

## Feasibility and relevance study for the opening educational programs at the bachelor's level of the Technological Institute of La Paz

### Estudio de factibilidad y pertinencia para la apertura de programas educativos a nivel licenciatura de Instituto Tecnológico de La Paz

VERGARA-GARIBALDI, María Olivia†\*, VILLEGAS-BARBA, María Jesús, MENDOZA-OSUNA Evangelina and YEPEZ-CASTILLO, Grecia Esmeralda

*Tecnológico Nacional de México- Instituto Tecnológico de La Paz, México.*

ID 1<sup>st</sup> Author: *María Olivia, Vergara-Garibaldi* / ORC ID: 0009-0001-9472-5218, CVU CONAHCYT ID: 407321

ID 1<sup>st</sup> Co-author: *María Jesús, Villegas-Barba* / ORC ID: 0009-0008-4911-8065, CVU CONAHCYT ID: 466107

ID 2<sup>nd</sup> Co-author: *Evangelina, Mendoza-Osuna* / ORC ID: 0009-0003-1645-2335, CVU CONAHCYT ID: 1319784

ID 3<sup>rd</sup> Co-author: *Grecia Esmeralda, Yopez-Castillo* / ORC ID: 0009-0003-9159-494X, CVU CONAHCYT ID: 1236745

DOI: 10.35429/JOTE.2023.18.7.20.27

Received January 30, 2023; Accepted June 30, 2023

#### Abstract

It's important to mention that the study was carried out under two aspects: Field and documentary research. It contains three fundamental items that make up the evaluation criteria and help to elaborate a diagnosis and evaluation of the environment of the Technological Institute of La Paz. These three items, as central core, for the feasibility and belonging of the opening of a new educational program are: Socioeconomic Factors, Institutional Factors and Development Perspectives. The methodology consisted of a quantitative research of a descriptive type, whose objective was to detect the demand of High School students, ITLP Graduates and the Productive Sector of the State of Baja California Sur. Of the options of Educational Programs in which the three interest groups coincided - gastronomy, Management Engineering, Mechatronics Engineering, Biomedical Engineering, Biotechnological Engineering, Chemical Engineering, Nanotechnology Engineering, Renewable Energy Engineering, Tourism Degree-, any of them would contribute to the 6 strategic areas of the TecNM in which the lines of research are concentrated.

#### Resumen

Es importante mencionar que el presente estudio se llevó a cabo bajo dos vertientes: investigación de campo y documental. Contiene tres rubros fundamentales que conforman los criterios de evaluación y ayudan a elaborar un diagnóstico y evaluación del entorno del Instituto Tecnológico de La Paz. Estos tres rubros, como núcleos centrales, para la factibilidad y pertenencia de la apertura de un nuevo programa educativo son: Factores Socioeconómicos, Factores Institucionales y Perspectivas de desarrollo. La metodología consistió en una investigación cuantitativa de tipo descriptivo, cuyo objetivo fue detectar la demanda de los estudiantes de Escuelas de Nivel Medio Superior, de Egresados del ITLP y del Sector Productivo del Estado de Baja California Sur. Conclusión. De las opciones de Programas Educativos en los que coincidieron los tres grupos de interés - gastronomía, Ingeniería en Administración, Ingeniería Mecatrónica, Ingeniería Biomédica, Ingeniería Biotecnológica, Ingeniería Química, Ingeniería en Nanotecnología, Ingeniería en Energías Renovables, Licenciatura en Turismo-, cuales quiera de ellas aportarían a las 6 áreas estratégicas del TecNM en las cuales se concentran las líneas de investigación.

#### Feasibility, Pertinence, Educational Programs

#### Factibilidad, Pertinencia, Programas Educativos

**Citation:** VERGARA-GARIBALDI, María Olivia, VILLEGAS-BARBA, María Jesús, MENDOZA-OSUNA Evangelina and YEPEZ-CASTILLO, Grecia Esmeralda. Feasibility and relevance study for the opening educational programs at the bachelor's level of the Technological Institute of La Paz. Journal of Technical Education. 2023. 7-18:20-27.

\* Correspondence from the author: (E-mail: maria.vg@lapaz.tecnm.mx)

† Researcher contributing as first author.

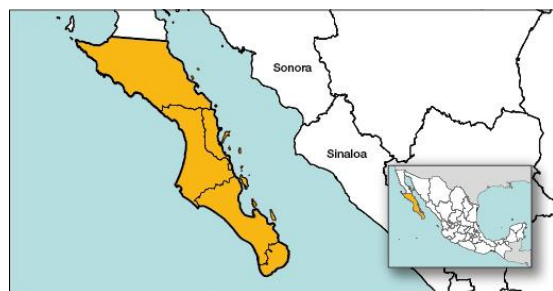
## Introduction

We are in a society in constant change and that is why we are interested in knowing what young people want to study in upper secondary schools. Do we have educational programmes that meet the needs of students with respect to the academic training they seek and in which they wish to dedicate themselves?

This is why we undertook the task of carrying out this research: Study of feasibility and relevance for the opening of educational programs at the undergraduate level of the Instituto Tecnológico de La Paz.

As part of the objectives, they are made up of 4 criteria: Analysis of the environment, social policy, economic policy and student demand.

The importance lies in knowing if the Instituto Tecnológico de La Paz has an educational offer relevant to the needs of the state of Baja California Sur.



**Figure 1** Map

Source:

<https://www.inegi.org.mx/app/areasgeograficas/?ag=03#collapse-Resumen>

In the year 2020 its population was 798,447 people. Its schooling is 10.3 years.

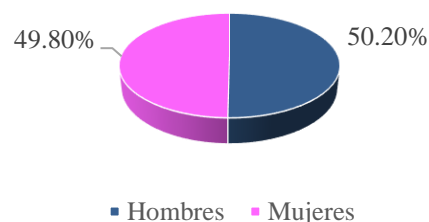
Feasibility and relevance study for the opening of undergraduate educational programmes at the Instituto Tecnológico de La Paz.

In most developing countries, children and adolescents already constitute the majority of the population.

This demographic dividend represents the most valuable force we have in shaping a better world for all and provides us with an unparalleled opportunity to make rapid progress on the Sustainable Development Goals (SDGs).

Young people will be the people who will lead the future, the decision-makers of the country. The state of Baja California Sur has 4,485 young people who are due to enter high school in 2019 and 5,213 first year students who are due to enter school in 2020. These students are distributed in the 5 municipalities of our state: Los Cabos, La Paz, Comondú, Loreto, Mulegé, La Paz, Comondú, Loreto and Mulegé.

Students Upper secondary education level



**Graphic 1**

Source: Own elaboration

A study was carried out in which young people from high schools in the 5 municipalities of the state of Baja California Sur were surveyed and the following results were obtained:

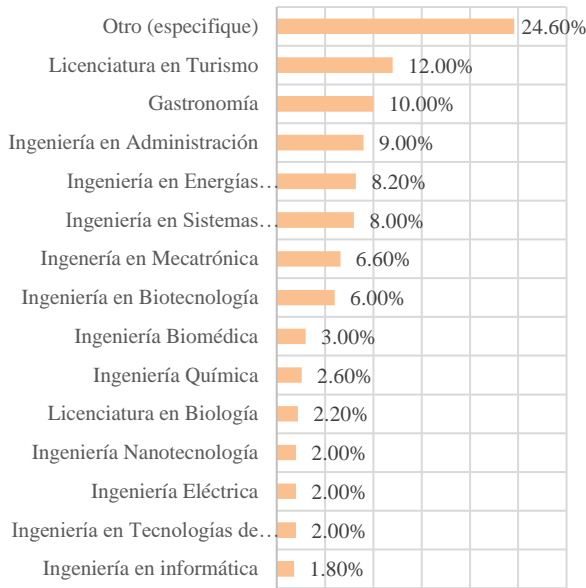
The demand of young people in the high schools is:

Student demand for higher education careers in the state of Baja California Sur	
CARRERA	%
Computer Engineering	1.80%
Information and Communications Technology Engineering	2.00%
Electrical Engineering	2.00%
Nanotechnology Engineering	2.00%
Bachelor of Science in Biology	2.20%
Chemical Engineering	2.60%
Biomedical Engineering	3.00%
Biotechnology Engineering	6.00%
Mechatronics Engineering	6.60%
Computer Systems Engineering	8.00%
Renewable Energy Engineering	8.20%
Management Engineering	9.00%
Gastronomy	10.00%
Bachelor's Degree in Tourism	12.00%
Other (specify)	24.60%
** Other: Medicine, Psychology, Law	

**Table 1** Demand

Source: Own elaboration

**Student demand for higher education careers in the state of Baja California Sur**



**Graphic 2 Demand**

Source: Own elaboration

It can be seen that young people are interested in the option of Others, with the most requested degrees being medicine, psychology and law. These degrees are not offered by the Tecnológico Nacional de México (TecNM) or the Instituto Tecnológico de La Paz (ITLP). The following are: Bachelor's Degree in Tourism 12%, Gastronomy 10%, Engineering in Administration 9%, Engineering in Renewable Energies 8.20%, Engineering in Computer Systems 8%, Engineering in Mechatronics 6.6%, Engineering in Biotecnology 6%, these being the most in demand by young people in high schools or at the upper secondary level of education.

The demand from young people who have already graduated from one of the 9 degree courses at the Instituto Tecnológico de La Paz is for both bachelor's and master's degrees:

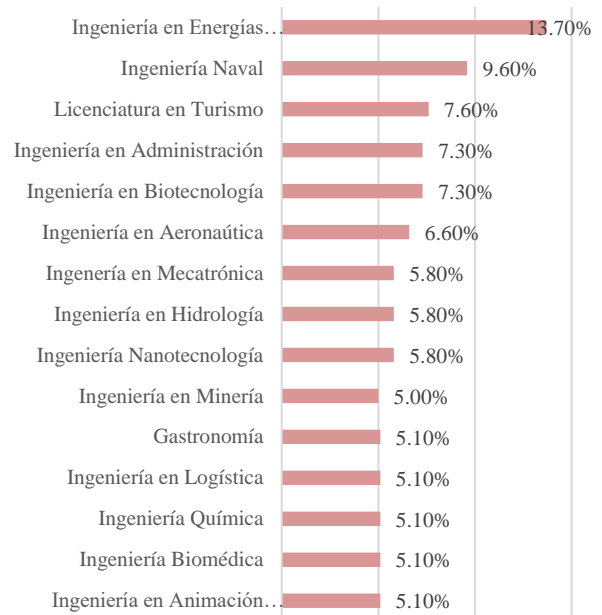
Demand for careers by graduates of the Instituto Tecnológico de La Paz	
CAREER	%
Digital Animation and Visual Effects Engineering	5.10%
Biomedical Engineering	5.10%
Chemical Engineering	5.10%
Logistics Engineering	5.10%
Gastronomy	5.10%
Mining Engineering	5.00%
Nanotechnology Engineering	5.80%
Hydrology Engineering	5.80%

Mechatronics Engineering	5.80%
Aeronautical Engineering	6.60%
Biotechnology Engineering	7.30%
Management Engineering	7.30%
Bachelor's Degree in Tourism	7.60%
Naval Engineering	9.60%
Renewable Energy Engineering	13.70%

**Table 2 Demand**

Source: Own elaboration

**Demand for careers by graduates of the Instituto Tecnológico de La Paz**



**Graphic 3 Demand**

Source: Own elaboration

The careers with the highest demand from young graduates of the Instituto Tecnológico de La Paz are Engineering in Renewable Energies 13.7%, Naval Engineering 9.60%, Bachelor's Degree in Tourism 7.6%, Engineering in Administration 7.3%, Engineering in Biotecnology 7.3%, Engineering in Aeronautics 6.6%, and Engineering in Aeronautics 6.6%.

**Demand for Master's Degrees by graduates of the Instituto Tecnológico de La Paz**

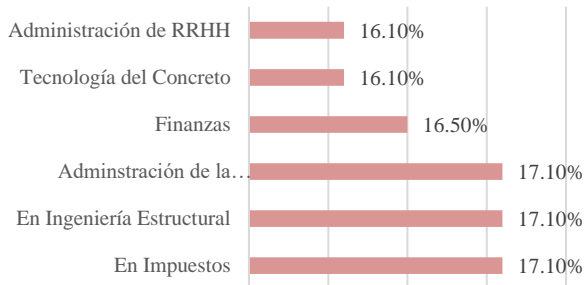
MA	%
In Taxation	17.10%
In Structural Engineering	17.10%
Construction Management	17.10%
Finance	16.50%
Concrete Technology	16.10%
Human Resources Management	16.10%

**Table 3 Demand**

Source: Own elaboration

With regard to the Master's degrees offered by the Instituto Tecnológico de La Paz, 65.6% of those surveyed wish to continue their training in the classroom mode. The Master's degrees that graduates of the Instituto Tecnológico de La Paz are requesting are:

**Demand for Master's Degrees by graduates of the Instituto Tecnológico de La Paz**



**Graphic 4 Demand**

Source: Own elaboration

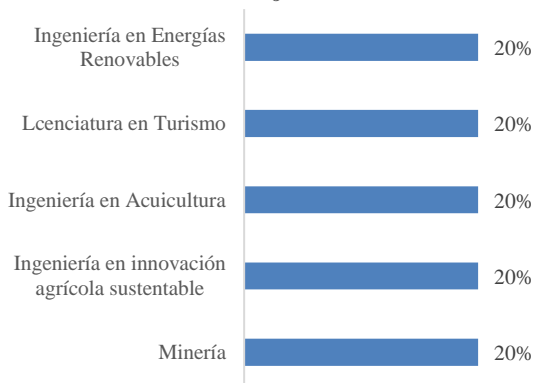
And finally, the business sector demanded the following degrees and master's programs:

Demand careers the Business Sector of the state of Baja California Sur	
CAREER	%
Mining Engineering	20%
Sustainable Agricultural Innovation Engineering	20%
Aquaculture Engineering	20%
Bachelor in Tourism	20%
Renewable Energy Engineering	20%

**Table 4 Demand**

Source: Own elaboration

**Demand careers the Business Sector of the state of Baja California Sur**



**Graphic 5 Demand**

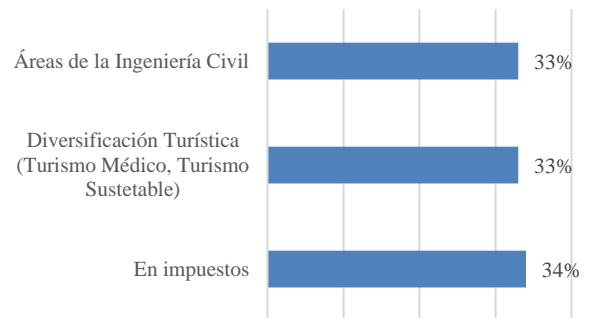
Source: Own elaboration

Baja California Sur's Business Sector Demands Master's Degrees	
MASTERS	%
In Taxation	34%
Tourism Diversification (Medical Tourism, Sustainable Tourism)	33%
Areas of Civil Engineering	33%

**Table 5 Demand**

Source: Own elaboration

**Baja California Sur's Business Sector Demands Master's Degrees**



**Graphic 6 Demand**

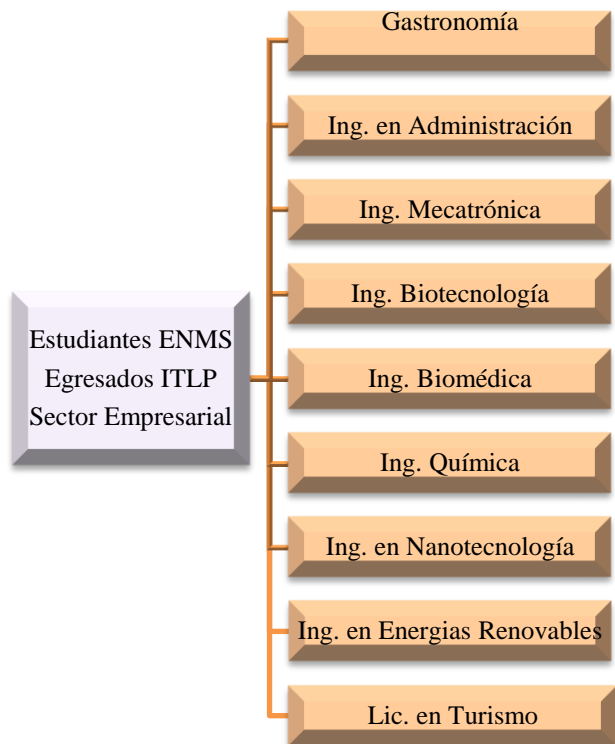
Source: Own elaboration

**Methodology**

The methodology used was quantitative with descriptive analysis.

**Results**

The results obtained through the surveys applied to the young students of the schools of the Medium Higher Education Level, the Graduates of the Technological Institute of La Paz and the Business Sector:



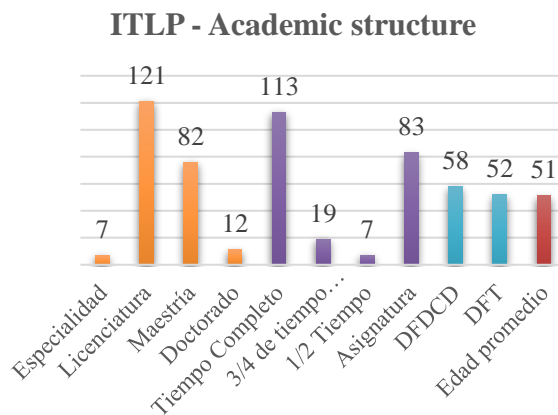
**Graphic 1 Results**  
Source: Own elaboration

The Institutional Factors are all the updated internal variables of the Instituto Tecnológico de La Paz (ITLP), the updated situation in terms of its human, financial and material resources, as well as an analysis of the academic work of the Institute, such as the attention to demand, the evolution of school enrolment and links with the productive sector. These factors are made up of 6 criteria: Human Resources (personnel), Financial Resources, Infrastructure for the attention of the programmes, Students, Linkage, Management, Human Resources (Personnel).

With respect to the academic structure of the teaching staff, the following are considered to exist:

ITLP - Academic structure	
Teachers	
Speciality	7
Bachelor's degree	121
Master's degree	82
Doctorate	12
Full-time	113
3/4 Full Time	19
1/2 Time	7
Subject	83
DFDCD	58
DFT	52
Average age	51

**Table 1**  
Source: Own elaboration



**Graphic 2**  
Source: Own elaboration

Of the 222 teachers and with the aim of having teachers who are up to date in the use of technologies, techniques and methods in current use in the industry, as well as with the teaching skills to create significant knowledge for students. 87% have participated in teacher training courses and 68% in professional updating courses; 87% have participated in teacher training courses and 68% in professional updating courses. There are 52 teachers who have been certified in tutoring in upper secondary and higher education (EC 0477) or in teacher training courses that qualify them as tutors, and 58 teachers have been trained in the Diploma for the Formation of Basic Teaching Competences (DFCDB).

The Instituto Tecnológico de La Paz has an annual budget, the origin of the resources with which it operates comes from three sources and thus guarantees the sustainability and development of the Educational Programmes.

It presents 3 performance indicators: Federal Resources, State Resources, Municipal Resources.

Infrastructure for the attention of the programme, The Technological Institute of La Paz is constituted by: 40 buildings, 64 classrooms built and used as such, 13 laboratories, 7 workshops, 8 sports facilities. With respect to students, an analysis of the last five years of the evolution of enrolment, absorption rate (applicants/accepted) is shown,

ITLP - Contribution to national enrolment (Bachelor)						
Registration ITLP	2015	2016	2017	2018	2019	2020
Men	64%	63%	61%	60%	60%	59%
Women	36%	37%	39%	40%	40%	41%

Table 2

Source: Own elaboration

Accredited Educational Programmes or those recognised for their good quality in the institution. Continuous improvement is a premise that regulates development in the different areas of our institution. Evaluation by external bodies is an opportunity to offer relevant professional preparation to students. The new criteria for evaluation by accrediting bodies represent a niche of opportunity for the Educational Programmes through which the impact of the graduates in the labour market can be measured and fed back, in the current year, the enrolment of 3 degree programmes offered, are enrolled in Bachelor's Degree Educational Programmes accredited for their high quality.



Figure 2 Accreditation of Bachelor's Degree in Management



Figure 1 Accreditation of certified public accountants



Figure 3 Accreditation in Business Management

The linkage is the relationship of mutual benefits between the institution and its surroundings, in the business, educational, social and environmental sectors, to strengthen the student's labour and professional competences. The Instituto Tecnológico de La Paz has signed 51 collaboration agreements; with the primary sector it has signed: 1 agreement, with the secondary sector: 5 and with the tertiary sector: 45; 3 agreements are valid until 2020 and another 3 until 2021, 9 until 2022, 1 agreement is valid until 2023, 10 until 2024 and 25 are valid indefinitely; the above shows that there is a formal and effective relationship with industry and other social actors and that there are concrete benefits for the students.

The follow-up of graduates presented in this analysis corresponds to the years 2018 and the first semester of 2019, and shows the following analysis: 60% of the graduates are graduates, 43% work in activities that are related to the graduate profile, 18% work in activities that are not related to the graduate profile and 39% state that they do not work. With regard to the economic sector in which they work, 13% of the graduates work in large companies, 19% in medium-sized companies, 43% in small companies and 25% in micro-companies. 74% of the graduates say that the emphasis given to research in the teaching process was good to very good, 22% considered it to be average. 84% expressed interest in continuing postgraduate studies. Satisfaction with the infrastructure was rated by 84% of the graduates as fair to very good and 15% as poor. The objective of the professional residency is to provide students with the opportunity to solve problems presented by public or private initiatives. 99% stated that the experience was satisfactory. The opinion on the efficiency to carry out the work activities is between efficient and very efficient with a qualification of 99%, finally, the graduate qualifies his academic training with respect to his work performance with 38% excellent, and between good and fair with 61%.

### Acknowledgements

To the directors of the Instituto Tecnológico de La Paz for their support and collaboration in this work.

### Conclusions

Two recommendations are presented, the first one is based on the review of the National Development Plan 2019-2024, the State Development Plan 2015-2021, the Tourism Sector Programme 2015-2021, the Education Sector Programme 2015-2021, the State and Economic Information of Baja California Sur, it is detected that in terms of national policy tourism, the construction sector, private financial services, become a priority. In the field of tourism in 2017, Baja California Sur registered an entry of 1,677,406 foreign tourists; in the tertiary sector, there is a national contribution of 67.7% for services, including construction services.

The second recommendation is based on the strategic areas covered by the Tecnológico Nacional de México, where after the analysis of the options of Educational Programmes in which the three groups of interest coincided - gastronomy, Engineering in Administration, Mechatronics Engineering, Biomedical Engineering, Biotechnological Engineering, Chemical Engineering, Nanotechnology Engineering, Engineering in Renewable Energies, Degree in Tourism - which of these would contribute to the 6 strategic areas of the TecNM in which the lines of research are concentrated.

The Tecnológico Nacional de México / Instituto Tecnológico de La Paz has the opportunity to propose new Educational Programmes of Bachelor's Degrees, specialities or, through the Division of Postgraduate Studies and Research, Master's Degrees or Doctorates that are linked to the tertiary sector, and thus provide the opportunity for graduates of the Educational Programmes of Architecture, Civil Engineering, and Electromechanical Engineering, Civil Engineering and Electromechanical Engineering to continue with their academic training, with the aim of enhancing their knowledge and meet the needs of the tertiary sector, which is the main source of income for Baja California Sur, and the educational programmes of the Instituto Tecnológico de La Paz are oriented towards this sector.

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