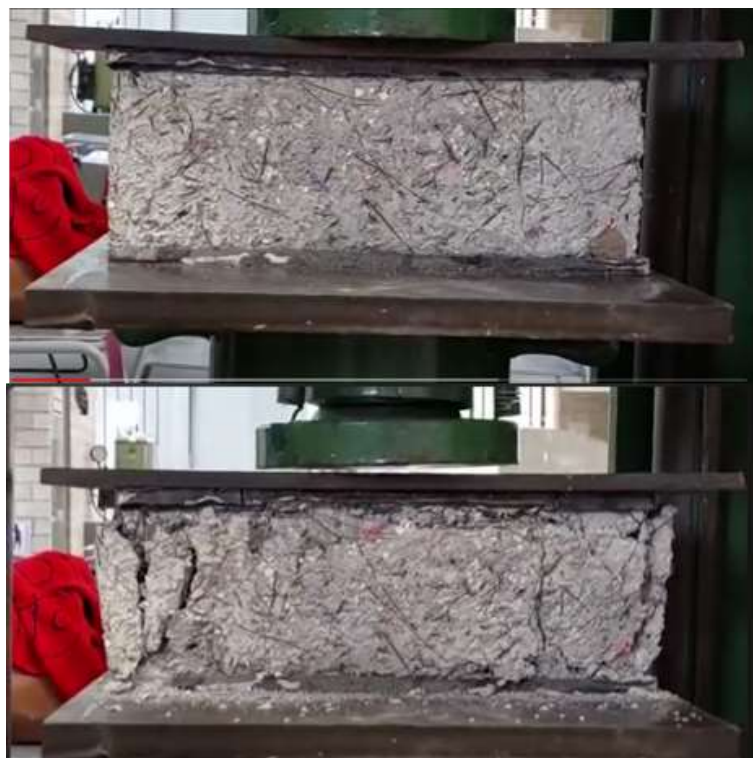
Figure 9 Application of water with a spray bottle for curing the ecoblocks



Source: Own Elaboration

Figure 10 shows the axial compression stress test to which the prototypes of the ecoblocks were subjected in the universal machine, showing the detachment of the material from the ecoblock.

Figure 10 Axial compression test on the universal prototype machine.



Source: Own Elaboration

Results of prototype I - (With leaf bearing)

For this prototype, the ocoxal was cleaned with chlorine and water, allowed to dry and then mixed with the other elements. For this section, a dosage of 1:5:2 was used, with an addition of 4 liters of water.

A resistant block was obtained with the ocoxal fibers scattered throughout the block, some of them appear outside of it, the leaf bearing caused them to remain united in the same place. However, this in turn caused some small gaps to occur in the block.

Prototype II Results - (No Leaf Bearing)

For the second prototype, the leaf bearing was removed from the sheet, cleaned with bleach and water, and allowed to dry for about 24 hours. For this section, the same dosage of materials was used, but with an addition of 5 liters of water.

A firm and heavy block with relief was obtained due to the amount of water used. When removing the leaf bearing, the ocoxal spread throughout the block, which caused it to present fewer voids than the other section.

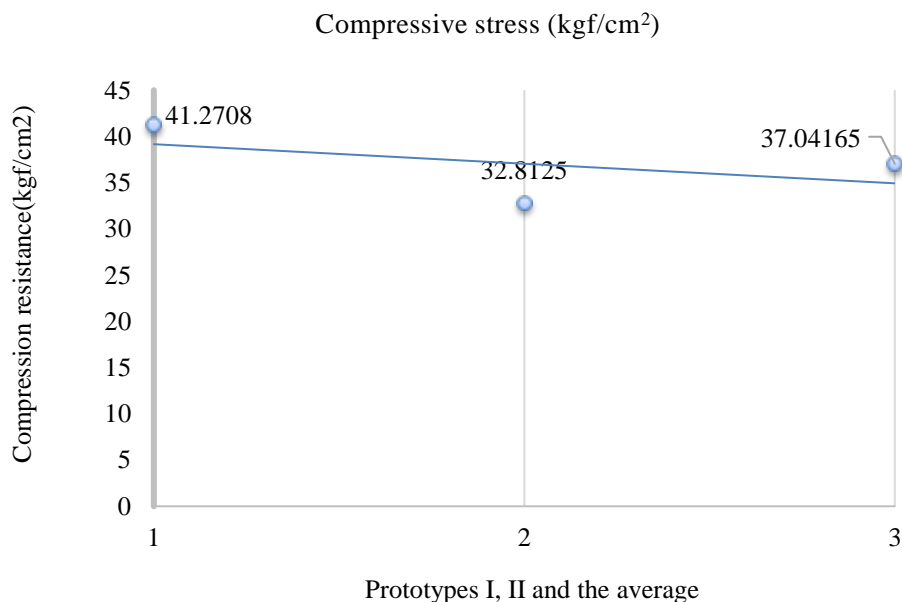
General results:

Absorption test:

Prototype I = change from a weight from 15 kg to 18 kg, having a weight greater than the initial one of 3 kg, Prototype II = change from a weight from 15 kg to 17 kg, having an increase of 2 kg.

Graph 1 shows the results of the compressive strength test of Prototype I = resistance of 41.2708 kgf/cm², Prototype II = resistance of 32.8125 kgf/cm² and the Average of the two prototypes = 37.0416 kgf/cm², with these data it can be inferred that only prototype 1 is the one that achieved a resistance greater than that referred to in the NMX-C-441-ONNCCE-2013 standard: Average Resistance: 35 kg/cm²; Minimum resistance: 28 kg/cm².

Graph 1 Axial compression test on the universal prototype machine.



Source: Own Elaboration

Conclusions

According to current regulations, prototype 1 of the ecoblock met the resistance greater than 35 kgf/cm², since it is more homogeneous, and contains less natural ocoxal fiber and water, which increased its compressive stress, this was a characteristic for which it met the test. These ecoblock designs are not for structural use since by adding recycled materials such as PET and Styrofoam, as well as natural ocoxal fibers, their compression resistance is reduced, causing them to fracture when used in confined load-bearing walls (structural).

Its application and use is recommended on non-structural walls that do not support loads, such as dividing walls (diaphragm walls), for low-rise architectural projects. The research only focused on the design and construction of ecoblock prototypes with the addition of materials such as PET, Styrofoam and natural ocoxal fibers, which in future research can vary the percentage of materials to increase their resistance to compressive stress.

Acknowledgements

To the students of the Delfín 2022 scientific research summer: Dorado García Elia María, Guerrero Becerril María Fernanda, Hernández Martínez Danny Guadalupe, Montiel Téllez Diana Aquetzalli, Rodríguez López Marco Polo, from the National Polytechnic Institute, for their valuable support in carrying out this project.

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Monarch Butterfly Ecotourism Route in the municipality of Donato Guerra, State of Mexico, Mexico, 2021-2023

Ruta Ecoturística de la mariposa monarca en el municipio de Donato Guerra, Estado de México, México, 2021-2023

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DOI: 10.35429/P.2023.2.38.51

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A. González, D. Castelán, A. Santillán, R. García and L. León (AA. VV.). Research perspectives at TESVB in the face of Industry 5.0 - Proceedings-©ECORFAN-México, México, 2023

Abstract

The Ecotourism Route was developed within the town of El Capulín, municipality of Donato Guerra, State of Mexico, Mexico; According to the National Institute of Statistics and Geography (INEGI, 2023), it is a locality with a high degree of marginalization. The Ecotourism Route begins from an ecotourism inn at the Monarch Butterfly Sanctuary, in the El Capulín ejido in Cerro Pelón, called Macheros (PN1. GCS: 19°21'51.76"N. 100°17'23.97"O. Elevation: 2,451 meters). The route continues until reaching the final point where the monarch butterfly hibernates (PN7. GCS: 19°23'18.31"N. 100°15'37.21"W. Elevation: 3279 meters). The intermediate points cover areas where the monarch butterfly lives on a large scale, where the sanctuaries of this species that exist in the municipality of Donato Guerra contribute to the economic benefits of the El Capulín town. Based on the above, the staging of an Ecotourism Route could increase the tourist flow in the region; and could contribute directly to the care of natural resources, being beneficial for the area.

On October 9, 1986, the Sanctuary was decreed as a protected natural area, because it serves as a hibernation and reproduction site for the monarch butterfly, and on November 10, 2000, it was declared a Biosphere Reserve by UNESCO (Governing Body of Protected Areas) (SEMARNAT, 2023). Visitors must respect nature with criteria for alternate trails for route regeneration. The objective of the project was to develop and trace an Ecotourism Route focused on the monarch butterfly species within the town of El Capulín, with the aim of generating an economic benefit for the local population, with which it could be possible to place the Biosphere Reserve as a site with ecotourism potential recognized worldwide. The methodology used was mixed: quantitative (surveys and statistical data), qualitative (focus groups are used), descriptive (the key elements of the project are described), using a socio-critical/reflexive critical paradigm (the individual constructs his or her reality), and from there transforms her as a reflective critical creative subject).

The results reflect the viability and profitability of the project (market study, market survey, interviews with locals, implementation of social media 5.0, pilot test of the route, financial study, among others); For this reason, it will be implemented in practice. The academic value is significant, and the practical implications will generate a regional economic benefit.

Marginalization, Ecotourism, Sanctuaries, Biosphere, Paradigm

Resumen

La Ruta Ecoturística se desarrolló dentro del poblado de El Capulín, municipio de Donato Guerra, Estado de México, México; Según el Instituto Nacional de Estadística y Geografía (INEGI, 2023) es una localidad con un alto grado de marginación. La Ruta Ecoturística inicia desde una posada ecoturística en el Santuario de la Mariposa monarca, en el ejido El Capulín en Cerro Pelón, llamado Macheros (PN1. GCS: 19°21'51.76"N. 100°17'23.97"O. Elevación: 2,451 metros). La ruta continúa hasta llegar al punto final donde hiberna la mariposa monarca (PN7. GCS: 19°23'18.31"N. 100°15'37.21"O. Elevación: 3279 metros). Los puntos intermedios abarcan zonas donde habita a gran escala la mariposa monarca, donde los santuarios de esta especie que existen en el municipio de Donato Guerra contribuyen a los beneficios económicos del poblado El Capulín. Con base en lo anterior, la realización de una Ruta Ecoturística podría incrementar el flujo turístico en la región; y podría contribuir directamente al cuidado de los recursos naturales, siendo beneficioso para la zona.

El 9 de octubre de 1986 el Santuario fue decretado como área natural protegida, debido a que sirve como sitio de hibernación y reproducción de la mariposa monarca, y el 10 de noviembre de 2000 fue declarado Reserva de la Biosfera por la UNESCO (Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura) (SEMARNAT, 2023). Los visitantes deberán respetar la naturaleza con criterios de senderos alternos para la regeneración de rutas. El objetivo del proyecto fue desarrollar y trazar una Ruta Ecoturística enfocada en las especies de mariposa monarca dentro del poblado de El Capulín, con el objetivo de generar un beneficio económico a la población local, con lo cual se podría ubicar la Reserva de la Biosfera. como un sitio con potencial ecoturístico reconocido a nivel mundial. La metodología utilizada fue mixta: cuantitativa (encuestas y datos estadísticos), cualitativa (se utilizan grupos focales), descriptiva (se describen los elementos clave del proyecto), utilizando un paradigma crítico sociocrítico/reflexivo (el individuo construye su realidad)., y a partir de ahí la transforma como sujeto creativo crítico reflexivo).

Los resultados reflejan la viabilidad y rentabilidad del proyecto (estudio de mercado, sondeo de mercado, entrevistas a locales, implementación de social media 5.0, prueba piloto de la ruta, estudio financiero, entre otros); Por este motivo se implementará en la práctica. El valor académico es significativo y las implicaciones prácticas generarán un beneficio económico regional.

Marginalización, Ecoturismo, Santuarios, Biosfera, Paradigma

Introduction

The subsequent research, called: "Ecotourism Route of the monarch butterfly in the municipality of Donato Guerra, State of Mexico, Mexico 2021-2023"; has as its main objective the mapping, delimitation and development of the Ecotourism Route with the Global Positioning System (GPS), which is carried out manually. It is worth mentioning that the State of Mexico is rich in fauna diversity in general, and specifically the monarch butterfly is a recurrent animal of the same, it travels more than ten thousand kilometers from Canada to the Oyamel forests of the State of Michoacán de Ocampo and Mexico, an area considered a Natural World Heritage Site.

For the execution of the field research it was planned to make a tour through the areas where the species lives, which can be done by walking or horseback riding to access remote areas, with the objective of marking strategic points for the design of the Ecotourism Route of the monarch butterfly, in which the outstanding areas of the area are indicated, which will later be indicated as tourist attractions included in the route.

It is important to point out that the Ecotourism Route to be implemented is integrated by three circuits: A, B and C; which are distributed strategically through the total area of the ejido El Capulín, with respect to this, each one will contemplate different attractions previously established, for the design of each one of the circuits to be carried out, it will be indispensable the study of the zone, combining the theoretical information with which it is counted together with the practice, in such a way that each one fits and represents the least possible impact to the natural spaces on which it will be developed.

In order to gather concrete and assertive information, it is contemplated to obtain it through direct consultation with local people, including adults, mainly because they are the ones who have more knowledge about the area of the ejido El Capulín, and consequently the background of the presence of the monarch butterfly in the area, as well as the creation of the National Sanctuary of the monarch butterfly.

The purpose of the Ecotourism Route project is to generate economic income for the local populations in the municipality of Donato Guerra, State of Mexico, Mexico; through the promotion of ecotourism activities contemplated in the circuits established in the design of the route; at the same time, part of the income will be used to improve the National Sanctuary of the monarch butterfly, with the idea of maintaining in optimal conditions everything related to the sanctuary.

Promoting small businesses for the local population is an opportunity resulting from the implementation of the Ecotourism Route, as is participating in the development of the operation of the Monarch Butterfly National Sanctuary.

The research contains positive and negative aspects for the monarch butterfly species (*Danaus plexippus*), so the methodology to be implemented should comply with what is necessary to ensure that the impact on the species' environment is not negative, so that the tourist attraction can be used in a sustainable manner.

We plan to conduct surveys within the Ejido El Capulín, municipality of Donato Guerra, applied to both local people and tourists who frequent the area, these will be conducted in order to know what the tourist's expectations are when visiting the National Sanctuary of the monarch butterfly, for example: price standards they are willing to offer for services; the activities of interest of their preference, such as horseback riding, biking, hiking, flora and fauna observation, handicraft workshops, among others; the availability of time they wish to invest in the tour, among other variables.

Development

Justification

The monarch butterfly is a transcendental topic, mainly because this species travels thousands of kilometers from Canada to the oyameles of the State of Michoacán and the State of Mexico, being the National Sanctuaries of the monarch butterfly one of its potential destinations.

This project seeks to raise awareness among society in general about the importance of the monarch butterfly species (*Danaus plexippus*), and the consequences that the alteration of the natural space where they spend part of their life cycle represents for this species. Specifically, the issue of clandestine logging in the region and the intentional burning of forests to incorporate land used for the cultivation of Hass avocado (*Persea americana*).

The project was chosen mainly because of the benefits it represents, among which is the generation of economic income for the local populations in the municipality of Donato Guerra, State of Mexico, Mexico. Through the promotion of ecotourism activities contemplated in the circuits established in the design of the same, promoting a culture of environmental conservation and preservation of the environment where the monarch butterfly species develops (which comes to be exploited as a tourist product, sometimes to the extent that it lacks concern for the damage that is caused, in order to generate a significant economic revenue, but without addressing the needs that this living being requires; The conservation of the monarch butterfly species contributes to the use of natural resources, as long as it is sustainable.)

Another reason for the creation of this Ecotourism Route is that nowadays people are looking for different places, to be in contact with nature, pleasant; that offer attractive experiences with the environment, with tranquility, places where the attention is personalized.

Objectives

The main objective of the project is to develop and trace an Ecotourism Route focused on the monarch butterfly species within the town of El Capulín; in order to generate an economic benefit for the local population, thus positioning the Biosphere Reserve as a site with ecotourism potential recognized worldwide. It is important to highlight the basic objectives in order to achieve the main one: to manually map the ecotourism route using a Global Positioning System (GPS) to identify where the monarch butterfly species is most abundant. Conduct soil and space studies to identify whether the Ecotourism Route to be implemented is suitable for development in the area, seeking sustainable alternatives to avoid a negative impact on the natural environment. Another objective has been to conduct a market survey to determine the feasibility and profitability of the project, with a delimited and defined market segment, as well as a sampling with high levels of confidence and low margins of error. A market survey to ascertain the impressions close to home.

Along the same lines, provide training to local people as a strategy for the development of the Ecotourism Route, in order to provide them with jobs. To inform local populations about how the Ecotourism Route will be developed, in order to avoid misinterpretations that could affect the project. For the purpose of generating an influx of tourists to the route, a Social media 5.0 (Facebook Ads, Instagram Ads and Google Ads), as a tourist product of the municipality of Donato Guerra, State of Mexico, Mexico.

Theoretical Framework

*The monarch butterfly (*Danaus plexippus*) is an insect that has attracted enormous attention in recent decades, due to the discovery of its migratory routes and hibernation sites called "sanctuaries". In Mexico, the largest monarch butterfly Sanctuaries in the world have been registered (Reserva de la Biosfera mariposa 2010), which has led to notable tourist attraction and, presumably, economic benefits for the region (Cortez-Madriral, García-González, & Guzmán-Larralde, 2014).*

Although monarch butterflies are native to the American continent, they have dispersed to different parts of the world, arousing the attention of onlookers to such an interesting migration process, currently remains one of the most admired insect species both for its beauty and its biological capacity, however, there are few studies focused on this species.

Sanctuaries. Since 1986, areas known as monarch butterfly sanctuaries have been established (RBMM Program, 2001). In the State of Mexico they are distributed in the municipalities of Temascalcingo, San Felipe del Progreso, Donato Guerra and Villa de Allende; in Michoacán, in the districts of Contepec, Senguio, Angangueo, Zitácuaro, Aporo and Ocampo (Esquivel-Ríos et al., 2011); in the latter is located El Rosario Sanctuary, one of the sanctuaries that registers the greatest tourist influx but also problems such as illegal logging, inadequate forest exploitation, and loss of flora and fauna, although a wide range of institutions participate in its conservation, exploitation, and development of tourist activity (Esquivel-Ríos, Cruz-Jiménez, Cadena-Inostroza, & Zizumbo-Villarreal, 2014).

Sanctuaries at the national level are sites where the monarch butterfly species is protected from various threats; there are several of these sanctuaries located especially in the State of Mexico and the State of Michoacán. El Rosario Sanctuary has the same problems as El Capulín Sanctuary: illegal logging, inadequate forest use, and loss of flora and fauna. It appears that this is a recurrent problem in the other sanctuaries, but it is particularly prevalent in El Capulín Sanctuary and El Rosario Sanctuary.

Ecotourism Route. is one that takes place in a specific geographic space, where the displacement is focused on an event or phenomenon, it addresses natural aspects of the space where it takes place (Luyz, 2017). The implementation of Ecotourism Routes is chosen because they allow the development of the mobility of spectators, without leaving aside the care and preservation of the natural environment where they are developed, the design of these is focused on the attractions that the space has. It is important to consider the type of route to be followed, in relation to the attractions that are available, to ensure that as much use as possible is made of the area on which it is carried out; in consideration of this it is essential to have delimited the points of attention on which it will be focused. The layout of the Ecotourism Route must be carried out and subsequently, to verify if it is indeed marketable or not.

The Tourist Routes allow us to determine the points to which the visitors will arrive, as well as to emphasize the representative tourist attractions of the site, in such a way, that allows to know each one of them, achieving the advantage of this.

The design of a Tourist Route. recognizes that it must first be based on its construction, taking into account the available resources and subsequently the conception of its commercialization, in this sense it considers the following phases: establish the objective pursued with its creation; specify which are the priorities to begin its design; identify through studies the acceptance or not of the tourist demand on the product, once it has been introduced in the market, and from its results, establish the strategies for its implementation and finally, at the same time that travelers arrive to the route, the information received must be analyzed to adapt them to the needs of the tourists. (Luyz, 2017).

It is important to consider the type of route to be carried out, this in relation to the attractions that are available, to ensure that the area on which it is carried out is taken advantage of as much as possible, in consideration of this it is essential to delimit the points of attention on which it will be focused. The layout of the Ecotourism Route must be carried out and subsequently, to verify if it is indeed marketable or not.

Marketing of the Tourist Route. in this process several elements should be considered such as: framing the itinerary from beginning to end with all the information that the tourist needs to make the journey without difficulty, so it should include signage along the entire route that allows the tourist to know how the route is developed. Likewise, the itinerary must include a varied communication network that provides the tourist with the possibility of moving easily. Finally, it must contain concrete elements that distinguish it from others, representing a great attraction for the tourist (Sanchez, 2014).

To achieve adequate marketing, the first thing to do is to analyze the demand that the product possesses, in the specific case of the municipality of Donato Guerra, State of Mexico, Mexico. The main focus is on determining the behavior of the tourist flow due to the natural protected areas that protect the monarch butterfly species, which is why it is necessary to design and define what it is intended to offer, that is, the routes to be implemented in the area should contemplate the attractions of the place, in order to capture the attention of people in general, thus motivating the development of tourism.

Methodology

The methodology used was mixed: quantitative (surveys and statistical data), qualitative (focus groups are used), descriptive (the project's actors are described); and it has a reflective sociocritical/critical paradigm (the individual constructs his reality, and from it transforms it as a reflective critical creative subject).

A quantitative research was carried out, in which a series of surveys were applied to inhabitants of the communities of the ejido El Capulín; and in this way it was possible to obtain knowledge about the style of work that the inhabitants carry out. Each survey has been designed with ten questions related to the interest that the project requires: price of the services, the feasible way to travel the route, the determined time, and also to calculate the feasible profit for both guides and tourists who visit the area. In addition to that, in the field research the students made a tour of the different trails, and in this way the appropriate trail for tourists was established, and alternative trails for environmental care to be applied later. It is intended that by the middle of the year 2023 the first Ecotourism Route of the monarch butterfly will be carried out, taught by students of the Bachelor's Degree in Tourism of the Tecnológico de Estudios Superiores de Valle de Bravo; as well as a sample of ecotourism given by people from the rural community of the ejido El Capulín. Subsequently, in order to trace the route, the material required to identify the exact coordinates points and trace the route was Google Earth, digitally.

A market survey was carried out through Google forms, by means of Google drive, with a previously determined market segmentation; with a sample size calculated in a specific way; with a minimum margin of error and a significant level of confidence.

Also a market survey in Valle de Bravo as a general and representative universe. The methodology is quantitative due to the use of surveys, but not only this instrument is used to collect information, but there are others to be implemented such as: leading questionnaire, observation and interview. For the collection of information, the market research methodology of Miguel Santesmases Mestre is followed.

The research plan comprises a set of activities that start with the identification of the problem to be investigated, go through the definition, classification and measurement of the variables and their expression in a form or questionnaire, and end with the analysis of the data and the interpretation of the results. Specifically, it includes the following stages:

1. Identification of the problem to be investigated.
2. Definition of the research objectives.
3. Determination of the type of research design.
4. Specification of the study hypotheses.
5. Definition, classification and measurement of the study variables.
6. Selection of the sources of information.
7. Design of the questionnaire or form for data collection.
8. Design and selection of the sample (if applicable).
9. Data collection and processing.
10. Data analysis and interpretation of results.
11. Preparation of the research report (Mestre, 2014).

The methodology handled by Miguel Santesmases Mestre will provide the guideline of market surveys, which provides the project with the guideline to follow, if the project is profitable.

The qualitative methodology constituted essentially the "focus groups" that are carried out with local people, inherent to the route.

The descriptive methodology allowed the mapping of the Ecotourism Route, through the GPS System, manually. Subsequently, the data is captured in Google Earth and the route is marked at satellite level.

Use is made of social networks so that the route can be marketed through "free" content marketing, with the use of digital applications (Apps) and digital platforms; providing promotion to the route at reduced prices.

Results

It has been mentioned that the work of investigation that has as product a Thesis between, it is had according to chronogram of activities already, partial results of the same one that are presented next, being these the main ones:

1. Marking and tracing of the Ecotourism Route.
2. Conducting a market survey through Google forms by Google drive.
3. Conduct a market survey in the municipality of Donato Guerra, State of Mexico.
4. Collect data on the impressions of the people settled along the Ecotourism Route.
5. Conduct a Social Media 5.0 about the Ecotourism Route, as a tourism product of the municipality of Donato Guerra, State of Mexico, Mexico; highlighting the fundamental values that constitute it such as respect and care for the natural environment.
6. Pilot test of the implementation of the Monarch Butterfly Ecotourism Route in the municipality of Donato Guerra.

– Marking and layout of the Ecotourism Route.

Figure 1 Layout of the Monarch Butterfly Ecotourism Route in the municipality of Donato Guerra, State of Mexico, Mexico



Source. Own Elaboration using GPS and Google Earth

Figure 2 Qr. of the Monarch Butterfly Ecotourism Route



Source. Own Elaboration

The existing monarch butterfly sanctuaries in the municipality of Donato Guerra, State of Mexico, Mexico; for years have contributed to the economy of the ejido El Capulin, where they are located, since the inhabitants of this municipality are directly benefited by being providers of tourist services, offering tourists guided tours to this sanctuary.

The Monarch Butterfly Ecotourism Route took approximately five hours to complete, during which different points of interest were observed and then marked in a computer program called Google Earth.

The route begins at one of the ecotourism stops of the monarch butterfly sanctuary, in the ejido El Capulín in Cerro Pelón, called Macheros (point number 1). Coordinates: 19°21'51.76 "N. 100°17'23.97"O. Elevation: 2,451 meters). This route began at approximately 11:30 a.m., marking as "Start", in front of the gates of the Monarch Butterfly Ecotourism Park.

Another marking area at the second point of importance (point number 2). Coordinates: 19°22'08.41 "N. 100°16'57.24 "O. Elevation: 2,568 meters), since in this area there is a first deviation that should be marked at the time of the tour, and thus prevent detours by tourists; also in this area you can give an explanation to tourists about that not every year the monarch butterfly hibernates in the same area, and that is why sometimes another route is used to reach the "Hibernation Nucleus".

Follow the route until you reach the third point of importance (point number 3). Coordinates: 19°22'14.91 "N. 100°16'16.75 "O. Elevation: 2,637 meters); this was one of the main points, since it is one of the most important visual attractions that can be offered to the tourist; this place is called "El Ranchito", it is where you can observe the fall of the monarch butterfly arriving to the place where it will drink water.

Afterwards we have point number four (point number 4). Coordinates: 19°22'21.38 "N. 100°16'12.54 "O. Elevation: 2,684 meters).

– **Conduct a market survey through Google forms by Google drive**

The process starts with a simple data collection instrument (questionnaire), which is launched by different electronic means (WhatsApp, email, Facebook, Twitter, YouTube) to the given market segment.

The program tabulates and delivers graphs, the graphs must be interpreted and presented in a report, which is what is presented in this section:

– **Target market. Mexican Republic**

Market segmentation. Men and women between the ages of 20 and 60 years old, upper-middle (MA), lower-middle (MB), upper-low (BA) economic class, according to the Ministry of Economy (SE), any schooling, any nationality, who wish to go on an Ecotourism Route and who wish to experience contact with nature.

Sample size. It is based on the principle of equiprobability, which means that all individuals in the selected sample will have the same probability of being chosen. This ensures that the sample drawn will be representative. The sample size is calculated, knowing the size of the unsegmented population, directly from the home page of the National Institute of Statistics and Geography (INEGI).

Calculation of the sample size for the market segment, when the size of the segmented population is not known, or the size of the unsegmented population is known. In the intercensal survey 2015, conducted by the National Institute of Statistics and Geography, 126 million, 014 thousand, 024 inhabitants were counted in the Mexican Republic, but the size of the target market population is not known. With a margin of error of 3%. Without knowledge of the size of the segmented population. Confidence level of 95%. Sample size is: 1014 surveys.

– **Market survey report.**

A total of 1,014 surveys are conducted, with the following results:

1. Age ranges. 15-20 years old: 46.9%; 20-35 years old: 34.8%; 35 years old or older: 18.3%.
2. States of residence. State of Mexico, State of Morelos, State of Michoacán.
3. If an Ecotourism Route has been taken. No: 55.6% and yes: 44.4%.
4. If you have heard about the Monarch Butterfly Biosphere Sanctuary. Yes: 49%; no: 38.7%; maybe: 12.3%.
5. You know the species of the monarch butterfly. Yes: 61.6%; no: 38.4%.
6. You have visited a monarch butterfly sanctuary. Yes: 53.7%; no: 46.3%.
7. Would take a Monarch Butterfly Ecotourism Route. Yes: 54.2%; no: 27.1%; maybe: 18.7%.
8. Amount willing to pay for the Ecotourism Route: \$300.00: 44.6%; \$500.00: 40.5%; \$600.00: 14.9%.
9. You would like to receive information about monarch butterflies before starting the route. Yes: 53.7%; no: 28.6%; maybe: 17.7%.
10. Ecotourism route on horseback or hiking. Horseback riding: 37.6%; hiking: 62.4%.

– **To conduct a market survey in the municipality of Valle de Bravo, State of Mexico**

Calculation of the sample size for the market segment, when the size of the segmented population is not known, or the size of the unsegmented population is known. In the intercensal survey 2020, conducted by the National Institute of Statistics and Geography (INEGI), 61,599 inhabitants were counted, but the size of the target market population is not known.

With a margin of error of 10%. No knowledge of the size of the population. Confidence level of 95%. Sample size: 96 surveys.

The first step is to design the research instrument (leading questionnaire), which will complement the collection of information with interviews and observation. Tabulations and graphs are presented, and subsequently the final report (which is included in this work) is prepared.

– **Market survey report**

A total of 96 surveys were conducted, with the following results:

1. Age ranges. 15-20 years old: 17.3%; 20-35 years old: 42.9%; 35 years old or older: 39.8%.
2. If you have taken an Ecotourism Route. No 63.3% and yes 36.7%.

3. If you have heard of the Monarch Butterfly Biosphere Sanctuary. Yes: 54.1%; no: 36.7%; maybe: 9.2%.
4. Amount willing to pay for the Ecotourism Route. \$300.00: 60.2%; \$500.00: 32.7%; \$600.00: 7.1%.
5. Knows the species of the monarch butterfly. Yes: 51%; no: 34.7%; maybe: 14.3%.
6. Attractions that you would like the route to have. Monarch butterfly education workshop: 44.9%; recreational workshop: 41.8%; none: 13.3%.
7. Ecotourism route on horseback or hiking; horse: 42.9%; hiking: 57.1%.
8. Visited a monarch butterfly sanctuary. Yes: 32.7%; no: 67.3%.
9. Use of websites or use of traditional sites as advertising media. Web sites: 73.5%; traditional sites: 26.5%.
10. Means of payment. Box office 67.3%; website 32.7%.

– **To collect data on the impressions of the people settled along the Ecotourism Route**

Surveys were administered to the inhabitants of the five communities that make up the El Capulín ejido: Macheros, El Capulín, Llano Redondo de Zaragoza, Las Galeras, La Fundición and El Capulín. Forty surveys were conducted in the ejido and it was found that the communities benefit economically from the tourism that takes place there; however, this is temporary because the monarch butterfly season only lasts from November to March.

– **Survey report:**

1. Sex. Female: 47%; male: 53%.
2. Occupation. Student: 20%; farmer: 17%; employee: 12%; housewife: 15%; professional: 3%; other: 33%.
3. Age range. 18-25 years: 30%; 25-40 years: 50%; 40 years and older: 20%.
4. ¿Do you think that the promotion of the Monarch Butterfly Biosphere Reserve as a tourist attraction through an Ecotourism Route is good for the municipality? Yes: 95%; no: 5%.
5. Would you agree to participate in the development of the Ecotourism Route, either as a guide or as a protector of the natural area? Yes: 56%; no: 40%; maybe: 4%.
6. Price of the route. \$400.00: 14%; \$500.00: 47%; \$600.00: 36%; \$700.00: 3%.
7. Attractions you would like to have on the route. Monarch butterfly education workshop: 63%; recreational workshop: 33%; none: 4%.
8. What activities do you carry out to preserve the habitat of the monarch butterfly? Care, regulation and monitoring: 32%; do not throw garbage or water: 20%; do not damage nature: 10%; physical condition: 5%; workshops: 30%; none: 3%.

To carry out a Social Media 5.0 about the Ecotourism Route, as a tourist product of the municipality of Donato Guerra, State of Mexico, Mexico; highlighting the fundamental values that constitute it such as respect and care for the natural environment.

Traditional advertising versus digital advertising, a contemporary issue that delimits the success or failure of modern companies; although it is true that there are elements that condition such success or failure different from the subject of study; it could be mentioned that this issue is central, unequivocally significant, which governs our globalized markets.

Digital advertising has become the vortex of marketing 5.0; it has become the watershed of a generation focused on the search for information, rather than simply being a subject of advertising. The "Boomers" and "X" generations continue to make use of traditional advertising; the "Y" (Millennials) and "Z" (Centennials) generations make indiscriminate use of digital advertising. As can be seen, traditional advertising has an expiration date, given by the emerging generations.

"What does all this portend for the marketers of the future; it means that they will have to prepare to wage real marketing warfare. Increasingly, successful marketing campaigns will have to be approached like military campaigns" (Ries Chairman & Trout, 2006).

As mentioned (Ries & Trout, 1990), the essence of marketing is war; although it is not a literal war, it is a war that implies establishing defined and accurate strategies (as in war); in such a way that the presumed opponent can be defeated. Marketing is an element that today's companies must use "against" their "enemies"; an element that will give them commercial success or failure. A war that leads companies to use established marketing strategies, with the deployment of contemporary and complementary elements of the subject of study.

A Social media 5.0 or digital marketing campaign should be carried out to advertise the Ecotourism Route.

– **Pilot test of the implementation of the Monarch Butterfly Ecotourism Route in the municipality of Donato Guerra and generate improvements**

Development of the pilot test:

- a) Presentation.
- b) Introduction of the route.
- c) Development of the route.
- d) Conclusions.

a) Introduction

The guide should introduce himself before the group of tourists with his name, using expressions that generate confidence and familiarity in the clients.

He/she should make reference to his/her skills, professionalism and experience in order to offer initial guarantees to the client in terms of safety:

The guide will take advantage of this stage to ask the clients about their state of mind, the experiences they have had so far on their vacation, and the expectations they have about the excursion; in this way, he/she can go about creating a suitable climate to develop the interpretation activity.

b) Introduction of the tour

Before starting the tour, the guide should specify some behavioral guidelines to be followed by tourists. Subsequently, the guide proceeds to start the tour by briefly informing the itinerary.

c) Development of the tour

After briefly informing the itinerary, the guide can begin to develop the actions and interpretation of the environment. For the development of the tour, each of the points marked on the itinerary is explained and it is recommended to share different "Did you know that..." to tourists, thus making the tour more enjoyable.

d) Conclusions of the tour

To conclude the excursion, the guide will make a brief summary of the tour and begin the dialogue by asking the clients about their impressions of the monarch butterfly biosphere sanctuary, the places they liked the most, and the sensations they experienced. Finally, he will kindly ask tourists to fill out satisfaction surveys, asking them to be objective. He/she will say goodbye remembering their name, will thank them for their company and good behavior throughout the tour, and will encourage them to return and comment on their experiences with family and friends (traditional word-of-mouth advertising).

– **Analysis: pilot test of the implementation of the Monarch Butterfly Ecotourism Route in the municipality of Donato Guerra**

The pilot test was conducted from December 19 to 23, 2022. During the course of the week, three pilot tests were carried out, in which the failures within the service were analyzed and thus set the guidelines to improve the service.

Annexes

Annex 1. Entrance to the monarch butterfly sanctuary in the ejido El Capulín, in the municipality of Donato Guerra, State of Mexico, Mexico



Source. Own Elaboration

Annex 2 Layout of the Ecotourism Route of the monarch butterfly. "Llano 3 Gobernadores"



Source. Own Elaboration

Conclusions

This research project was based on different sources. The research addressed new issues within the tourism sector, since there is no Ecotourism Route in Donato Guerra, State of Mexico, Mexico. For this purpose, an investigation was carried out through different digital and printed media in order to gather information about the monarch butterfly, as well as the problems that have arisen during the last decades in the National Sanctuary of the monarch butterfly in this municipality of Donato Guerra, reaching the conclusion that the implementation of the Ecotourism Route allowed the promotion of new tourist services that allowed the attraction of tourism to the local community; with this activity it was possible to explain what happens in the place and encourage people to visit it, promoting the conservation of the habitat of the monarch butterfly species (*Danaus Plexippus*), composed by the fresh forests, populated by oyameles (*Abies religiosa*), pines (*Pinus spp.*) and pine-oak (*Pinus* and *Quercus*), acting as a safe habitat for the winter months.

The field research, which consisted of a tour through the areas where the species lives, provided that the activity can be done on foot or horseback for access to remote areas, this activity was the key point to mark strategic points for the design of the Ecotourism Route of the monarch butterfly, in which the outstanding areas of the area were indicated, These should be updated periodically and a logbook should be kept, as well as a report supported by photographic material on the environment. This will allow us to know if the natural space is suffering negative alterations, and if so, the route will be suspended temporarily or definitively, as well as a modification in its period of functionality.

For the development of the project it was important to consider all the aspects that could be key to the proper promotion of the route, in addition to other factors such as the review of the design of the route, the delimitation, mapping of the contemplated routes, analysis of the conditions of the environment, the acceptability and support it would have from the locals, and how it could become a key point to improve the economy of a group of people. We concluded by making arrangements for service providers to receive training to acquire theoretical and practical knowledge to conserve and promote the importance of the natural resources in the communities, as well as to acquire new strategies for tourism trends in the natural attractions and to strengthen their capacity to respond to environmental changes and be better prepared for the day to day, which generates greater personal confidence to develop in the field, which in this case is tourism. For this purpose, a script or speech was developed to facilitate the quality of service and greater communication between the guide and the tourist.

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Management and Inventory Control of adventure tourism equipment, based on Financial Reporting Standard C-4

Manejo y Control de Inventario de equipo, de turismo de aventura, basado en la Norma de Información Financiera C-4

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A. González, D. Castelán, A. Santillán, R. García and L. León (AA. VV.). Research perspectives at TESVB in the face of Industry 5.0 - Proceedings-©ECORFAN-México, México, 2023

Abstract

Tourism is an important social and economic activity, which encompasses various economic sectors of society and unites several disciplines that are applied in its development, so it is important to develop a body of knowledge that every professional should know.

The Bachelor's Degree in Tourism of the Tecnológico de Estudios Superiores de Valle de Bravo (TESVB); is a career focused on alternative tourism, in which students will obtain the necessary skills and resources, to be able to achieve the ability to perform these activities; so that they can perform them in the labor field.

For the development of students as professionals, the Bachelor's Degree has infrastructure and adventure tourism equipment, with which students can develop field practices safely, since the equipment provided is of the highest quality.

The adventure tourism equipment used for field practices is located in a laboratory or warehouse properly guarded, but when the equipment is used, there is no adequate control for its entry and exit, only the teacher in charge is trusted; which is not correct, for this reason we must give importance to the exits or entries of equipment for better control.

The importance of inventory control of adventure tourism equipment in the Bachelor's Degree in Tourism of the TESVB lies in being able to maintain the correct balance of stock in the warehouse, which avoids wasting time to carry out activities of the Bachelor's Degree, and to have enough inventory to develop them.

The development of a guide that meets the necessary requirements to carry out an adequate inventory control of adventure tourism equipment is a necessity for TESVB's Bachelor's Degree in Tourism.

The purpose of this guide is to solve the loss of equipment, to write off obsolete equipment, or to eliminate equipment that no longer works. This guide, through research, will efficiently serve to carry out an adequate inventory control; the elaboration of equipment entry and exit logs, as well as a possible procedures manual, are the core of the research. It is worth mentioning that for a private company inventory control is a priority, which for a public company is not so much; with the help of equipment check-in and check-out forms, and the responsibility of who is going to occupy it, there should be a better control in the handling of equipment.

Elaboration, Practices, Alternative, Adequate, Control

Resumen

El turismo es una actividad social y económica importante, que engloba a varios sectores económicos de la sociedad y une varias disciplinas que se aplican en su desarrollo, para eso es importante desarrollar un cúmulo de conocimientos que todo profesional debe de conocer.

La Licenciatura en Turismo del Tecnológico de Estudios Superiores de Valle de Bravo (TESVB); es una carrera enfocada al Turismo alternativo, en la cual los estudiantes obtendrán las habilidades y los recursos necesarios, para poder lograr la capacidad de desempeñar esas actividades; para que puedan desempeñarlas en el campo laboral.

Para el desarrollo de los estudiantes como profesionistas, la Licenciatura cuenta con infraestructura y equipo de Turismo de aventura; con el cual los estudiantes pueden desarrollar prácticas de campo con toda seguridad, puesto que el equipo proporcionado es de la mejor calidad.

El equipo de Turismo de aventura que se utiliza para prácticas de campo se encuentra en un laboratorio o almacén debidamente resguardado, pero cuando se ocupa el equipo, no se lleva un control adecuado para su entrada y salida, solo se confía en el maestro responsable; lo que no es correcto, por tal motivo debemos de darle la importancia a las salidas o entradas de equipo para su mejor control.

La importancia del control de inventario de equipo de Turismo de aventura en la Licenciatura en Turismo del TESVB; radica en poder mantener el balance correcto de existencias en el almacén, lo cual evita perder tiempo para realizar actividades propias de la Licenciatura, y poseer suficiente inventario para desarrollarlas.

La elaboración de una guía que cumpla con los requisitos necesarios para llevar a cabo un adecuado control del inventario de equipo de Turismo de aventura, es una necesidad para la Licenciatura en Turismo del TESVB.

Resolver la pérdida de equipo, dar de baja el equipo obsoleto, o eliminar el equipo que ya no funcione es la finalidad de esta guía que, a través de la investigación, servirá de manera eficiente para llevar un adecuado control de inventario; la elaboración de bitácoras de entrada y salida de equipo, así como un posible manual de procedimientos, son la parte medular de la investigación. Cabe mencionar que para una empresa privada el control de inventarios es una prioridad, lo que para una empresa pública no lo es tanto; con la ayuda de formatos de entrada y salida de equipo, y la responsabilidad de quién va a ocuparlo, debe existir un mejor control en el manejo de equipo.

Elaboración, Prácticas, Alternativas, Adecuado, Control

Introduction

Tourism is an abstraction, a concept of which we all have different interpretations, for that reason there is a great variety of definitions, but regardless of which ones are established, it can be based on the definition of the World Tourism Organization (WTO), which is the highest authority on the subject; "Tourism is the sum of relationships and services resulting from a temporary and voluntary change of residence not motivated by business or professional reasons" (Gurría, 2013).

The Tecnológico de Estudios Superiores de Valle de Bravo offers a Bachelor's Degree in Tourism with a focus on Adventure and Ecotourism; it has the infrastructure to develop adventure tourism activities; in addition to having the necessary equipment to develop such activities within the campus; such as: zip line, climbing wall, hiking trail and mountain biking; it also has the equipment to develop activities such as: mountain bikes, kayaks, harness, carabiners, pulleys, life jackets, first aid kit, lamps, survival kits, survival kits, first aid kit, lamps, survival kits, camping houses, among others; that is to say, the necessary equipment to develop practices in all activities.

Development

In the Bachelor's Degree in Tourism of the Tecnológico de Estudios Superiores de Valle de Bravo (TESVB); practices are carried out with the purpose of performing recreational and sports activities, associated to carry out challenges imposed by nature.

Activities such as: kayaking, zip-lining, climbing, hiking, mountain biking.

To carry out these activities, special and specific equipment is needed, such as: kayaks, paddles, mountain bikes, carabiners, camping houses, pulleys, lifelines, helmets, gloves, hydration backpacks, survival kits, ropes, etcetera.

Adventure tourism equipment is delicate and costly to handle; therefore, it is necessary to keep an adequate control of the entry and exit of the equipment to be used for the practices carried out during the race, or the day it is required for any event.

The TESVB's Bachelor's Degree in Tourism has good infrastructure and top quality equipment to carry out adventure tourism practices, but what it does not have is an Inventory Control Guide, Procedures Manual and Regulations for the use of equipment, all of which help to control the entrances and exits of the units; There are no Inventory Control Logs for equipment, nor is there a technician responsible for the safekeeping of the equipment, who is dedicated to registering the inputs and outputs of the equipment, which causes it to gradually dissipate, generating an expense to the TESVB; it is also important to verify that the equipment that is delivered is sometimes damaged or in unfit conditions.

It is also important to verify that the equipment that is delivered is sometimes damaged or in unacceptable conditions. For this reason, not keeping an adequate and orderly control of the equipment that is in place causes unnecessary expenses and costs to be incurred due to the deterioration or loss of equipment for these activities.

The management of the inventory of equipment in adventure tourism is particularly complex, due to the variability of the composition of tourist events, the high degree of competition, and the difficulties in predicting visitor flows.

On the other hand, as a consequence of the acquisitions that take place in adventure tourism events, the equipment inventory represents the core of the company, since without it it would not be possible to carry out tourism activities.

For the company, the investment in the equipment is a transaction value set to commercialize its events in the market, cover costs and obtain benefits from the equipment acquired to carry out the event; while, for the consumer, what is important in the price is the monetary amount he is willing to spend, in exchange for living an experience that satisfies his desires.

However, this conception of price as the monetary counterpart of a product is limited. In reality, the notion of price is much broader and is not limited to the exclusive consideration of the purely quantitative aspects of the exchange relationship. The total sacrifice made by the buyer is not perfectly measured by the amount of money to be given up, just as what is received in exchange is something more than a given quantity of product. Therefore, from a marketing point of view, the definition of price must also take into account those sacrifices that are not strictly monetary, which are associated with the purchase of the product, as well as those added values of the product.

Justification

The purpose of this research is to present a series of data that illustrates the general panorama of the inventory of adventure tourism equipment in the Bachelor's Degree in Tourism of the Tecnológico de Estudios Superiores de Valle de Bravo, and that that interested have knowledge of how the inventory of the equipment should be managed for the practices.

A guide to be used for the entrances and exits of the adventure equipment; as well as Logbooks, Procedures Manual and a basic regulation for the adequate control, suggest a responsible technician in charge of carrying out the follow-up of the use of the logs of entrances and exits, as well as to verify the conditions of exit and delivery of the equipment.

Review the necessary documentary information to support the knowledge needed to prepare the Inventory Control Guide for the Adventure Tourism equipment.

Make a physical count of the adventure tourism equipment that the Bachelor's Degree in Tourism has, and keep a real inventory record.

To elaborate the Inventory Control Logbooks for the Bachelor's Degree in Tourism.

Elaborate a regulation for the entrances and exits of the adventure equipment of the Bachelor's Degree in Tourism.

- To elaborate a Procedures Manual for the entries and exits of adventure equipment.
- Present the documentary results obtained from the Inventory Control guide for review.
- Deliver the results obtained to the Science and Technology Research Department, and later to the Head of the Bachelor's Degree in Tourism.

Theoretical framework

Adventure tourism is a type of tourism that consists of practicing adventure sports or adventure travel. Adventure sports are those that the person who practices them runs more risk or danger than in traditional sports. Among these are the following: aerostation, or aerostatic balloon ride, bungee jumping, kayaking, rafting, windsurfing, paragliding, hang gliding, rappelling, skydiving, trekking, etc. (Montaner, 2021).

Leisure activities that take place in a natural environment, seeking an emotional experience and/or sporting satisfaction; they have as a particular interest the natural and sporting environment, from which adventure activities are derived that must be enhanced by the technical knowledge and physical condition of the practitioner; they are classified according to the area where they are practiced in: aerial, aquatic and terrestrial.

Aquatic activities: in any season of the year it is possible to practice aquatic activities; some examples of summer aquatic sports are pedal boats, banana boats. Also scuba diving, snorkeling, speedboats and jet skis or boat excursions, to name just a few water activities typical of the summer period (Euroinnova, 2022).

Land activities: these are all practices that take place on land. This means that it includes all sports that are neither aquatic nor aerial, making it a very broad category.

"Kayaking: adventure tourism sport, which consists of descending in an individual canoe (kayak), through the rough waters of rivers" (Montaner, 2012).

"Cyclotourism: sport and adventure tourism activity, which consists of touring a tourist circuit using bicycles as a means of transportation" (Montaner, 2012).

Camp: duly delimited space of land, equipped with the corresponding facilities and services and conditioned for temporary occupation, with capacity for more than 10 people who intend to live outdoors, for vacation or tourism purposes, and using as residence mobile shelters, tents, caravans or other similar easily transportable elements (Montaner, 2012).

Investment: investing is, in short, the process of buying assets that increase in value over time and provide returns in the form of income payments or capital gains. In the case of financial investments, these refer to transactions made in securities such as stocks, bonds, bills of exchange, bank deposits and other financial instruments (BBVA, 2023).

Procedures manual: The procedures manual is a document that contains the rules and guidelines that indicate how certain processes should be executed. These manuals allow companies to guide and manage their operations, strategies and workflows towards optimal results, as well as to maintain quality and efficiency standards (Rodriguez, 2023).

An inventory is a document that records all the tangible and stocked goods of a company, which can be used for rental, use, transformation, consumption or sale. It should be a detailed list that includes everything in the warehouse.

NIF C-4 establishes that the production cost of inventories must include, without exception, all purchase and conversion costs and all other costs and expenses incurred to bring the inventories to their present condition, to be in accordance with the definition of acquisition cost (Public, 2019).

NIF C-4 requires that, "where applicable, the amount of inventories recognized in profit or loss during the period, when other items are included in cost of sales or when a portion of cost of sales is included as part of discontinued operations or when the income statement is presented classified according to the nature of the items that comprise it and a cost of sales line item is not presented but rather the items that comprise it are presented in different line items.

"The provisions of FRS C-4 require disclosure of the amount of any impairment loss on inventories recognized as cost in the period. This disclosure was not required in Statement C-4" (Public, 2019).

NIF C-4 which refers to inventories states: inventories - are non-monetary assets over which the entity already has the risks and rewards:

1. Acquired and held for sale in the normal course of an entity's operations;
2. In the process of production or manufacture for sale as finished goods;
3. In the form of materials to be consumed in the production process or in the rendering of services.
 - a) Inventory valuation methods - are a set of procedures used to evaluate inventories and are: acquisition cost, standard cost and retail.
 - b) Impairment loss - is the amount by which the expected future economic benefits of an inventory are less than its net book value. Impairment loss may be due to obsolescence, damage to items and write-downs in their market value (Public, 2019).

Methodology

The inductive method and the exploratory method are used, from the review of bibliography to the elaboration of the Guide for Tour Operators.

Elaborating an Inventory Control Guide of recommended equipment to operate adventure tourism activities requires identifying the type of activity to be carried out, determining the equipment used for each activity in a thorough and detailed manner, concentrating the necessary information in formats and logs that will result in a practical and easy to read document, of all the equipment used for both individual use and for the organization's own activities, easy to read, of all the equipment used for both individual and collective use.

This guide is easy to access because it has information on the equipment that should be used for the different adventure tourism activities, to provide safety and comfort in its practice.

The documentary research techniques that focus on this research are based on the practical and rational use of the documentary resources available in the information sources, such as the compilation of the documentary research, based on the historical background of the development of the inventory and equipment of adventure tourism, to know its importance in the development of field activities; as well as the application of a guide that serves to support its usefulness for decision making.

Compilation of documentary research based on the state of the art

Analysis of documentary information to support the theoretical framework and the state of the art of inventory control for adventure tourism equipment.

Verification and counting of the adventure equipment that the Tecnológico de Estudios Superiores de Valle de Bravo has, for the elaboration of the entry and exit logs.

Elaboration of a guide where the inventory control of adventure tourism equipment is applied, analyzing its results.

Presentation of the practice of the Guide for Inventory Control for adventure equipment of the TESVB's Bachelor's Degree in Tourism; for its revision and approval.

Elaboration of a guide for the people in charge of the Adventure Tourism team, where inventory control is applied.

Inform the users of the Adventure Tourism team that all the companies that are dedicated to any type of goods or services offer, undoubtedly have a control of their inventories, both assets and warehouse; in the case of service companies, the inventory control is based on the equipment they need to offer their services.

Inventory control in the service is of vital importance, because the entries and exits of the furniture and equipment that are used to carry out the activities of the service in question must be recorded, and losses of tools and equipment are avoided, since there is a responsible administrator

According to the author Ildefonso Guzman who stipulates in Seidor's website: "It is that of a system that allows the management of the stock of a warehouse, both in the entrance and in the permanence or the exit. The ultimate goal is to optimize costs and achieve the best use of stock" (Guzman, 2023).

Because the TESVB offers the Bachelor's Degree in Tourism, which in turn focuses on Alternative Tourism; this type of tourism carries out recreational practices outdoors, terrestrial or aquatic, in which there is absolute contact with the habitat; due to the nature of these activities, to carry out the practices of Adventure Tourism special equipment is needed, as well as the necessary tools to maintain it, this equipment and tools, are kept in a warehouse which in turn is called inventory.

In addition, the TESVB's Bachelor's Degree in Tourism has infrastructure such as a wall and zip line, where teaching and learning practices are developed; given the nature of these activities, it is necessary to apply techniques and technologies to reduce the risk of accidents with the equipment and tools necessary to allow greater enjoyment of these activities.

Even though the Bachelor's Degree in Tourism is not dedicated to offering services for profit, and the equipment in safekeeping is for student practices, it is necessary to carry out a correct inventory control of the equipment and tools used in the practice.

Although there is a quotation for the equipment that was acquired in advance to carry out alternative tourism activities, there is no study of the inputs and outputs of the equipment and tools in the practices that are carried out.

The lack of inventory control has led to the gradual loss of this type of assets in the equipment and tools storage warehouse; also, the lack of knowledge of their use has caused damage.

Results

As a result of the research, a Guide was prepared containing formats, entry and exit logs of adventure tourism equipment; where Financial Reporting Standards C-4 inventories, their application and accounting basis are applied and cited.

The data obtained in this investigation show that the correct management and control of inventories avoids inventory loss; it should also be noted that deterioration and obsolete equipment should be selected; it should be written off and new equipment should be acquired, as well as determining the life span of the equipment in inventory.

In the contents of the guide there is a practice where the application of the formats and the logbook are mentioned, as well as flow charts.

The information contained in the research was based on updated bibliography, and the data stipulated in the practical guide in the current market value; it is suggested that when you want to develop an inventory control, current market price figures should be taken into account, as well as the interbank rate of the day in which the application is being carried out.

Conclusions

In conclusion, presenting a Guide on the Inventory Control of adventure tourism equipment, formats, input and output logs, as well as the retirement and acquisition of equipment generates several advantages for an organization; in this case for the Tecnológico de Estudios Superiores de Valle de Bravo, because it is considered as a correct organization and planning of the acquisition of equipment, a correct control and above all a correct direction for future investments, will facilitate the analysis of data and the comparison of information in the competitive market.

Other major benefits:

- It facilitates an accurate knowledge of the equipment that was acquired in the past, and a disclosure of its current validity.
- By detailing equipment receipts and disbursements, and the name of the responsible party, there should be no shortages, only imperfect or deteriorated equipment.
- It offers the possibility of making an accurate measurement of its operational assets, and of the economic results of the management.
- It determines a correct order in the arrangement of equipment in the area assigned to it, and in the place where it should be kept.
- The application of the guide will be carried out once it has been reviewed and authorized for printing by the research department of the Technological University of Valle de Bravo.
- In the first instance it will be applied in the Bachelor's Degree in Tourism of the Tecnológico de Estudios Superiores de Valle de Bravo, and later it is expected to be applied in private companies that are dedicated to adventure tourism.

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School desertion in the Bachelor's Degree in Administration of TESVB

Deserción escolar en la Licenciatura en Administración del TESVB

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DOI: 10.35429/P.2023.2.60.68

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A. González, D. Castelán, A. Santillán, R. García and L. León (AA. VV.). Research perspectives at TESVB in the face of Industry 5.0 - Proceedings-©ECORFAN-México, México, 2023

Abstract

The following research aims to identify the causes of school dropout among students of the Bachelor's Degree in Administration of the Tecnológico de Estudios Superiores de Valle de Bravo. This phenomenon has been affecting students for several years, however, the main characteristic observed is that most of the cases occur in the first semesters of the career. To analyze the problem, it was necessary to conduct a documentary research, to objectively know the reasons why this unfortunate decision is taken, making use of the students' withdrawal forms, safeguarded by the School Control Subdirection, however, there are students who do not perform this process and simply stop attending classes, therefore, a survey was also developed in Google Drive through WhatsApp and Messenger, to students who dropped out of the race. Now, as for the most frequent causes of school dropouts in the Bachelor's Degree in Administration, according to the point of view of the dropout students themselves, they are located around four predominant situations: Social problems, economic problems, family situations and they did not like the career.

Identify, Withdrawal, Phenomenon, Predominant

Resumen

La siguiente investigación tiene como objetivo identificar las causas de la deserción escolar entre los estudiantes de la Licenciatura en Administración del Tecnológico de Estudios Superiores de Valle de Bravo. Este fenómeno afecta a los estudiantes desde hace varios años, sin embargo, la principal característica que se observa es que la mayoría de los casos se presentan en los primeros semestres de la carrera. Para analizar la problemática, fue necesario realizar una investigación documental, para conocer objetivamente los motivos por los cuales se toma esta desafortunada decisión, haciendo uso de los formatos de baja de los alumnos, resguardados por la Subdirección de Control Escolar, sin embargo, existen alumnos que no realizan este proceso y simplemente dejan de asistir a clases, por ello, también se elaboró una encuesta en Google Drive a través de WhatsApp y Messenger, a los alumnos que abandonaron la carrera. Ahora bien, en cuanto a las causas más frecuentes de deserción escolar en la Licenciatura en Administración, de acuerdo al punto de vista de los propios alumnos desertores, se ubican en torno a cuatro situaciones predominantes: Problemas sociales, problemas económicos, situaciones familiares y no les gustó la carrera.

Identificar, Retiro, Fenómeno, Predominante

I. Introduction

This research focuses on a very important topic at all educational levels, School Dropout, is a very common phenomenon and can be caused by various aspects of individual, family, material and especially cultural, as well as economic, social, technological and political factors generated in the country and that indirectly affect. Chapter III contains the objectives of the research, developed the theoretical framework, which describes the background or historical framework, the conceptual and referential framework, to support and deepen on the subject and the methodology, which describes the methods and tools used to cover the objectives of this research. Chapter IV shows the results, which support the actions and activities carried out to fulfill the research, as well as tables and information obtained to support the data presented. Chapter V shows the specific conclusions of the project and Chapter VI the bibliographical references.

II. Background

The Universidad Autónoma Metropolitana Azcapotzalco Mexico, in the article entitled La deserción escolar universitaria. The experience of the UAM. Between the deficit of higher education supply and the difficulties of school retention, mentions the following: "According to some studies, there are explanatory factors derived from economic, social and cultural conditions and contexts that become relevant and that studies in this regard have delimited and located in the family field as the economic constraints of families combined with intrafamily situations or single-parent households, parents without work or very low income, reduced or minimal school preparation of parents, all phenomena that lead to a low appreciation for education or schooling of children." (Rodríguez Lagunas & Leyva Piña, 2007, pág. 6).

Several of the studies have been able to find a greater relationship with certain contexts depending on the social situation in which they are located; according to the type of society there could be a greater inclination or emphasis to certain contexts (family, social, social stratification, economic, race or race) through which it is possible to propose explanations of the phenomenon.

In the paper "Desertion: A Current Problem at the Níger Level and Its Relation to the Pit", at the XIX INTERNATIONAL CONGRESS OF RESEARCH IN ADMINISTRATIVE SCIENCES, the following was mentioned: Dropout and educational lag is something real that is being experienced, that is why it is important to consider as something essential to have tutors to help students guiding them to learning. "Establish educational guidance services, tutoring and attention to the needs of students, mainly those who are at risk of dropping out or failing school." (Lugo Lopez, 2014, pág. 9).

Fabiola Lydie Rochin Berumen, in her scientific article, published in La Revista Latinoamericana para la Investigación y Desarrollo Educativo, entitled: Deserción escolar en la educación superior en México: revisión de literatura, mentions the following: "From the literature review, it can be said that students drop out of school due to factors of various kinds, such as personal, linked to lack of motivation, interpersonal relationships, teenage pregnancy, etc., socioeconomic problems associated with the family income level, and pedagogical, related to strategies, activities, resources and academic evaluation, socioeconomic problems associated with the level of family income; and pedagogical, related to strategies, activities, resources and academic evaluation" (Rochin Berumen , 2021, pág. 4).

III. Development of the topic

Objectives

General

To determine the causes of school desertion in the Bachelor's Degree in Administration at TESVB.

Specific

- To identify the factors of the extra-university dimension (family and personal work situation, economic resources and means of transportation) in school dropout in the degree program.
- To determine how the factors of the university dimension (responsibility for homework, level of participation and attendance, hours and place of study, and evaluation processes) participate in the students' decision to drop out of the degree program.
- To determine the percentage of participation of both dimensions in undergraduate dropout.

Theoretical framework

School dropouts

The concepts of efficiency and effectiveness are widely used in administration, one emphasizing the achievement of objectives and the other the optimization of resources. If we focus on the application of these terms to educational institutions, we can observe that an educational system is effective when it achieves its teaching objectives in an adequate time and without wasting resources; however, there are problems that prevent this from being achieved, such as failure and desertion.

Failure consists of not accrediting one or more subjects of the semester. Desertion can be described as the abandonment of an activity, program or specific place.

Throughout his or her life, the individual develops attitudes, expectations, actions and behaviors that do not always favor school success, generating mobility or displacement.

School dropout is a common phenomenon at all educational levels and can be caused by various aspects of individual, family, material and especially cultural nature, as well as economic, social, technological and political factors generated in the country that indirectly affect.

Based on INEGI data, in Mexico only eight out of every 100 students complete a university degree, the main reason being lack of economic resources (García Hernández, 2015).

School dropout, student lag and terminal efficiency is not a problem faced only by Mexican institutions of higher education, but is being reflected worldwide, the concept of dropout indicates the abandonment of a student of his career, leaving classes and not fulfilling his obligations, this can be temporary or permanent, voluntary or involuntary.

"It is necessary to point out that, according to the study developed in 2007, there are many causes that affect it, such as economic, cultural, social and personal situations; Santiago and Vázquez (2008) also agree with this research that it is necessary to reduce the problem, since it influences the economic, social, cultural and political processes of the nation". (López Villafañá & Beltrán Solache, 2017, pág. 11)

There are five forms of school dropout, which are:

- Early dropout. When the student has been accepted into a school program and never attends school or completes his or her classes.
- Early dropout. When the student abandons the study program during the first four semesters.
- Late dropout. When the student abandons the study program from the fifth semester onwards.
- Total dropout. When the student completely abandons an educational plan and never returns to it.
- Partial desertion. When the student leaves temporarily for a determined duration and then resumes his or her studies.

Psychological Theory.

This theory considers several elements that can contribute to school dropout: on the one hand there is the adjustment in personal goals, each person establishes a series of goals to achieve and adjusts to them; life histories, each student has a series of problems that they face every day, just as there is a student who does not live with his parents, feels alone and has to work to support his studies, there may also be another who lives in a hostile family environment; As well as their reactions to adapt socially and intellectually to the institution, they originate hostility in the individual to continue with their studies, that is to say that it depends on the human capacity developed by the student to face changes, forms and different demands of study that can lead them to abandonment.

Environmental Theory

This theory emphasizes the role of external forces (social status, race, institutional prestige) in student persistence.

This refers to all the exogenous factors that can influence displacement, for example, insecurity within the population where the institution is located and the recognition and acceptance of the institution itself by sources of employment.

Economic Theory

They emphasize individual finances and financial aid with respect to student retention.

Within this theory, emphasis is placed on two dimensions, one of the individual, that is, the student's economic capacity to meet the demands of study, such as transportation expenses, rent, food, tuition and school requirements; and the other refers to the economic situation of the country, since the degree of support for education and the conditions in which the school system will be presented depend on this.

Organizational Theory

They consider student desertion as a reflection of the impact that the organization has on the socialization and satisfaction of the student, that is, it has to do with the elements provided within the institution, such as the educational level, the physical conditions, the academic instances, the norms and rules established within the institution, the evaluation systems provided and the contact with external instances as sources of development and employment.

Interactional Theory

Dropout depends on the way in which each student interprets the experiences lived at the university, as well as the degree of interaction between the institution and the individuals, that is to say, what was the student's experience and his or her connection with everything related to the institution.

Considering the information of these theories, the factors that influence school dropout can be classified into two dimensions: university and extra-university.

The university dimension includes those that have to do with the organization as such, for example, the prestige of the institution, the quality of the educational level, the physical conditions of the institution, the evaluation system and the relationship with the labor field.

The extra-university dimension would include those that are totally related to the student, such as: personal goals, economy and social status in which he/she develops, health situation and family stability.

"School dropout must be stopped, as this is a slow process in which individual solutions are important. It should propose certain actions so that the system can prolong the years of education:

- Make schools more accessible to families
- Focus action on students learning by recognizing their basic needs
- Follow-up for failing students
- Individualizing practices for high-risk students and intervening in three contexts: family, school and community
- Mobilize resources to link the worlds of school and work". (Moreno L. & Moreno González, 2005, pág. 2)

IV. Methodology

A quantitative analysis was performed on the dropout rate of the career of the years 2018, 2019 and 2020 with the data provided by the Subdirectorate of Professional Studies.

A qualitative analysis was performed to identify the causes of dropout through the data obtained in the temporary or permanent withdrawal forms of the students, kept by the Subdirección de Estudios Profesionales and a survey applied in Google Drive, which was sent to the following link <https://docs.google.com/forms/d/1twsDdmfODbZa18IRQKWiVERm916KoWXvbazZf8B2umA/edit> through WhatsApp and Messenger to students who dropped out of the course.

The reasons why students drop out of school were classified, based on the information found in the documents provided by the Subdirectorate of School Control and responses obtained from the online surveys.

Finally, the percentages of participation of each of the factors of both dimensions were determined in order to subsequently determine the degree and impact of each factor within the school permanence.

V. Results

In the table 1 shows the information on the reasons for permanent or temporary withdrawal provided by the students of the course, obtained from the forms kept by the Subdirectorate of School Services, and it can be observed that very few students carry out the process.


Table 1 Reasons for leaving

Reasons for low	Frequency
Social problems (employment situation)	1
Financial problems	2
Family problems	1
Health problems	1
Did not like career	1
Changed schools	1

Source: Own Elaboration

In the table 2 shows the most salient results on the reasons for attrition obtained from the surveys.

Table 2 Results of the survey of dropout students

Question	Results
By choosing the Bachelor's Degree in Management as part of your professional training, it was your choice.	 <p>First option 64%</p> <p>Second option 27%</p> <p>Last option 9%</p>

<p>In general terms, how would you rate the Bachelor's Degree in Administration? Where 1 is poor and 5 is excellent.</p>	<table border="1"> <caption>Rating of Bachelor's Degree in Administration</caption> <thead> <tr> <th>Score</th> <th>Number of Students</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> </tr> <tr> <td>2</td> <td>0</td> </tr> <tr> <td>3</td> <td>1</td> </tr> <tr> <td>4</td> <td>3</td> </tr> <tr> <td>5</td> <td>7</td> </tr> </tbody> </table>	Score	Number of Students	1	0	2	0	3	1	4	3	5	7						
Score	Number of Students																		
1	0																		
2	0																		
3	1																		
4	3																		
5	7																		
<p>In what year did you withdraw from the Bachelor's Degree in Management?</p>	<table border="1"> <caption>Year of Deregistration</caption> <thead> <tr> <th>Year of deregistration</th> <th>Number of students</th> </tr> </thead> <tbody> <tr> <td>2018</td> <td>0</td> </tr> <tr> <td>2019</td> <td>2</td> </tr> <tr> <td>2020</td> <td>4</td> </tr> <tr> <td>2021</td> <td>5</td> </tr> </tbody> </table>	Year of deregistration	Number of students	2018	0	2019	2	2020	4	2021	5								
Year of deregistration	Number of students																		
2018	0																		
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2021	5																		
<p>What semester were you in when you decided to drop out?</p>	<table border="1"> <caption>Semester of Deregistration</caption> <thead> <tr> <th>Semester</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>First</td> <td>9%</td> </tr> <tr> <td>Second</td> <td>27%</td> </tr> <tr> <td>Third</td> <td>37%</td> </tr> <tr> <td>Fourth</td> <td>9%</td> </tr> <tr> <td>Fifth</td> <td>9%</td> </tr> <tr> <td>Sixth</td> <td>9%</td> </tr> </tbody> </table>	Semester	Percentage	First	9%	Second	27%	Third	37%	Fourth	9%	Fifth	9%	Sixth	9%				
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<p>Which of the following causes originated the abandonment of the Bachelor's Degree in Administration?</p>	<table border="1"> <caption>Causes of Abandonment</caption> <thead> <tr> <th>Cause</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Family problems</td> <td>35%</td> </tr> <tr> <td>Economic problems</td> <td>23%</td> </tr> <tr> <td>Did not like the race</td> <td>18%</td> </tr> <tr> <td>Employment situation</td> <td>12%</td> </tr> <tr> <td>Change of school</td> <td>6%</td> </tr> <tr> <td>Health problems</td> <td>6%</td> </tr> <tr> <td>Excess of responsibilities at the university</td> <td>0%</td> </tr> <tr> <td>Rigorous evaluation process</td> <td>0%</td> </tr> </tbody> </table>	Cause	Percentage	Family problems	35%	Economic problems	23%	Did not like the race	18%	Employment situation	12%	Change of school	6%	Health problems	6%	Excess of responsibilities at the university	0%	Rigorous evaluation process	0%
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Rigorous evaluation process	0%																		
<p>Did you receive any financial support from Tecnológico de Estudios Superiores de Valle de Bravo?</p>	<table border="1"> <caption>Financial Support</caption> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>No</td> <td>91%</td> </tr> <tr> <td>Yes</td> <td>9%</td> </tr> </tbody> </table>	Response	Percentage	No	91%	Yes	9%												
Response	Percentage																		
No	91%																		
Yes	9%																		

Most of the students who dropped out were in the second and fourth semesters; it can be observed that this is a situation that is constantly repeated in the first semesters; therefore, it is determined that the Bachelor's Degree in Administration has an early dropout rate.

Most of the students chose the career as their first option, which eliminates the first assumption that the students dropped out because they did not choose the career as their first option.

With the information found, the causes of desertion are classified as follows:

- They did not like the career.

Within the extra-university dimension, the following are found:

- Social problems.
- Work situation.
- Economic problems.
- Family problems.
- Health problems.
- He/she changed schools.

The percentages of participation of each of the factors of both dimensions are shown in Table 3.

Table 3 Percentages

Extra-university dimension		83.33 %	University dimension		16.66 %
Tors	Family problems	33.33 %	Factors	Did not like the care	16.66 %
	Financial problems	22.22 %			
	Social problems (Employment situation)	16.66 %			
	Health problems	5.55%			
	Change of school	5.55 %			

Source: Own Elaboration

Therefore, it can be affirmed that the impact is minimal; the greatest impact is found in this extra-university dimension, since it corresponds to external factors submerged within a large context formed by social, economic and cultural factors, which will determine school permanence.

V. Conclusions

With this project, it was detected that school desertion within the Bachelor's Degree in Administration at TESVB is generated by social and economic factors and family problems that have the greatest impact, since there are those who leave their studies because they do not have sufficient economic resources to survive and pay for their studies, some are even parents or even worse, there are those who see the salary in a full-time job as more attractive than continuing their studies.

There are also students who bring with them a series of health problems that prevent them from continuing.

In addition to this, the world pandemic that occurred recently was an incentive for many students to drop out of school. Education became a challenge, due to the difficult access to a stable internet network that would allow them to manage the new hybrid model.

An important piece of information was found: 90% of the dropouts consider that there is no economic support from the university, which is probably because no information is provided about the scholarships provided by the Federal and State Governments, Institutional Support and those granted by economic entities, available for the students of the Tecnológico de Estudios Superiores de Valle de Bravo.

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Filing the annual tax return as an economic benefit for individuals for wages and salaries

Presentación de la declaración anual como beneficio económico de personas físicas por sueldos y salaries

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DOI: 10.35429/P.2023.2.69.74

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A. González, D. Castelán, A. Santillán, R. García and L. León (AA. VV.). Research perspectives at TESVB in the face of Industry 5.0 - Proceedings-©ECORFAN-México, México, 2023

Abstract

This project was developed with the purpose of analyzing the tax situation of natural persons in the salary and wage system of the municipality of Valle de Bravo, with the objective of proposing strategies that generate an economic benefit derived from the management of personal deductions, analyzing the factors and problems that have led to the little or no presentation of the annual declaration.

The research was based on an exploratory and descriptive methodology which consisted of applying an information collection instrument to a population sample of natural persons in the salary and wage system of the Municipality, later the answers were analyzed to elaborate a guide that allows a correct presentation of the annual declaration, as well as their processes to be candidates for a tax refund.

The sample to which the information instrument was applied according to the statistical formula resulted in 380 employees, where 76.9% representing 292 people stated that they had not submitted the annual declaration on any occasion, as complementary data only 28% have if Electronic signature.

Declaration, Deductions, Individuals, Salaries and Strategies

Resumen

El presente proyecto se desarrolló con la finalidad de analizar la situación tributaria de las personas físicas en el régimen de sueldos y salarios del municipio de Valle de Bravo, con el objetivo de plantear estrategias que generen un beneficio económico derivado de un manejo de deducciones personales, analizando los factores y problemáticas que han llevado a la poca o nula presentación de la declaración anual.

La investigación se basó en una metodología exploratoria y descriptiva la cual consistió en aplicar un instrumento de recaudación de información a una muestra poblacional de personas físicas en el régimen de sueldos y salarios del Municipio, posteriormente se analizaron las respuestas para elaborar una guía que permita una correcta presentación de la declaración anual, así como sus procesos para ser candidatos a una devolución de impuestos.

La muestra a la cual se aplicó el instrumento de información, según la formula estadística resultó de 380 asalariados, donde el 76.9% que representa a 292 personas manifestaron no haber presentado en ninguna ocasión la declaración anual, como dato complementario solo el 28% cuenta con su firma electrónica.

Declaración, Deducciones, Individuales, Salarios y Estrategias

Introduction

When talking about the Income Tax we must go back to 1921 for our country, the first name that this tax received was the Centennial Tax published on July 20, 1921 as a decree enacted as a federal law, this tax was extraordinary and payable only once, this law was not intended to be of a permanent nature (Economía-UNAM, 2021).

Currently, the current regulations for this procedure are found in the Income Tax Law of date, in Chapter V dedicated to individuals in Article 90, which states "Individuals residing in Mexico must inform the tax authorities, through the means and formats indicated for such purpose by the Tax Administration Service through general rules, regarding the amounts received for the concepts indicated in the previous paragraph at the time of filing the annual tax return of the fiscal year in which they are obtained" (Cámara de Diputados, 2023).

The Tax Administration Service is the authority in charge of collecting taxes and customs duties provided by law, providing tools to taxpayers to enable them to comply with their tax obligations, being a decentralized body of the Ministry of Finance and Public Credit. When talking about collection, it is important to define a taxpayer as an individual or legal entity obliged to pay taxes in accordance with the tax laws in force (Servicio de Administración Tributaria, 2021).

The objective of the project was that the taxpayer knows the obligations, rights and tax benefits that can be obtained during a fiscal year, promoting the accounting culture in the Municipality of Valle de Bravo. With the information obtained, an analysis was made, explaining and establishing examples that allow a better understanding of taxation.

The high income tax withholdings in Mexico for individuals in the wages and salaries regime in comparison with other countries reflect a high difference, added to this the little fiscal culture in the Municipality due to the lack of knowledge of the fiscal benefits granted by the law causes the lack of filing of the annual tax return (Expansión, 2023).

The informality and bad habits of businesses that apply for personal deductions (doctors, psychologists, dentists, private schools, etc.) are a factor that hinder the annual tax return, part of this behavior is caused by taxpayers who do not request their invoice. Finally, a program of tax strategies was obtained to allow workers under the wages and salaries regime to recover part of the tax withheld in a fiscal year through the filing of the annual tax return.

Theoretical Development

Program

Planning that is developed around a project or an initiative, it is a method that details actions to be carried out and defines the steps to be followed (Porto & Gardey, 2022).

Culture

Understood as the set of values, beliefs and attitudes that a certain number of people have in common and that shape the way they perceive, think and act (Instituto Mexicano de Contadores Públicos).

If culture is the set of values, beliefs and attitudes of a given social group, tax culture is the same, but with respect to taxation and the observance of the laws that govern the conduct manifested in the permanent fulfillment of tax duties based on reason, trust, affirmation of the values of personal ethics, respect for the law, civic responsibility and social solidarity (Medina, 2013).

Natural person

It is an individual who performs any economic activity (seller, merchant, employee, professional, etc.), who has rights and obligations. The regimes for Individuals are classified according to their activities and income and are:

- Wages and salaries and income assimilated to salaries.
- Business and professional activities
- Tax Incorporation Regime
- Sale of goods
- Business activities with income through technological platforms.
- Leasing regime
- Interests
- Obtaining prizes
- Dividends
- Other income (Servicio de Administración Tributaria, 2023).

Personal Deductions

These are the expenses that, as a taxpayer, you are entitled to deduct from your taxable income in the Annual Income Tax Return for the fiscal year.

Health

Medical, dental and professional services in psychology and nutrition. They are deductible if they are rendered by persons with a professional degree legally issued and registered by the competent educational authorities.

Education

Tuition in private educational institutions with official validity of studies. From preschool to high school or equivalent.

Others

Funeral expenses for your spouse or common-law spouse, as well as for your parents, grandparents, children and grandchildren, you can pay them with any means of payment and you must have the invoice.

Actual interest accrued and effectively paid on mortgage loans for your home, contracted with the financial system, INFONAVIT or FOVISSSTE, among others, and as long as the loan granted does not exceed seven hundred and fifty thousand investment units.

Donations granted to institutions authorized to receive donations

Fiscal Policy

It is understood as the set of instruments and measures taken by the State in order to collect the necessary revenues to carry out the functions that help it meet the objectives of the economic policy, through public spending.

Annual Declaration

The annual tax return is an official document in which individuals or legal entities submit a report of all the operations they carried out during the year to the Tax Administration Service (Servicio de Administración Tributaria, 2023).

Methodology

The methodology sought to determine the perception of individuals under the wages and salaries regime regarding the withholding of their taxes and whether they have achieved a tax benefit so far, for which an instrument was used to collect information using statistical processes.

This instrument was validated with a statistical tool called Cronbach's Alpha.

Part of the research was developed by means of an exploratory and descriptive methodology, which allowed analyzing and investigating aspects of the reality within the Municipality.

A questionnaire was constructed in Google forms which was applied to a systematic sampling to obtain quantitative data, for this methodology it was necessary to have defined the study population, in this case the population was contemplated as the inhabitants of Valle de Bravo which is equivalent to 65,703 inhabitants according to INEGI data, for the determination of the sample as a proportion will be taken as follows:

$$N = \frac{NZ^2Pq}{(N-1)E^2 + z^2pq} \quad (1)$$

Where:

N=Total population

Z=Confidence level 95%-1.96

PQ=Proportion allowed .5

E=Error allowed 5%

Results

Once the data collection instrument has been applied to the population sample of the Municipality of Valle de Bravo, some conclusions can be drawn, among them that there is not an adequate tax culture among people under the Wages and Salaries Regime, out of one hundred percent only forty-five percent know what the annual tax return is, and only nineteen percent know if they are required to file it, and only nineteen percent know if they are obliged to file it, this fact leads us to the fact that seventy seven percent have never filed the return, of the remaining 23% only 10% have obtained a balance in favor, when questioned about the knowledge they had of personal deductions 81% know few or no deductions.

An important part of the research was to question the sample on the issuance of invoices, and how often they requested them for services such as medical, dental, psychological consultations, purchase of eyeglasses and payment of tuition outside public or governmental institutions, these are part of some allowable deductions, The answer obtained was that only 27% of those surveyed request invoices always or almost always, this fact allows us to know the needs of diffusion as an area of improvement in the Municipality, ending with 72% of those questioned that do not have electronic signature, document generated by the Tax Administration System (SAT), being this personal and irreplaceable, being a requirement sometimes for the sending of the annual declaration.

As a solution, a guide was developed that describes as a first point a glossary of words and concepts that are handled in the guide, with this we sought to provide a better understanding of accounting and tax issues at the time of reading it; Likewise, we sought to answer the most common questions that were obtained through the data collection instrument, the concepts that tax the Income Tax (ISR) for Individuals with Wages and Salaries Regime were detailed, it also contains examples of the calculation of ISR, described activity by activity, referencing the tables of Article 96 of the ISR law, ending with a detailed example of the presentation of the annual return in the SAT portal.

Conclusions

Due to the high tax rates collected by the SAT in our country, it was found that there is a poor tax culture among taxpayers, which has caused a very small percentage of taxpayers in the municipality of Valle de Bravo not to file their annual tax return and consequently not to deduct taxes. This is manifested when it is inferred that 67% of the population has never filed the annual tax return, this for various reasons such as: not knowing if they are obliged to file it; it was also found the lack of knowledge of personal deductions and the invoicing process, which allows inferring that a large part of the population of Valle de Bravo does not know it. Likewise, it can be inferred that close to 75% of the municipality's population does not have an electronic signature, which means a problem for taxpayers since they do not have an official document that.

Finally, the objective set at the beginning of the research was achieved, since a problem was identified in the taxpayers of the municipality and a Guide is proposed that will help solve the problems that afflict these people through a series of strategies that allow the taxpayer to know the procedure for the calculation of Income Tax, the taxable concepts of the same, the authorized personal deductions and the presentation of the annual declaration, all reflected in this guide for consultation.

This guide also intends to increase the formality of all those businesses that provide deductible services, which must issue an invoice, which implies being registered with the SAT, affecting an increase in the rate of individuals for wages and salaries that file an annual tax return.

This research seeks to serve as a basis for future compatible studies, in order to provide an analysis of data based on a population and certain periods of time, as well as to make a comparison to see the rate of growth or decrease in the filing of the annual tax return.

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The diffusion of Cannabis impact on Gastronomy: Legality and culinary evolution

Difusión del impacto del Cannabis en la Gastronomía: Legalidad y evolución culinaria

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DOI: 10.35429/P.2023.2.75.94

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A. González, D. Castelán, A. Santillán, R. García and L. León (AA. VV.). Research perspectives at TESVB in the face of Industry 5.0 - Proceedings-©ECORFAN-México, México, 2023

Abstract

The culinary integration of cannabis has been influenced by its increasing acceptance in both medical and recreational contexts across various locations, sparking considerable interest in contemporary gastronomy. This trend has elevated culinary exploration to a heightened level, challenging established norms. The research was conducted with the goal of disseminating knowledge about cannabis cuisine among culinary students, professionals, and the public. The methodology employed a combination of quantitative and qualitative approaches to analyze the perception and understanding of cannabis gastronomy within the studied population.

Conducting documentary research on cannabis use in food, a recipe book was compiled, and a survey involving 445 individuals, primarily advanced culinary students, was undertaken to assess their knowledge of cannabis in gastronomy, encompassing its incorporation into more sophisticated culinary dishes. Information dissemination among culinary students utilized both social media platforms and in-person conferences. Despite a general awareness of cannabis as a culinary ingredient, notable unfamiliarity was observed in terms of compound extraction, such as CBD and THC, as well as processes like decarboxylation and the extraction of these compounds into fats. Moreover, there existed ambiguity in comprehending the effects of cannabis, where recognized effects such as alterations in nervous functions, increased appetite, and anxiety (THC) were acknowledged, alongside properties of relaxation and anti-inflammatory characteristics (CBD); however, the information presented was often limited and unclear.

In conclusion, the research highlights the growing interest in cannabis cuisine within the culinary community but underscores the necessity for a more profound understanding of compound extraction and the effects of cannabis in gastronomy. This knowledge is crucial for the responsible and creative use of cannabis in the kitchen.

Cannabis, Gastronomy, Decarboxylation, THC, CBD

Resumen

La integración culinaria del cannabis se ha visto influenciada por su creciente aceptación en contextos tanto médicos como recreativos en varios lugares, lo que ha despertado un interés considerable en la gastronomía contemporánea. Esta tendencia ha elevado la exploración culinaria a un nivel superior, desafiando las normas establecidas. La investigación se realizó con el objetivo de difundir el conocimiento sobre la cocina cannábica entre estudiantes de cocina, profesionales y público en general. La metodología empleó una combinación de enfoques cuantitativos y cualitativos para analizar la percepción y comprensión de la gastronomía del cannabis dentro de la población estudiada.

A través de una investigación documental sobre el uso del cannabis en la alimentación, se elaboró un recetario y se llevó a cabo una encuesta en la que participaron 445 personas, principalmente estudiantes avanzados de cocina, para evaluar sus conocimientos sobre el cannabis en la gastronomía, abarcando su incorporación a platos culinarios más sofisticados. La difusión de información entre los estudiantes de cocina utilizó tanto plataformas de redes sociales como conferencias en persona. A pesar de una conciencia generalizada sobre el cannabis como ingrediente culinario, se observó un notable desconocimiento en términos de extracción de compuestos, como CBD y THC, así como de procesos como la descarboxilación y la extracción de estos compuestos en grasas. Además, existía ambigüedad en la comprensión de los efectos del cannabis, donde se reconocían efectos reconocidos como alteraciones en las funciones nerviosas, aumento del apetito y ansiedad (THC), junto con propiedades de relajación y características antiinflamatorias (CBD); sin embargo, la información presentada era a menudo limitada y poco clara.

En conclusión, la investigación destaca el creciente interés por la cocina cannábica dentro de la comunidad culinaria, pero subraya la necesidad de una comprensión más profunda de la extracción de compuestos y los efectos del cannabis en la gastronomía. Este conocimiento es crucial para el uso responsable y creativo del cannabis en la cocina.

Cannabis, gastronomía, descaboxilación, THC, CBD

1. Introduction

The intersection between gastronomy and cannabis has emerged as an extremely intriguing and debated territory today. What was once simply a discussion about the consumption and use of this plant has now expanded into the culinary world. This phenomenon has been partly driven by the growing acceptance and legalization of cannabis in various states in the United States and other primarily developed countries, for both medicinal and recreational purposes, shaping the social perception around this plant and paving the way for exploration of its application in cuisine (Pareja, 2014; Healy, 2019).

The rise of this culinary initiative goes beyond cannabis-infused edibles or homemade marijuana brownie recipes; it extends into the realm of haute cuisine. There has been a notable shift in focus towards cannabis gastronomy, evolving into professionally crafted culinary preparations.

In the United States, although federal laws prohibit the recreational use of marijuana, some state jurisdictions have legalized its medicinal and recreational use. Since 2014, the federal government in this country has respected local laws regarding cannabis.

Internationally, legislations vary considerably. In the year 2016, countries such as Australia, Canada, Uruguay, the Netherlands, Spain, and certain jurisdictions in the United States had less restrictive laws regarding cannabis. In contrast, nations like China, Japan, Saudi Arabia, and the United Arab Emirates maintained highly strict regulations around cannabis. In the case of Mexico, legislation for the medical and recreational use of cannabis has made significant progress, but its use in edibles or culinary preparations is prohibited (UNODC, 2014).

This diverse and ever-evolving landscape has fostered an environment in which the relationship between cannabis and gastronomy has flourished, driving culinary innovation that challenges traditional boundaries and promises to continue transforming the world of cuisine in the future.

Cannabis sativa L. is an herbaceous species of the Cannabaceae genus that has been used since ancient times for various purposes such as food, a source of fiber, a drug, and medicine. This plant has been referred to by different names over time and depending on the region. In the case of Mexico, the most colloquial term is "marihuana" (Contreras, 1978; Candela García et al., 2006; Inzunza y Peña, 2019).

Marijuana, also known as "marijuana," is a mixture of dried leaves, flowers, stems, and seeds of the hemp plant (NIDA, 2019). Additionally, among consumers, there are numerous nicknames or colloquial terms, such as "Mary Jane," "Amnesia," "Doobie Houdini," "Reefer" (derived from the Spanish term "Grifo"), "Spliff," "Herb," "Bud," "Grass," "Green" (Potheadtv.com, 2019). In a Mexican book, more than 1000 words are compiled to refer to marijuana; some of these names include "Chabela," "Chíchara," "Chipiturca," "De la buena," "De la verde," "Diosa," "Verde," "Doña Diablo," "Dama de la ardiente cabellera," "Flor de Juana," "Goma," "Grifa," "Grilla," "Güera," "Join," "Juana," "Juanita," "Mala hierba," "María," "Mari," "Mariana," "Mary Poppins," "Mois," "Mora," "Mota" (Plano Informativo, 2015). In other countries, such as Uganda, it is called "Khat" (Kyokunda et al., 2021).

Cannabis originates from Asia, America, and Africa; it belongs to the Cannabaceae genus and is divided into three main varieties:

1. *Cannabis Sativa*

This variety is generally associated with more cerebral and energetic effects. Plants of this species tend to be tall and slender, with more stylized leaves and a prolonged flowering period (Contreras, 1978; Kushka, 2016).

Figure 1 *Cannabis sativa*



Source: Antropocene.it, 2017

2. *Cannabis Indica*

With more relaxing and physical effects, plants of this variety are usually shorter and more compact, with broader leaves and a shorter flowering period. (Contreras, 1978; Kushka, 2016).

Figure 2. *Cannabis indica*



Source: Cannabisindustria, 2019

3. *Cannabis Ruderalis*

Less common and typically smaller in size, it has been used to develop auto flowering varieties. (Contreras, 1978; Kushka, 2016).

Figure 3 *Cannabis Ruderalis*

Source: *Weediid.com*, 2020

It is important to highlight differences in the effects, the appearance of plants, and the characteristics of each Cannabis variety within the Cannabaceae genus.

The physicochemical composition of cannabis is diverse and can vary depending on the strain, cultivation, and other factors. The plant contains many compounds, among which the most relevant ones are:

- **Cannabinoids:** THC and CBD stand out. THC induces psychoactive effects, whereas CBD offers therapeutic properties without significant effects on the mind (Thomas & ElSohly, 2015; Clarke & Merlin, 2016; Lawson, 1997; Chandra, Lata & ElSohly, 2017; Pacher *et al.*, 2018; Cano-Valle *et al.*, 2019).
- **Terpenes:** Aromatic compounds present in cannabis and other plants. They contribute to the unique aroma and flavor of each strain and may have therapeutic effects. Examples include limonene, myrcene, pinene, and linalool. (Thomas & ElSohly, 2015; Clarke & Merlin, 2016; Lawson, 1997; Chandra, Lata & ElSohly, 2017; Pacher *et al.*, 2018; Cano-Valle *et al.*, 2019).
- **Flavonoids:** These compounds, with antioxidant and anti-inflammatory properties, are found in various plants, including cannabis. Although less studied than cannabinoids and terpenes, they are believed to offer health benefits. (Thomas & ElSohly, 2015; Clarke & Merlin, 2016; Lawson, 1997; Chandra, Lata & ElSohly, 2017; Pacher *et al.*, 2018; Cano-Valle *et al.*, 2019).

It is crucial to consider that the exact composition of these compounds varies depending on the plant's genetics, cultivation, harvest, and processing. Laboratories employ advanced techniques such as gas chromatography and mass spectrometry to precisely analyze the chemical composition of cannabis.

From these three base varieties, new variations have been created through combinations, grafts, and modifications. Differences among these variants are based on the content of THC, CBD, aroma, flavor, and the effects they produce. Some of these modified varieties are detailed in Table 1. Cannabis varieties derived from the three original types (sativa, indica, and ruderalis), with commercial names.

The cannabis plant has a millennia-old history in Central Asia, with diverse uses ranging from fiber production for textiles to medicinal applications and religious rituals.

In China over 4,000 years ago, it was used for therapeutic purposes, documented in ancient medical texts such as the "Nei Ching," attributed to Emperor Huang Ti, which included cannabis recipes for treating diseases. In India around 2000 B.C., the Aryans used cannabis in religious rituals, and it is mentioned in the sacred Vedas as an herb associated with the god Siva, considered sacred and endowed with magical properties and health benefits. Cannabis spread from China and India to Persia, Assyria, and Scythia, where it was used in religious and funeral rituals, as well as for therapeutic purposes to alleviate various ailments. Throughout history, cannabis has been valued by various cultures for its medicinal properties, religious rituals, and recreational uses, showing a wide range of applications and effects in different societies (Lorenzo and Leza, 2000; Escohotado, 1998; Ramos and Fernández, 2000).

Cannabis has been used throughout history by various cultures and civilizations. From archaeological remains of hemp vessels dated around 6000 B.C., cannabis becomes one of the oldest plants cultivated by humanity (Leal-Galicia et al., 2018). The historical uses are presented below:

As Medicine:

Even though the U.S. Food and Drug Administration (FDA) has not approved the marijuana plant as medicine, the study of its cannabinoids has led to the approval of two pill-form medications containing cannabinoids. The legalization for medicinal use is under discussion, as its potential to treat a wide range of diseases has been observed. Several states have legalized its use for medicinal purposes.

Effects as Medication:

Numerous beneficial effects of cannabinoids on health have been identified, including anti-inflammatory, analgesic, protective of nervous tissue, anticonvulsant properties, among others.

As a Drug:

- a. **Smoked or Inhaled:** It is common to consume cannabis by smoking, either mixed with tobacco or alone, in cigarettes or pipes. It is also used in water pipes. **Oral or Ingested:** The resin is incorporated into foods such as cakes, candies, and sometimes leaves and stems are used in food products like tortillas or pastries.
- b. Cannabis has been studied for its potential medicinal benefits, although its use as a drug has also been historically significant in various consumption forms, whether smoked, inhaled, or orally ingested (NIDA, 2015; Infodrogas.org, 2020; Fundación Canna, 2020).

On the other hand, the history of cannabis in Mexico spans five centuries since its introduction in the 16th century by the Spaniards. During the 20th century, the influence of the United States affected Mexican drug policies. Starting in the 1980s, cannabis trafficking became a matter of public security due to U.S. pressure and increased competition in illegal markets, resulting in violence and corruption.

The domestic consumption of cannabis solidified in Mexico, becoming the preferred illegal drug, with an incidence of 4.2% in the population aged 12 to 65, according to the National Addiction Survey of 2008. According to the 2009 International Narcotics Control Board, cannabis is the most widely used drug by young people and adults worldwide, with a usage rate of 3.3% to 4.4% in the population aged 15 to 64 in 2007 (UNODC, 2009; CONADIC, 2009).

Throughout the centuries, cannabis has had a constant presence in Mexico, influencing policies, trafficking, and consumption, shaping its role in Mexican society and culture.

The legalization of cannabis for recreational purposes has sparked a broad global debate. While some seek to reduce drug trafficking through regulation and control, others are concerned about the risks of consumption. Despite its legalization in some countries, a consensus on its regulation and the elimination of the black market remains elusive.

Table 1 Strains of cannabis derived from the three original varieties (sativa, indica, and ruderalis), with commercial names

Name	Genetics	Name	Genetics	Name	Genetics
A.M. S	Indica dominant (60%)	Galaxy	Indica Dominant 70%	Orange Candy	Sativa 65%
Aroma	Indica dominant	Gorilla	Indica Dominant 60%	Ogre	Sativa
ASH	Indica dominant (75%)	Guayaka	Indica dominant	Pandora	Indica 70%
Atomic	Indica /Sativa	Haoma	Indica dominant 70%	Purple	Indica-Sativa 50-50%
Banana	Sativa dominant (60%)	Honey b	Sativa 90%	Qleaner	Sativa 60%
Big bang	Indica dominant	Ice kush	Indica/Sativa	Quash	Indica 70%
Black Domina	Indica 90-100%	Irie	Sativa dominant 75%	Royal Gorilla	Indica-sativa 50-50%
Cannatonic	Indica Sativa 50-50%	Jack	Indica /Sativa	Runtz	Indica/Sativa 50-50%
Caramelo	Indica dominante70%	Juanita	Sativa dominant	Sugar Loaf	Indica / Sativa 50-50%
Cheesus	Indica dominant 60%	Kaya 47	Sativa dominant	Sangria	Indica dominant
Dementia	Sativa dominant 80%	Khufu	Indica dominant 75%	TNT Kush	Indica 90-100%
Desfran	Sativa 90%	LSD	Indica dominante70%	The OX	Indica dominant
Dr. Who	Indica dominant	Lennon	Sativa Dominant 80%	U2	Sativa dominant
Easy Bud	Indica dominant 55%	Malawi	Sativa 90%	Utopia Haze	Sativa 90%
Eldorado	Sativa 90%	Michka	Sativa dominant 80%	Veneno	Indica/Dominant 85%
Ewe-2	Indica 90-100%	Nordle	Indica	Vertigo	Indica/Sativa
F13	Sativa dominant	Nebula	Sativa 60%		

Source: Canna Connection, 2019

Cannabis consumption has increased globally, according to the United Nations Office on Drugs and Crime. Although there have been attempts to decriminalize its use since the 1970s, the implementation of reduced sanctions has been limited, especially for recreational use. Despite progress in its exclusively medicinal use, resolution for recreational use remains unclear.

The discussion about the legalization of cannabis for recreational use remains complex, balancing the regulation of its market and controlling its risks, while its consumption continues to rise globally (Blickman and Jelsma, 2009; Madoz-Gúrpide and Ochoa Mangado, 2014; UNODC, 2014; Cannabis.senado.gob.mx, 2022).

In Mexico, the process of marijuana legalization has been progressive and controversial. In 2017, its use for medicinal purposes was approved, and since 2019, the Supreme Court demanded Congress to legislate on its recreational use, considering it unconstitutional to prohibit its consumption. Faced with Congress's failure to regulate recreational marijuana, the Court approved a historic ruling in June 2021 allowing recreational self-consumption, though not commercialization (Quillupangui, 2021).

The "Federal Law for the Regulation of Cannabis and Reform" authorizes adult use and establishes conditions for consumption, cultivation, and commercialization. Self-consumption of up to six plants per person is allowed, limited to the residence, but access to those under 18 is prohibited, and sales are restricted to authorized establishments. The law regulates packaging, labeling, and information about cannabis products. Additionally, it prohibits the marketing of products that exceed certain levels of THC or CBD, among other restrictions.

A study by Reynoso González et al. (2021) reveals that the Mexican population has a mostly positive attitude towards medicinal marijuana, supporting its legalization and consumption (85.2% and 75.9%, respectively). However, there is greater opposition to recreational use, where 42.5% of respondents reject its legalization, indicating a greater reluctance towards recreational consumption (74.1%).

These contrasting positions reflect widespread acceptance of marijuana for medicinal purposes but significant divisions regarding its recreational use, showing a trend favoring therapeutic use but more reluctance towards its use for entertainment or pleasure.

In 2021, the topic of cannabis cuisine or gastronomy gained popularity in Mexico due to legislative processes for its legalization. However, in other countries, the procedures to legalize it and its gastronomic uses are topics of a distant past. It has been an entrenched trend in countries where cannabis consumption is decriminalized, such as the Netherlands and some U.S. states. Specialized restaurants, like Yerba in Amsterdam and Gracias Madre in California, have made marijuana their specialty (nytimes.com, 2018).

Figure 4 *Cannabis cuisine*



Source: gourmetdemexico.com 2019

This cuisine not only seeks the psychoactive effect, but chefs use it as a flavor enhancer, like monosodium glutamate, generating salivation, intensifying flavors, and stimulating appetite (nytimes.com, 2018). History shows the millennia-old relationship of cannabis with food. From its role as an economic engine in early civilizations to its contribution to the rise of agriculture and its use in the production of wines and pastries in ancient Rome (Robinson, 1999). In Chinese culture, the plant was a staple in their diet in the 6th century, later replaced by grains with lower fat content, thus forgetting its nutritional properties (Robinson, 1999).

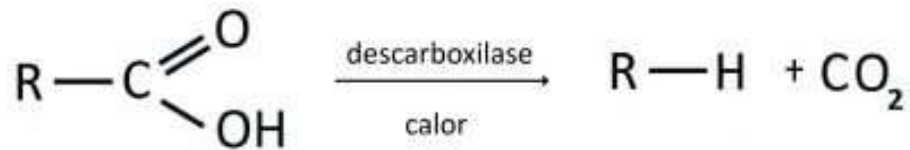
Indians contributed the sacred drink Bhang, made with milk and cannabis, used on the night of Shiva, and in the 10th century, its use as medicine was extrapolated with 50 different preparations (Gottlieb, 1993; Robinson, 1999). This drink was offered to deities, followed by the tradition of serving it to family and visitors along with traditional sweets.

Cannabis seeds were a staple in ancient cultures of Australia, India, and Africa due to their versatility and nutritional value. In Europe, it was consumed during festivities in the form of a drink, and its seeds were a common ingredient in soups, especially accentuating its use during World War II as survival food. Impoverished tribes in Africa and India also used the seeds as essential food (Robinson, 1999).

In Mexico, the presence of cannabis dates to the exploration trips to America during the 16th century. It was introduced as a fiber source in Chile in 1545 and in Peru nine years later. During the Conquest, hemp reached Mexico, brought by Pedro Cuadrado, a conqueror who was part of Pánfilo de Narváez's expedition. Hernán Cortés recommended its planting and cultivation (Honorable Cámara de Diputados LX Legislatura, 2009).

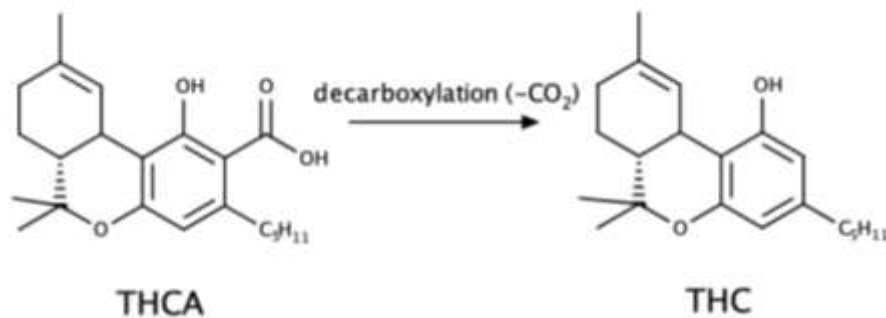
But for the use of cannabis and to obtain its effects, a chemical process called decarboxylation is required.

The term Decarboxylation designates a chemical reaction in which the carboxyl group is removed from a carboxylic acid, resulting in the release of carbon dioxide (CO₂) (see Figure 5). Decarboxylation occurs through the action of enzymes called decarboxylases, and it can also occur, in certain cases, spontaneously after the heating of metabolites (Quesada Moya, 2021).

Figure 5 The general decarboxylation reaction

Source: Quesada Moya, 2021

Based on the foregoing, fresh or dried cannabis, without being heated, lacks psychoactive effects since tetrahydrocannabinol (THC) is present in its inactive form, known as tetrahydrocannabinolic acid (THCA). THC activation is achieved through decarboxylation, a process that requires heat. THCA is converted into THC (see Figure 6), responsible for psychoactive effects, when subjected to heat. Smoking or vaporizing cannabis naturally induces decarboxylation due to heat. However, when cooking it in recipes such as brownies, prior decarboxylation is necessary for the resulting edibles to be psychoactive (Quesada Moya, 2021).

Figure 6 The decarboxylation reaction of THCA to THC

Source: Beadle, 2023

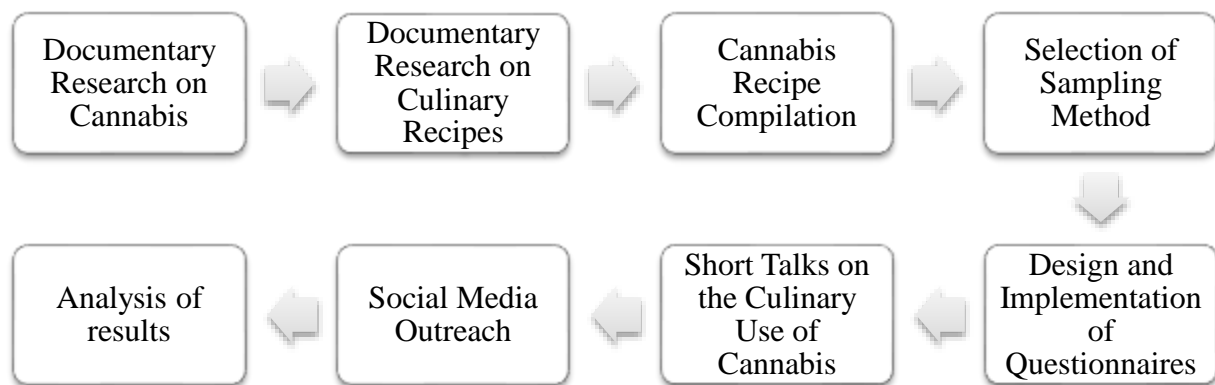
To decarboxylate cannabis, it is finely ground to increase the contact surface. The recommended method involves placing it on a tray with wax paper, preheating the oven to 105°C, and baking it for 45-50 minutes to activate it. If the temperature is increased to 120°C, the process can be accelerated to 30 minutes. This procedure ensures a uniform and controlled activation of cannabis. When the process is complete, the cannabis changes from a bright green color to an opaque brown – this is normal and one of the visual changes that occur during the cannabis decarboxylation process (Quesada Moya, 2021).

2. Methodology

A mixed methodology was employed, combining quantitative and qualitative approaches. The scope encompassed both an exploratory and descriptive approach, addressing a relatively understudied topic from an innovative perspective, allowing for the identification of concepts. Furthermore, relevant concepts and variables in the study were outlined. A qualitative approach was chosen to examine the perception and experience of the culinary population regarding knowledge about cannabis cooking, delving into their viewpoints, interpretations, and meanings.

The sample size used for this mixed-methods study was based on a cultural ethnographic approach, recommending a range of 30 to 50 individuals as the suggested minimum sample. A homogeneous sample was selected, consisting of individuals with a similar profile, specifically students and professionals in the culinary field. The sampling method used was non-probabilistic convenience sampling.

The methodology followed for this research is summarized in Figure 7 Research Methodology, and each step undertaken is detailed later.

Figure 7 Research Methodology

A comprehensive documentary investigation on cannabis in gastronomy was conducted, analyzing scientific articles, websites, and videos. Recipes worldwide incorporating cannabis as an ingredient were identified. A cookbook for cannabis cuisine was compiled, featuring representative dishes from various regions. Stratified random sampling was employed to survey students, culinary professionals, and restaurant personnel. A data collection instrument was designed to assess knowledge of cannabis in gastronomy. Lectures on cannabis cuisine were delivered to culinary students, and information was disseminated through social media. Finally, results from questionnaires and social media outreach were analyzed.

3. Results

The survey included a total of 445 participants, with 61% identifying as culinary students, while the remaining 39% comprised other groups, including restaurateurs, professionals, or workers in the culinary field. According to the obtained results, 94% of the respondents claimed to have knowledge about cannabis, whereas 57% demonstrated understanding of the concept of cannabis gastronomy. However, 68% indicated a lack of awareness of the fundamentals of this culinary form, and 63% admitted to not having tried food prepared with cannabis.

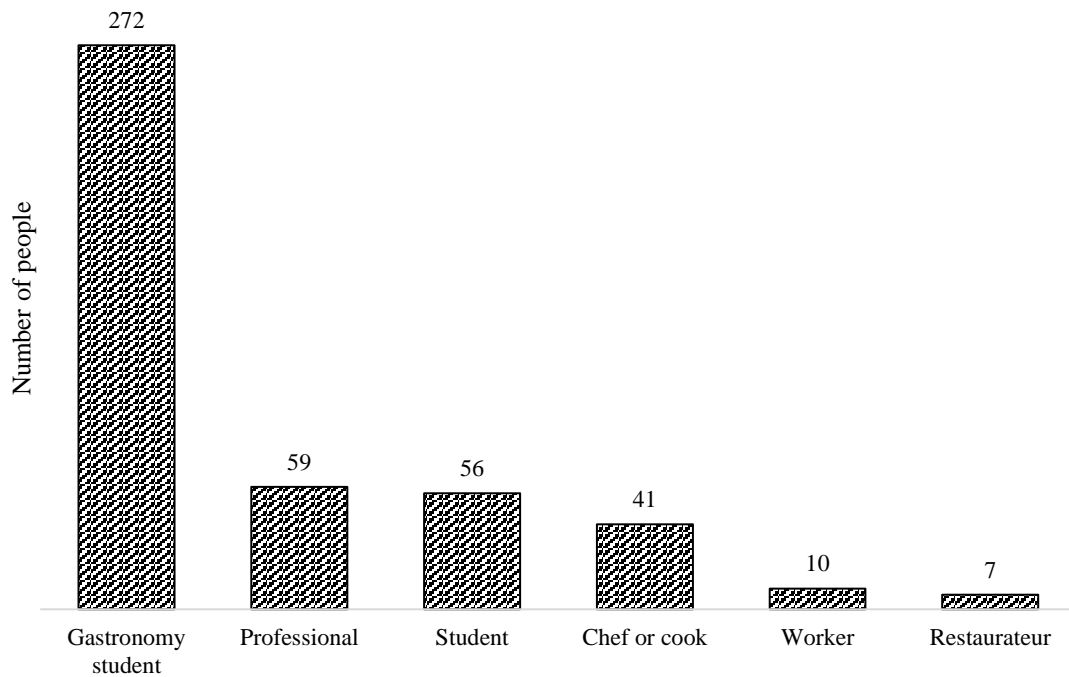
Regarding the perception of cannabis-infused foods, only 3% of the participants expressed the belief that this type of food is harmful. It is noteworthy that most respondents were culinary students, representing 61%, while only 1.6% belonged to individuals involved in the restaurant industry, as depicted in Graph 3.1 illustrating the distribution of occupations among the surveyed individuals.

Concerning students, they came from various educational institutions, including TESVB, TESH, TEST, UAEM, TESOEM, IUEM, CUI, ENVB, UNITEC, and other recognized institutions in the culinary field.

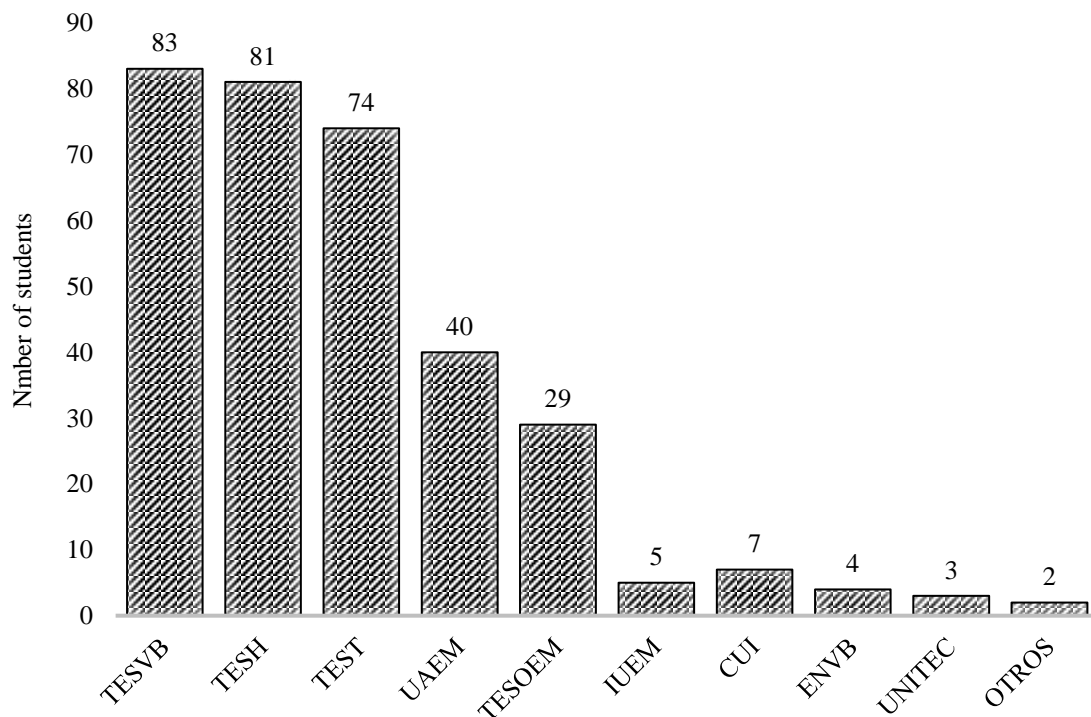
Most surveyed students were from TESVB, the institution where the research was conducted, constituting the initial sample with 28.82%, as shown in Graph 3.2. This represents the institution where the surveyed students study gastronomy.

The age range of the surveyed individuals spanned from 18 to 25 years, accounting for 71.68% of the total respondents. Meanwhile, those aged between 41 and 55 years comprised only 2.47% of the sample. The female gender predominated in the surveys, reaching a percentage of 58%.

Regarding the geographical location of the surveyed individuals, the majority resided in Valle de Bravo, representing 16.62% of the total. Toluca followed with 13.25%, and 21.79% corresponded to other places of residence, as depicted in Graph 1. Places of residence of the surveyed individuals.

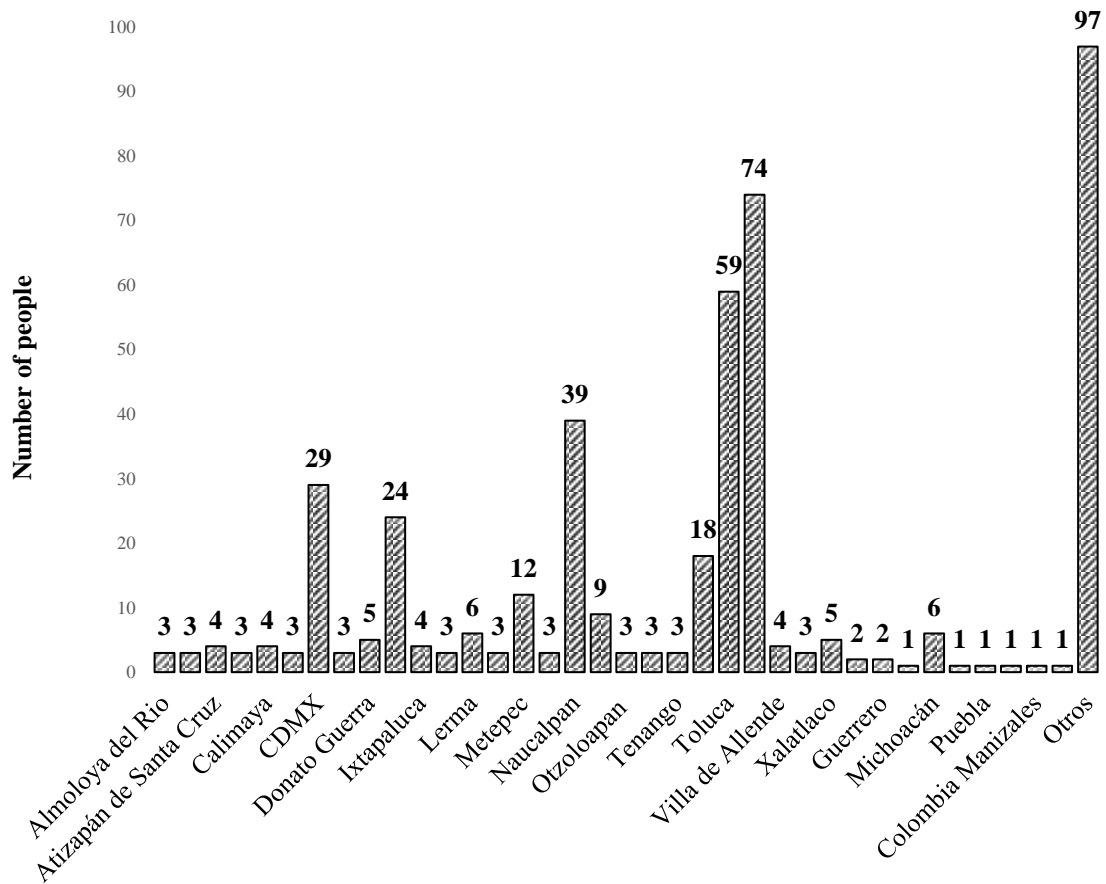
Graph 1 Occupation of the people surveyed

Ninety-four percent (94%) of the surveyed individuals expressed awareness of what cannabis is, and 91% indicated familiarity with the scientific name of marijuana. When asked about cannabis gastronomy, 59% claimed to have information on the topic, while 57% admitted to being unfamiliar with this subject.

Graph 2 Institution where the students surveyed study gastronomy

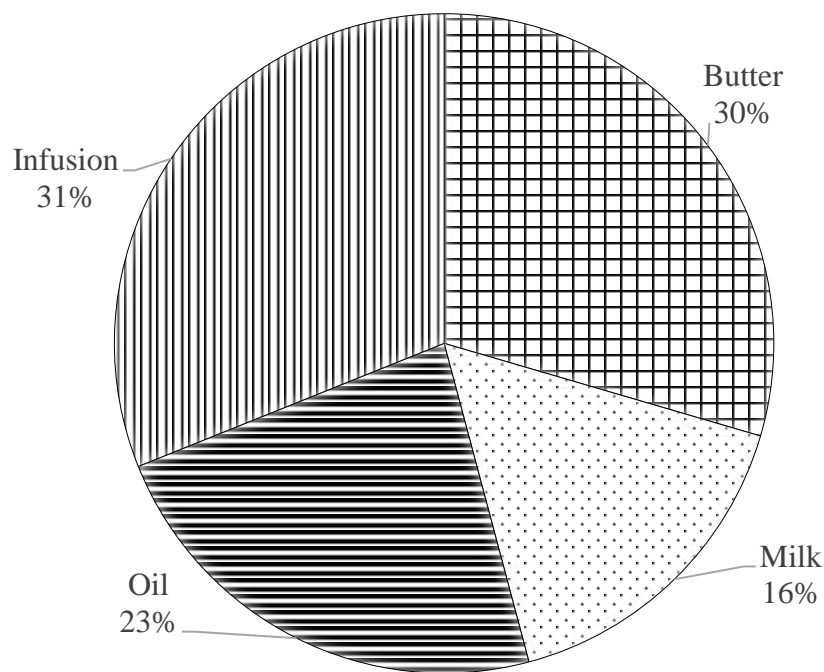
Furthermore, 68% of the respondents stated that they are not familiar with the foundations for preparing cannabis-infused foods. Among those who are acquainted with these foundations, 31% mentioned that preparation is carried out through infusions, 30% using butter, 23% with oil, and 16% using milk, as detailed in Graph 4. Preparation of Cannabis-infused Foods.

Graph 3 Places of residence of the surveyed individuals

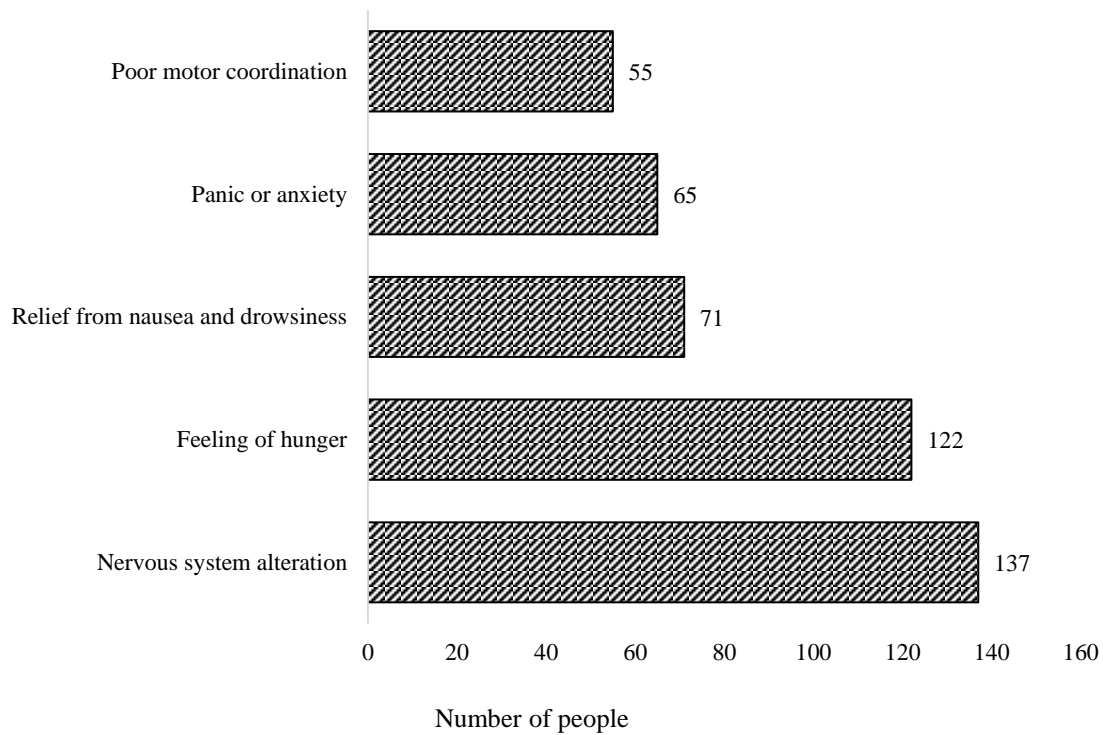


Regarding knowledge of tetrahydrocannabinol (THC), the primary active compound in cannabis, 58% of the respondents admitted to not being familiar with it. Nevertheless, 30% recognize the effects associated with THC.

Graph 4 Preparation of Cannabis-infused Foods

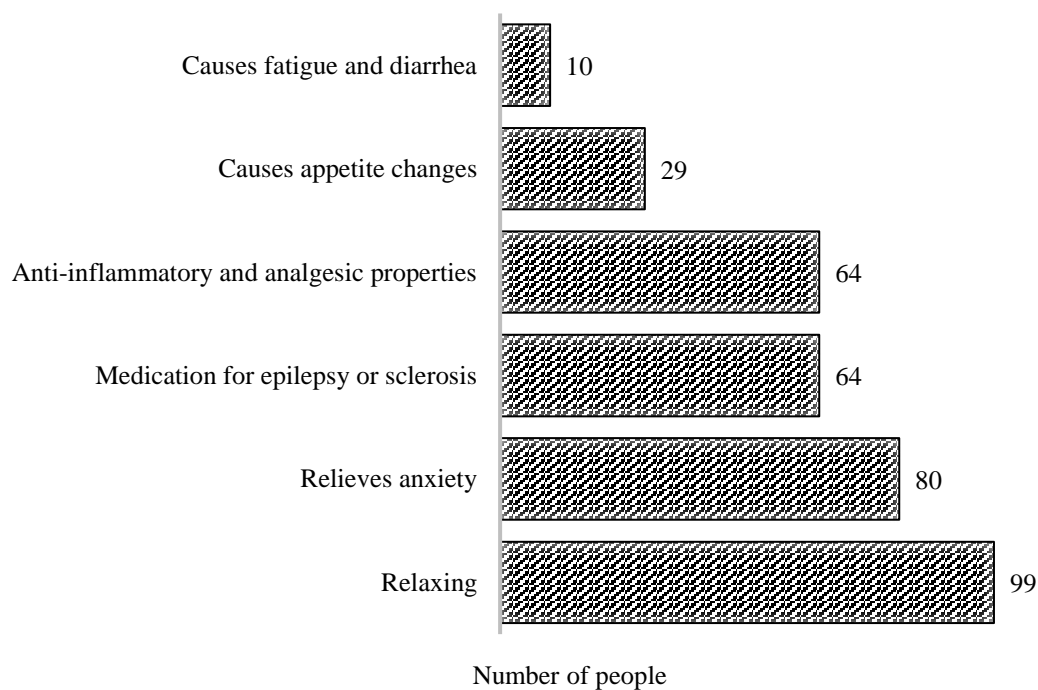


According to respondents familiar with the effects of THC, 30.79% consider the alteration of the nervous system to be one of its main effects, followed by the sensation of hunger at 27.41%. In contrast, low coordination was identified as the least known effect, with only 12.35% awareness, as depicted in Graph 5. THC Effects Known by Survey Participants.

Graph 5 THC Effects Known by Survey Participants

On the other hand, only 28% of the respondents have knowledge about Cannabidiol (CBD). It is noteworthy that a significant 78% of the individuals surveyed regarding the effects of CBD indicated complete unfamiliarity with them. Among the respondents, 22.25% identify the relaxing effect as one of the main attributes attributed to cannabis consumption, followed by anxiety relief, recognized by 17.98% of the respondents. In contrast, only 2.25% of the respondents identify tiredness and diarrhea as effects derived from cannabis use, as presented in Graph 6. CBD Effects Known by Survey Participants.

In response to the question about the consumption of cannabis-infused foods, 37% of the respondents claimed to have ingested such foods. When asked about their willingness to try food with cannabis, 67% responded affirmatively, while 23% were undecided about this possibility. Regarding attendance at restaurants that offer cannabis-infused foods, 61% stated that they would be willing to go, while only 12% refused to do so.

Graph 6 CBD Effects Known by Survey Participants

In terms of perception, 73% of the respondents do not consider cannabis-infused foods to be harmful, in contrast to the 3% who do. Additionally, a notable 82% expressed support for the use of cannabis in gastronomy.

Regarding cannabis consumption in general, 51% of the respondents indicated having tried or consumed this substance in some of its forms, not necessarily in foods. Of these, 39.10% have consumed it in the form of joints, 44.71% have ingested it in foods or as medication, and 49% have not consumed cannabis in any form.

Furthermore, because of the literature review, 30 cannabis-based recipes were compiled, categorized into entries, soups and creams, main courses, desserts, beverages, bread, Mexican recipes, and others, detailed in Table 2. Cannabis-Based Recipes.

Table 2 Cannabis-Based Recipes

Category	Name
Appetizers	Vegetable pie
	Ceviche
Soup and creams	Vegetable soup
	Tomato soup
	Mushroom soup
	Green cream soup
Main course	Salmon
	Chicken breast
	Hamburger
	Lasagna
Desserts	Classic Brownies
	Chocolate chip cookies
	Chocolate cake
	Lemon mousse with yogurt
	Mint ice cream
Non-alcoholic beverages	Infusion
	Strawberry milkshake
	Hot chocolate
Alcoholic beverage	Mojito
	Liqueur
	Mariman
	Green dragon
Bread	Boxed bread
	Hot cakes
Mexican recipies	Pan de muerto
	Pozole
	Enchiladas
Extras	Butter
	Oil

As part of the achievement of the overall goal of promoting cannabis gastronomy, profiles were established on the social media platforms Instagram and Facebook under the name "Cannabis Gastronomy." Since its creation on September 26, 2021 (refer to Figures 8a and 8b), continuous monitoring has been maintained until March 2022. During this period, the following results were recorded on Instagram.

Regarding the Instagram social media platform, the results obtained are depicted in Figure 3.7, illustrating the achieved reach. Over a span of 5 months with a total of 33 posts, 85 followers were gained, and 370 likes were obtained.

As for the Facebook platform, a total of 163 followers were reached, and 157 'likes' were garnered in the posts. These publications generated a reach of up to 627 individuals, as detailed in Figure 3.8. Results of the posts on Facebook.

The dissemination of cannabis gastronomy through 8 virtual talks within the gastronomy program of TESVB proved to be an excellent way to introduce and explore an innovative and relevant topic in the culinary field.

Reaching 75 students from different semesters (1st, 3rd, 5th, and 7th) is a significant achievement, as it allowed for sharing knowledge and experiences with a broad range of apprentices, from those just starting their training to those more advanced in their careers.

Figure 8 a) Instagram, a social media platform where cannabis gastronomy was promoted, b) Facebook, a social media platform where cannabis gastronomy was promoted



a)



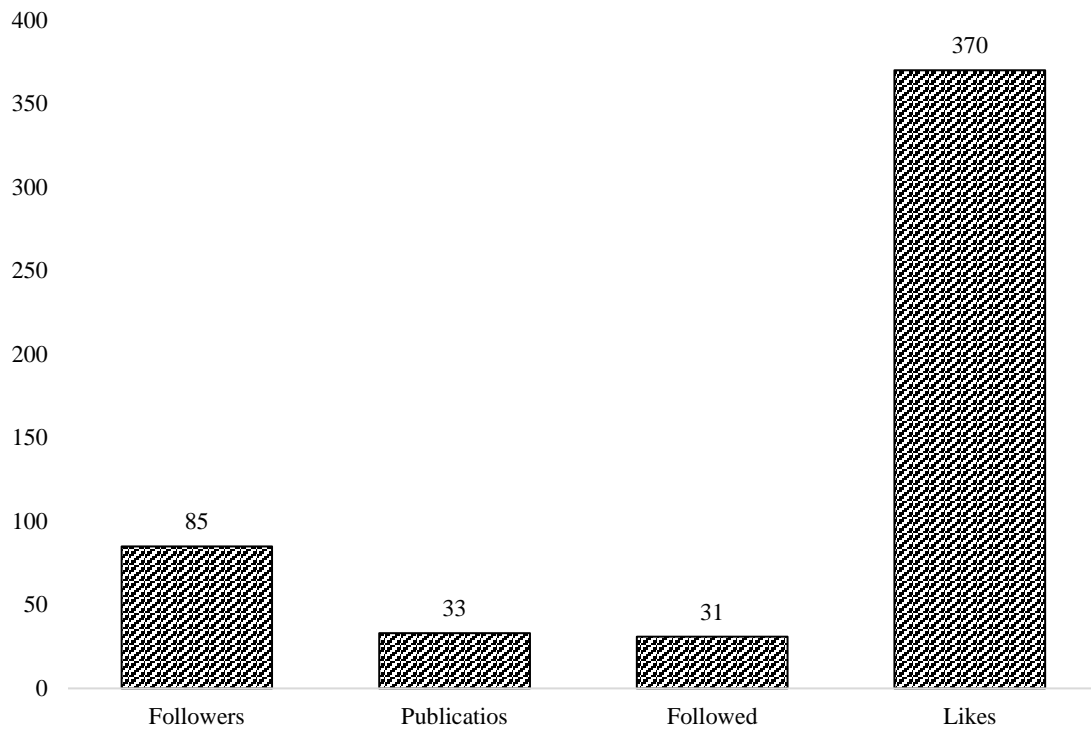
b)

The diversity of the audience provided an opportunity to address the topic from various perspectives and levels of understanding, thereby enriching the overall comprehension of cannabis gastronomy.

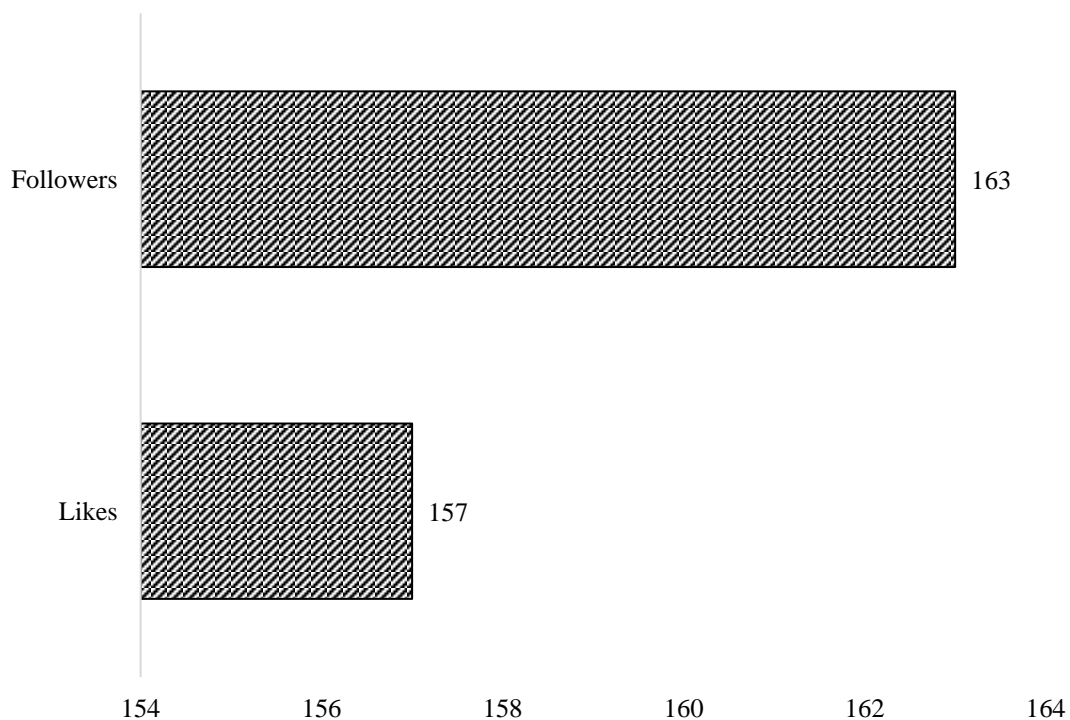
The talks were informative, educational, and sparked a positive and thoughtful interest among the students. Furthermore, initiatives of this nature not only expand knowledge but can also foster open and responsible dialogue on a topic that is gaining relevance in both culinary and medicinal contexts.

In conclusion, the research highlights the growing interest in cannabis cuisine within the culinary community but underscores the need for a deeper understanding of compound extraction and the effects of cannabis in gastronomy. This knowledge is crucial for the responsible and creative use of cannabis in the kitchen.

Graph 7 Results obtained from the dissemination on Instagram are as follows



Graph 8 Resulted of the post on Facebook



4. Acknowledgments

We would like to express our sincere gratitude to the National Technological Institute of Mexico for their invaluable support and contribution during the development of this research. The support provided by this institution has been crucial to the success of this project, granting us access to resources, academic guidance, and a conducive environment for our research endeavors.

Likewise, we extend our appreciation to the Autonomous University of the State of Mexico, whose support has been fundamental at every stage of this work. The academic backing and resources provided by this institution have significantly enriched our research efforts.

We deeply appreciate both institutions for their commitment to academic excellence, their ongoing support, and the opportunity afforded to carry out this project. Their contributions have been essential to the growth and success of this research.

5. Conclusions

Knowledge and Perception of Cannabis Gastronomy:

There is a high overall level of knowledge about cannabis among respondents (94%), but there is a significant lack of understanding about cannabis gastronomy (68% are unfamiliar with its culinary fundamentals).

Most respondents (57%) admit to having no information about cannabis gastronomy, although a significant proportion (59%) claims to have knowledge about it.

The general perception of cannabis-infused foods is mostly positive (only 3% believe they are harmful), indicating a willingness to try them (67%) and visit restaurants that offer them (61%).

Profile of Respondents:

Many participants are culinary students (61%), with minimal representation from restaurant industry professionals (1.6%).

The surveyed group is predominantly composed of young individuals, with an age range between 18 and 25 years (71.68%), and a majority being female (58%).

Knowledge Level about Cannabis Components:

Although the majority have knowledge about cannabis, a substantial portion (58%) is unaware of the active compound THC, while a considerable number (78%) is unfamiliar with the effects of CBD. THC effects are more widely known than those of CBD. Respondents identify effects such as alterations in the nervous system (30.79%) and increased appetite (27.41%) as the most common.

Habits and Cannabis Consumption:

A significant percentage of respondents have tried cannabis-infused foods (37%) and express a willingness to do so in the future (67%). Furthermore, the majority does not consider these foods harmful (73%).

Regarding general cannabis consumption, over half of the respondents have tried or consumed the substance in various forms (51%).

Promotion and Dissemination of Cannabis Gastronomy:

A social media promotion strategy was implemented to promote cannabis gastronomy. A modest but significant number of followers and likes were achieved on Instagram (85 followers, 370 likes) and Facebook (163 followers, 157 likes).

Virtual talks were conducted in the TESVB gastronomy program, reaching 75 students from different semesters. This allowed for sharing knowledge and experiences, enriching understanding of cannabis gastronomy from various perspectives.

Overall, there is a growing interest in cannabis gastronomy among culinary students, with a good overall knowledge of cannabis. However, significant gaps are identified in the understanding of the active components of cannabis and their effects. Social media promotion and educational talks have proven to be effective methods in fostering dialogue and understanding on this emerging topic in the culinary industry.

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Potential analysis resources for rural Tourism in the community of San Lucas, Amanalco; State of Mexico, Mexico

Análisis de potencial Turístico de recursos para Turismo rural en la comunidad de San Lucas, Amanalco, Estado de México, México

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DOI: 10.35429/P.2023.2.95.106

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A. González, D. Castlán, A. Santillán, R. García and L. León (AA. VV.). Research perspectives at TESVB in the face of Industry 5.0 - Proceedings-©ECORFAN-México, México, 2023

Abstract

The San Lucas Community is a territory characterized by the inefficient promotion and practice of rural tourism, which has repercussions on the boom of projects within the region through the offer of activities derived from the use of nature, agriculture, and rural culture. Therefore, resources were identified and prioritized; the data collected were subjected to valuation matrices, measuring a total of 51 indicators. Subsequently, the calculation of the Tourism Potential Index was carried out along the lines of the pillars of sustainable development. As a result, the development of three different routes focused on gastronomy, agriculture and the nature of San Lucas was obtained. Likewise, as a means of dissemination, a website was implemented that will contribute to the promotion, to strengthen the strategies and thus encourage tourism in the study area.

Substantiable Development, Ecotourism, Agrotourism, Communitarian Development, Gastronomy Tourism

Resumen

La Comunidad de San Lucas es un territorio que se caracteriza por la ineficiente promoción y práctica del turismo rural que repercute en el auge de proyectos dentro de la región mediante la oferta de actividades derivadas del aprovechamiento de la naturaleza, la agricultura y la cultura rural. Por lo que se realiza la identificación y jerarquización de recursos; los datos recabados se sometieron a matrices de valoración, midiendo un total de 58 indicadores. Posteriormente se realiza el cálculo del Índice del Potencial Turístico sobre la línea de los pilares del desarrollo sustentable. Como resultado se obtuvo el desarrollo de tres distintas rutas enfocadas en la gastronomía, la agricultura y en el medio ambiente de San Lucas. Así mismo, como medio de difusión se implementó un sitio web que contribuirá a la promoción, para el fortalecimiento de las estrategias y así incentivar al turismo en el área de estudio.

Desarrollo sostenible, Ecoturismo, Agroturismo, Desarrollo Comunitario, Turismo Gastronómico

1. Introduction

According to the data the World Tourism Organization, in the last decade tourism has represented 7% of the world trade. However, it is inevitable to ignore the growing interest towards new trends that point to a conscious tourism interested in the contact with rural communities and the natural environment. As highlighted by (Sánchez Sánchez & Sánchez Jesús, 2018), for the current times rural tourism has been seen as an alternative for the economic impulse in the provinces with rural population, constituting itself as a tool for community development under the framework of sustainability (Parra Cárdenas, Cisneros Mustelier, & Velasteguí López, 2019). In addition, as highlighted by (González Domínguez, Osorio García, & Delgado Cruz, 2021), for these studies, it is important to understand the phenomena that occur in the rural environment, since this allows visualizing the productive strategies necessary to achieve the expected impact. Although, these places have an exceptional natural wealth, sometimes we face local ignorance of it, a case that involves the community of San Lucas, as well as the lack of job opportunities and the scarce promotion of rural tourism in the area.

Therefore, the study is developed with the objective of identifying the tourism potential of the place for the development of a rural tourism proposal that works as a strategy to solve the problems that negatively affect San Lucas. The research was divided into seven phases. In the first phase, the contextualization of the study area was carried out so that in the second phase a registry of the identified tourism resources could be obtained. Subsequently, in the third phase, an inventory of thirteen resources was prepared by means of a technical sheet. In phase four, the hierarchical ranking is deployed in accordance with the Manual for the Preparation and Updating of the Tourism Resources Inventory.

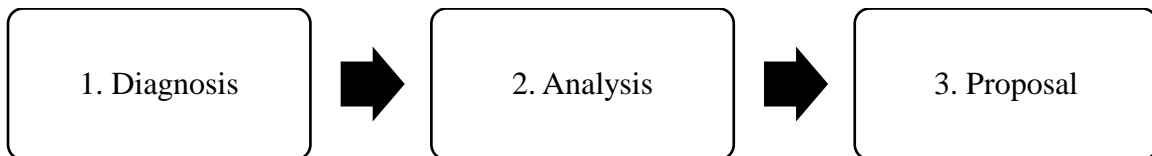
In the fifth phase, the resources were evaluated using calculation matrices, scoring a total of 58 indicators that gave a total of 174 points for the six evaluation matrices; the results obtained were submitted to the Tourism Potential Index (IPT) formula.

For phase six, according to the values calculated, the proposal of three routes of a gastronomic, agrotourism and ecotourism nature was elaborated. Finally, the seventh phase concluded with the programming of a web site for the promotion of rural tourism in San Lucas. It is important to consider that tourism is a subject that should be measured beyond the economic and focus on the social and environmental line for the proper implementation and management of tourism in rural environments.

2. Methodology

The methodology to be used was based on Quijano Ricaurte (2009) *"It can be inferred that, in general, a planning process includes the stages of diagnosis, analysis and proposal"*.

Figure 1 Tourism planning process



Source: Own Elaboration with information from (Ricaurte Quijano, 2009)

Therefore, the research is divided into three main stages (Diagnosis, Analysis and Proposal), giving a total of seven phases.

The Diagnostic stage comprises the following phases:

1. Contextualization of the territory.
2. Resource identification.
3. Registration and classification of resources.
4. Hierarchization and cartographic identification.

In the first phase (Contextualization of the territory) of this stage, an information sheet of San Lucas was obtained based on the information registered by the National Institute of Statistics and Geography (INEGI) and the Municipality of Amanalco.

Table 1 San Lucas Information Sheet

Geographical location	Community of San Lucas, Municipality of Amanalco, State of Mexico.
No. of inhabitants	1009
Predominant economic activity	Agriculture, livestock, fishing.
Predominant culture	Otomí
Level of marginalization	High
Natural resources	Water bodies, flora, and fauna.

Source: Own elaboration with information from (National Institute of Statistics and Geography (INEGI), 2020) y (H. Ayuntamiento del Municipio de Amanalco, 2022)

These phases are elaborated based on the Manual for the Preparation and Updating of the Tourism Resources Inventory by the Ministry of Foreign Trade and Tourism of Peru (Ministerio de Comercio Exterior y Turismo [MINCETUR], 2018).

The categorization is divided into five categories in order to better manage an inventory (Table 2).

Table 2 Categories of Natural Resources

Category	Features
Natural sites	This category groups diverse elements of nature that, due to their own attributes.
Cultural manifestations	The different cultural expressions of the country, region or people are considered, from ancestral times (progressive development of a certain place), such as archaeological sites, historical sites, among others.
Folklore	It is the set of traditions, customs, legends, poems, arts, gastronomy, etc., of a given country, region or people. It refers to the intangible elements or goods of the culture that have prevailed until today.
Contemporary technical, scientific or artistic achievements	They include those current works, movable or immovable, that show the process of culture, civilization and technology, with relevant characteristics for tourist interest.
Scheduled events	Category grouping all organized events, current or traditional, public or private, that attract tourists as spectators or actors.

Source: Ministry of Foreign Trade and Tourism, 2018

For the fourth phase of this stage, the hierarchical ranking of the resources according to MINCETUR's Tourist Resource Hierarchy Chart, where the hierarchy levels were identified (Table 3).

Table 3 Hierarchy Levels

Hierarchy	Description
4	Exceptional tourism resources of great significance for the international tourism market.
3	Tourist resources with exceptional features, capable of motivating the flow of domestic and/or foreign visitors.
2	Tourist resources with some striking features capable of attracting regional or local visitors.
1	Tourist resources without sufficient merit to be considered at the level of the previous hierarchies.

Source: Ministry of Foreign Trade and Tourism, 2018

The second stage of analysis consists of the following phases:

1. Choice and adaptation.
2. Field visit and SWOT analysis.
3. Application and obtaining values.

In the selection and adaptation phase, a documentary search of 41 works (including articles and theses) was carried out, where the reference was taken from works such as the "Evaluation of Tourism Potential in the Pedro Vicente Maldonado Canton", by Narváez and the "Evaluation of Tourism Potential with GIS case: The Department of Caldas, Colombia", by Olivar Londoño. This resulted in six valuation matrices comprising different indicators to be measured. Where, a score of 0-3 is considered, being three the high score.

In the evaluation of the Economic Factor, the following indicators were taken into account.

1. Correct distribution of resources
 2. Funds management
 3. Profit sharing
 4. Shock absorption
 5. Amount of employment generated
 6. Visitor age range
 7. Level of attractiveness of demand for festivities and events
 8. Alignment with tourism trends
 9. Visitor's travel motivation
 10. Offer of activities
- This matrix includes a total of 30 points for the evaluation.

For the evaluation of the environmental factor, the following indicators are used.

1. Conservation of natural areas or zones
2. Biotic factors in the ecosystem
3. Flora, fauna and geomorphology content
4. Clean environment
5. Renewable resources
6. Non-renewable resources
7. Exploitation of the resource
8. Regulatory principles and appropriate measures

The matrix includes 24 points as a total score.

In the assessment of the Social Factor, the indicators are understood as follows:

1. Cost of living
2. Community participation
3. Social organization
4. Practice of a dialect or language belonging to the territory.
5. Economic activity
6. Basic services
7. Public health services
8. Security
9. Population density
10. Clean environment

This matrix includes a total of 30 points for the evaluation.

The following indicators are used to evaluate the Resources Factor:

1. Flora and fauna content
2. State of conservation of the attraction
3. State of conservation of the environment
4. Natural deterioration factors
5. Anthropogenic deterioration factors
6. Natural hazards
7. Association with other attractions
8. Arterial pathway connectivity
9. Road safety
10. Millenary practices
11. Content of intangible assets
12. Custom content
13. State of conservation of the environment
14. State of functionality of the cultural heritage
15. The population of the territory is sympathetic to the presence of tourists.
16. Number of visitors motivated by activities related to rural tourism
17. Gastronomic ethnicity
18. Practice of a dialect or language belonging to the territory.
19. Beliefs and rituals
20. Millenary practices
21. Content of intangible assets
22. Custom content
23. State of conservation of the environment
24. State of functionality of the cultural heritage
25. The population of the territory is sympathetic to the presence of tourists.
26. Number of visitors motivated by activities related to rural tourism
27. Gastronomic ethnicity
28. Practice of a dialect or language belonging to the territory.
29. Beliefs and rituals

The matrix includes 87 points as a total score.

The natural resource consists of 57 points, while the cultural resource consists of 30 points.

Regarding the assessment of the Random Factor, the following indicators are considered:

1. Voice and data connectivity
2. Signage and mobility
3. Support infrastructure
4. Type of access roads to the territory
5. General conditions of access roads
6. Type of transport
7. Crossover areas
8. Arterial pathway connectivity
9. Road safety
10. Resting point facilities on access roads

Considering that this is a random value, accessibility is taken as a factor to be measured in this work.

This matrix includes a total of 30 points for the evaluation.

Likewise, a Tourism Potential Index formula was obtained based on the pillars of sustainability

$$I.P.T = VE + VA + VS + VR (RN + RC) + "a" \quad (1)$$

Where:

I.P.T= Index of Tourist Potentiality

VE= Economic Value

VA= Environmental Value

VS= Social Value

VR= Recourses Value

RN= Natural Resource

RC= Cultural Resource

a= Accessibility

The main basis for both the matrices and the formula are the pillars of sustainability, ecological, social and environmental.

The third and final stage, Proposal, comprised two phases:

1. Identification of activities.
2. Proposal design.

3. Results

Stage 1. Diagnosis

Phase 1.1. Contextualization of the territory

The different aspects obtained from San Lucas were captured in an information sheet with relevant data on the community (Table 1).

Phase 1.2. Identification of resources

The identification was based on field visits and information provided by the villagers, resulting in a list of resources (Table 4).

Table 4 Identified resources

Tourist Resource	Features
San Lucas Ecotourism Park	Mountain biking trails and scenic areas
Cañada Oscura Reservoir	Water body
Ojo de Agua	Water spring
El Pocito	Water spring with signs of deterioration.
Cachanillas Ranch	Agro-tourism activities
San Lucas Church	Festivities
Elaboration of Artisan Bread	Economic activity
Mushroom Harvesting	Searching for edible wild mushrooms
Elaboration of Pulque	Self-sustaining activity
Gastronomic diversity "Los Patos Restaurant".	Preparation of various local dishes
Otomi Language	It is part of the cultural identity
Crops	Daily activities
Trout Farm	Breeding and production process

Source: Own Elaboration

Phase 2.3. Registration and classification of resources

The registry is made by means of technical information sheets, giving a total of 13 records. An inventory of the resources recorded is also obtained (Table 5).

Table 5 San Lucas resource inventory

Category	Type	Tourist Resource
Natural Sites	Landscape Areas	San Lucas Ecotourism Park
	Springs	Cañada Oscura reservoir, Ojo de Agua, El Pocito, Rancho Cachanilla, San Lucas Church
Cultural Events	Architecture and urban spaces	Rancho Cachanilla, San Lucas Church
Folklore	Gastronomy	Artisan Bread Making, Mushroom Picking, Pulque Making, Gastronomic Diversity, "Los Patos" Restaurant.
	Ethnic groups	Otomi Language
Contemporary technical, scientific and artistic achievements	Farming and fishing operations	Cultivation of corn, beans, peas, trout farm.

Source: Ministry of Foreign Trade and Tourism, 2018

Phase 2.4. Hierarchization and cartographic identification

The hierarchy is determined by criteria to obtain the degree of importance and usefulness (Table 6).

Table 6 Ranking of tourism resources.

Tourist Resource	Total score	Hierarchy
Bike Park San Lucas	32.2	2
Depósito de Cañada Oscura*	17	1
Ojo de Agua (Adelaido)	17	1
El Pocito	14	1
Rancho Cachanilla	20	2
Iglesia de San Lucas	19	1
Elaboración de Pan	18	1
Recolección de Hongos	14	1
Elaboración de Pulque	18	1
Restaurante Los Patos	22	2
Lengua Otomí	14	1
Cultivación de Plantas	14	1
Granja de truchas	27	2

Source: Own Elaboration

Cartographic identification is carried out using Google Earth Pro (Figure 2)

Figure 2 Cartographic identification of resources



Source: Own Elaboration

Stage 2. Analysis

Phase 2.1. Choice and adaptation

The choice and adaptation was made on the basis of documentary research, based on a selective criterion, leaving the following works as inspiration to elaborate the analysis.

1. Evaluación del Potencial Turístico con SIG Caso: El Departamento de Caldas, Colombia (Olivar Londoño, 2020).
2. Evaluación del Potencial Turístico en la Comunidad de Bella Vista, Zona de Influencia del Bosque Protector Paso Alto, Parroquia San José de Minas, Provincia de Pichincha (Chontasi Imba, 2018).
3. Evaluación del Potencial Ecoturístico del Distrito de Sincos – Jauja (Parra Guillermo, 2019).
4. Evaluación del Potencial Turístico del Cantón Echeandía, Provincia Bolívar (Bonilla Gordón, 2019).
5. Evaluación del Potencial Turístico en El Cantón Pedro Vicente Maldonado (Narváez Chimarro, 2018).

Six matrices and a formula based on the pillars of sustainable development were adapted to calculate the tourism potential index for the resources of San Lucas.

Phase 2.2. Field visit and SWOT analysis.

The field visit was conducted with the purpose of preparing an Analysis of Strengths, Weaknesses, Opportunities and Threats (Table 7), based on the information gathered from semi-structured interviews that were carried out with a 90% confidence level and allowing a percentage margin of error of ten. The number of 82 is obtained as the number for the sample size. The analysis shows the most relevant aspects of the community.

Table 7 SWOT Analysis of the San Lucas Community

Strengths	Opportunities
F1. Almost virgin landscapes and without a high presence of urban footprint. F2. Ejidatarios' interest in conserving their land. F3. Existence of tourism resources.	O1. Participation in conservation and sustainable development projects. O2. Participation in farmers' fairs to share strategies for sustainable land use.
Weaknesses	Threats
D1. Lack of knowledge and low appreciation of the local culture (Otomí). D2. Low environmental and cultural education of the population. D3. Participatory interest of the locals to be part of projects that are already being developed in the community.	A1. Insecurity within the community. A2. Death of population that preserved local knowledge and customs. A3. Insufficient public resources to support conservation work.

Source: Own Elaboration

Phase 2.3. Application and obtaining values.

For this phase, the thirteen were submitted to the evaluation matrices, calculating a total of 174 points as the expected value.

Table 8 General Values of Evaluated Indicators of the Valuation Matrices

Factors	Recourses												
	San Lucas Ecotourism Park	Rancho cachanillas	Iglesia de san lucas	Dark glen reservoir	The adelaide cannon	Ojo de agua san francisco	Artisanal pulque bread	Mushroom picking	Otomí language	Plant cultivation	Pulque production	Los Patos Restaurant	Trout farm
Economic	10	10	10	8	20	10			3	18	17	25	26
Environmental	10	8	9	9	10	10	9			4	9	8	11
Social	23	23	23	23	23	23	23	23	23	23	23	23	23
Recourses	36	38	24	20	18	15	35	35	13	36	37	26	33
Accessibly	13	16	18	13	11	9	13	10	17	16	16	20	10
Total points	92	95	84	73	82	67	80	68	56	97	102	102	103

Source: Own Elaboration

Therefore, to obtain the Index of Tourism Potential (IPT), the values were converted to decimal figures, where the resources that obtained a result greater than 17.4 are considered to have a high IPT margin, those that exceed the margin of 5.7 are considered to have a medium margin, while a low margin is below 5.6 (Table 9).

Table 9 General Values of the Tourism Potential Index (TPI) Calculation.

Factors Resources	Economic (V.E)	Environmental (V.A)	Social (V.S)	Recourses (V.R)	Accessibility (V.A)	I.P.T	P.T.I margin
Parque Ecoturístico San Lucas	1	1	2.3	3.6	1.3	9.2	Medium
Rancho Cachanillas	1	0.8	2.3	3.8	1.6	9.5	Medium
Iglesia de San Lucas	1	0.9	2.3	2.4	1.8	8.4	Medium
Depósito de Cañada Oscura	0.8	0.9	2.3	2	1.3	7.3	Medium
El Cañito De Adelaido	2	1	2.3	1.8	1.1	8.2	Medium
Ojo De Agua San Francisco	1	1	2.3	1.5	9	6.7	Medium
Pan Artesanal de Pulque		0.9	2.3	3.5	1.3	8	Medium
Recolección de Hongos			2.3	3.5	1	6.8	Medium
Lengua Otomí	0.3		2.3	1.3	1.7	5.6	Low
Cultivación de Plantas	1.8	0.4	2.3	3.6	1.6	9.7	Medium
Elaboración de Pulque	1.7	0.9	2.3	3.7	1.6	10.2	Medium
Restaurante Los Patos	2.5	0.8	2.3	2.6	2	10.2	Medium
Granja de Truchas	2.6	1.1	2.3	3.3	1	10.3	Medium

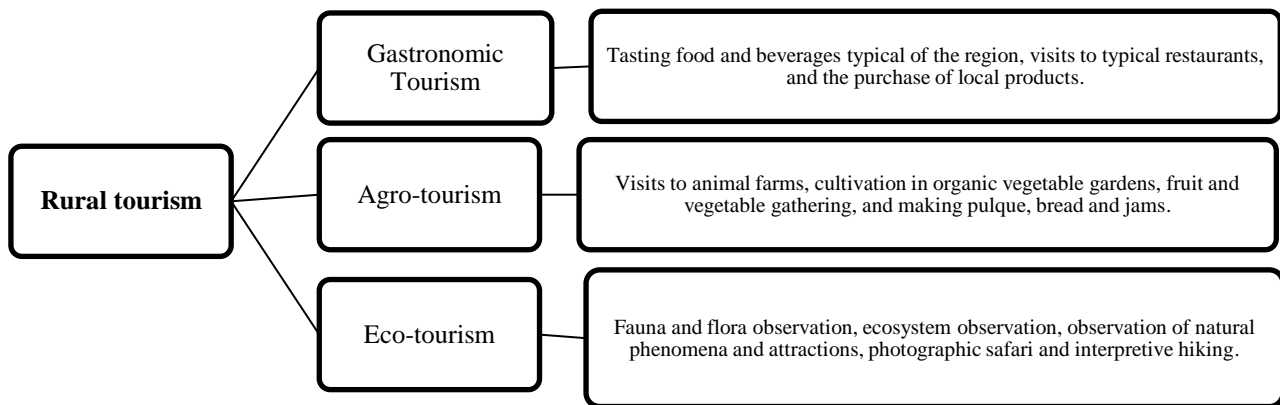
Source: Own Elaboration

Stage 3. Proposal

Phase 3.1. Identification of activities

In order to determine the activities, a schematization of the modalities that comprise rural tourism and the activities that are carried out for each one was elaborated. Based on the above results, the following activities were identified.

Figure 3 Diagram of rural tourism modalities



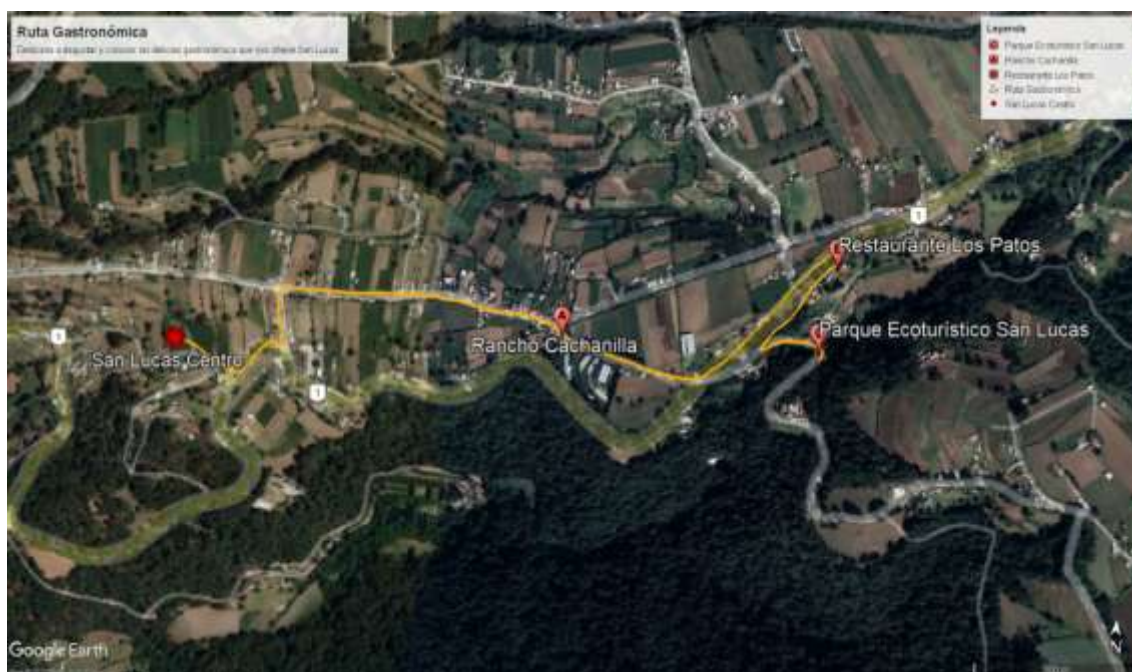
Source: Own Elaboration with information from (Cortijo Villa Rosa, 2013) and (Vida Alternativa, s.f.)

Phase 3.2. Proposal design.

For the proposal, the resources that obtained high scores are taken into account; however, those that did not reach a hierarchy or potential index are not an isolated case. Therefore, the proposal is based on the establishment of three routes with a rural tourism theme, routes that are intended to be a tool for environmental and cultural education for locals and visitors interested in learning about the beauties of this community.

The first proposed route is based on gastronomic tourism, including activities such as tasting food and beverages typical of the region, visits to typical restaurants, and the purchase of local products (Figure 4).

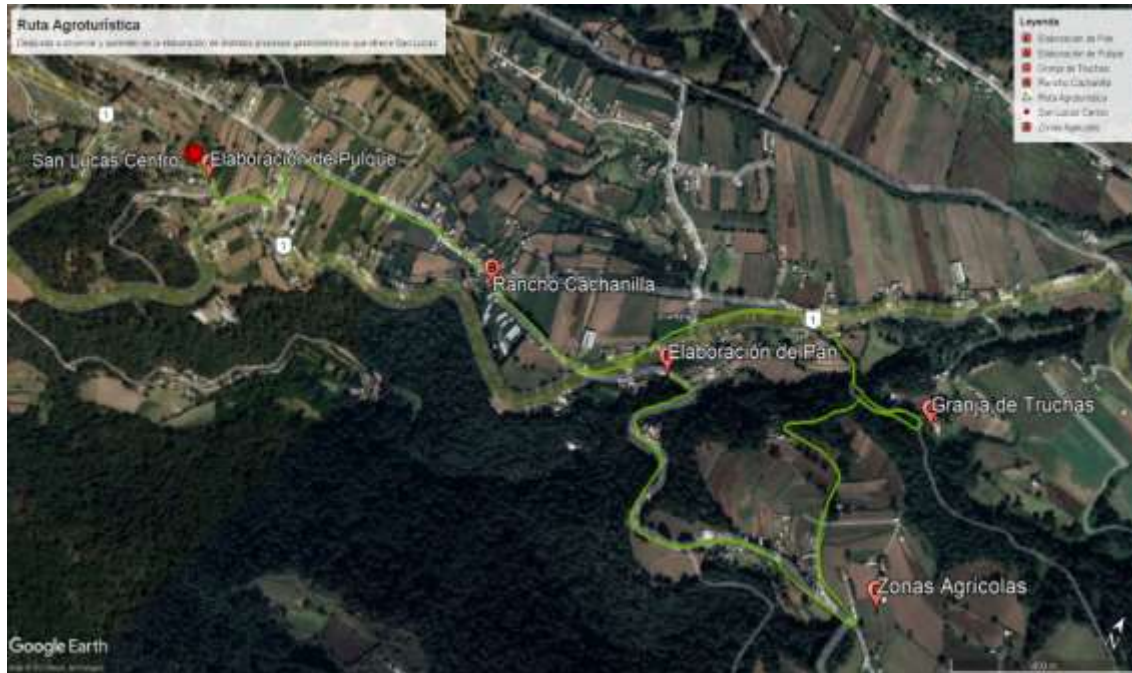
Figure 4 Proposed Gastronomic Route in San Lucas



Source: Own Elaboration

The second option includes agro-tourism with the following activities: visits to animal farms, cultivation in organic vegetable gardens, fruit and vegetable gathering, and making pulque, bread and jams (Figure 5).

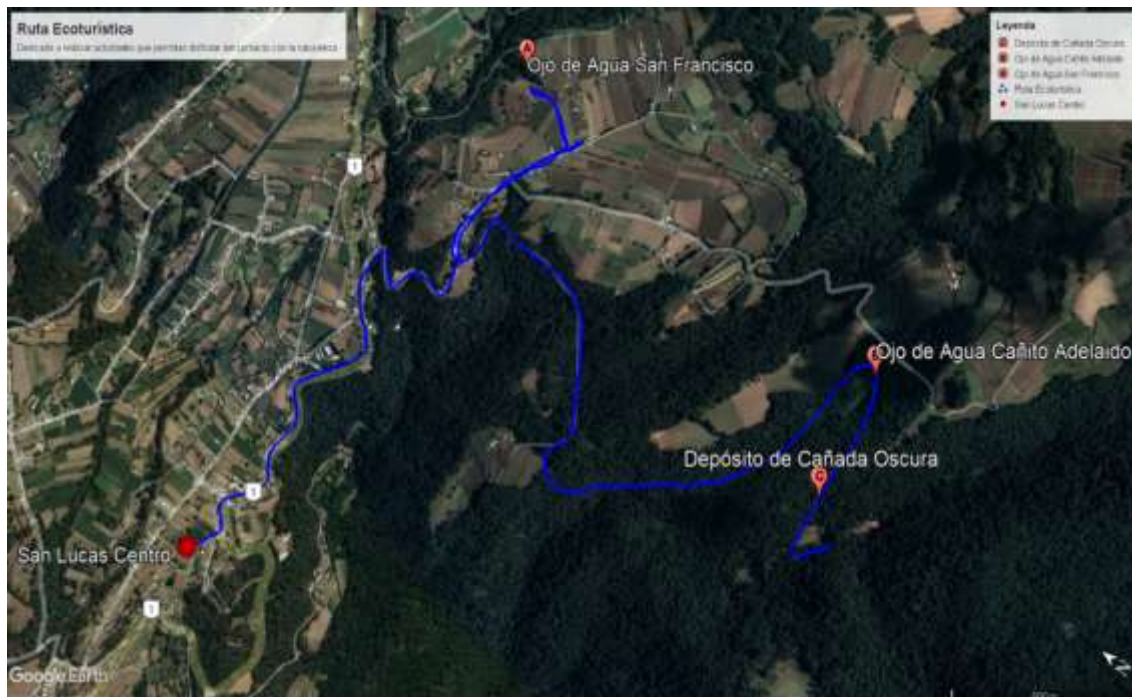
Figure 5 Proposed Agrotourism Route in San Lucas



Source: Own Elaboration

The third proposed route is based on ecotourism activities: fauna and flora observation, ecosystem observation, observation of natural phenomena and attractions, photographic safari and interpretive hiking (Figure 6).

Figure 6 Proposed Ecotourism Route in San Lucas



Source: Own Elaboration

Conclusions

Identifying the rural tourism potential of San Lucas Amanalco was of vital importance to generate proposals and strategies to improve job opportunities; this has an impact on the improvement of the quality of life of these communities through a greater economic benefit.

In this sense, there are areas that have sufficient resources to be promoted as a rural tourism destination; however, the lack of training of people in the proper management of resources limits the sustainable tourism activities that can be taken advantage of along the different routes. To complement the field study, it is necessary to generate hierarchy manuals of potential resources to enrich the routes and thus boost the attractiveness for visitors.

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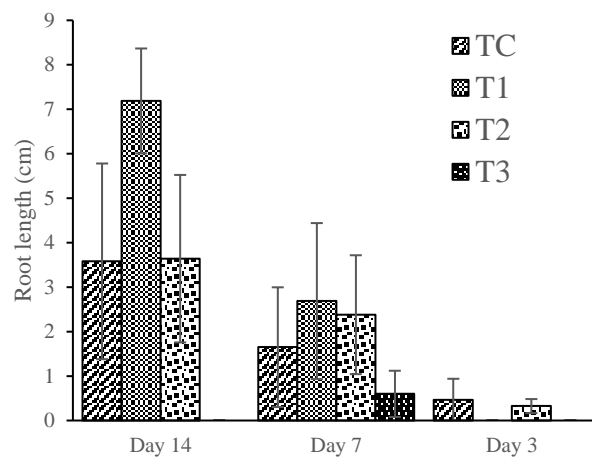
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ISBN 978-607-8948-22-2



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