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Societal relevance of a Master of Science degree in environmental studies and sustainability at CIIEMAD-IPN, Mexico

Pertinencia social de una maestría en ciencias en estudios ambientales y de la sustenibilidad en el CIIEMAD-IPN, México

SILVA, Jorge A. [1]

Abstract
The purpose of this article, a descriptive research, is to develop a Societal relevance study for the Master of Science degree in environmental studies and sustainability of the Centre for Interdisciplinary Studies in Environment and Development in the National Polytechnic Institute of Mexico in order to fulfill one of the requirements of permanency and increasing the level within the National Postgraduate Quality Programs. The results reveal that the program is relevant at the present time.
key words: environment, Master degree, National Postgraduate Quality Programs, study of relevance.

Resumen
El objetivo de este artículo, de tipo descriptivo, es desarrollar un estudio de pertinencia social para el programa de Maestría en Ciencias en Estudios Ambientales y de Sustenibilidad del Centro Interdisciplinario de Investigaciones y Estudios sobre Medio Ambiente y Desarrollo del Instituto Politécnico Nacional de México para cumplir con uno de los requisitos de permanencia y aumento de nivel dentro del Padrón del Programa Nacional de Posgrados de Calidad. Los resultados muestran que el programa es pertinente para la actualidad.
Palabras clave: medio ambiente, maestría, Programa Nacional de Posgrados de Calidad, estudio de pertinencia.

1. Introduction

Within the framework of the National Development Plan (PND) 2019-2024, and in compliance with its objective, the National Council of Science and Technology promotes education, development and linkage of scientific community in an effort to consolidate the strategies and national capacities that might satisfy the needs and priorities in Mexico for the benefit of social welfare, from humanistic scientific and technological development with social and environmental responsibility. Furthermore, the present situation of Mexico demands a greater commitment to collaborate from research and scientific formation offered by postgraduate programs across the country in order to contribute to solve the increasingly complex challenges presented to society. This compromise is supported by the acknowledgement of the importance of contributing that various scientific fields

[1] Head of Territory and Environment Department. Instituto Politécnico Nacional, Centro Interdisciplinario de Investigaciones y Estudios sobre Medio Ambiente y Desarrollo. j.a.silva@outlook.com

and disciplinary, multidisciplinary, interdisciplinary and transdisciplinary approaches (Consejo Nacional de Ciencia y Tecnología Conacyt, 2020c).

The Census of National Postgraduate Quality Program (PNPC) is considered as a strategy that contributes to orient learning processes in postgraduate degrees toward a well-rounded education of scientific communities commited with science development, technology, social innovation and knowledge generation that contributes to social welfare, sustainability and attendance of priority problems in regional, national, international and frontier science levels in public and private higher education institutions, as well as public research centers (Conacyt, 2020c).

During the formulation of the admission application form to PNPC, there are six fundamental aspects, one of which is the institutional compromise and responsibility. In this section, it has to be described briefly the main aspects of institutional compromise to consolidate the postgraduate degree in a manner that facilitates the comprehension of the context in which the program is developed and the rationale of the scientific and societal relevance thereof in the regional context where it is located (Consejo Nacional de Ciencia y Tecnología [Conacyt], 2020a).

On this matter, derived from the new tendencies in higher education and postgraduate degree in a national and world level to upgrade and diversify the educational offering, in 2009 the Master of Science degree in Environmental Studies and Sustainability Program (MCEAS) of the Centro Interdisciplinario de Investigaciones y Estudios sobre Medio Ambiente y Desarrollo (CIIEMAD) was approved by the XXVIII General Advisory Board on environment and development. The program was created to satisfy the demand of high level human resources enabled to comprehend, analyze, address and resolve the varied and complex problems related to environment and development. This program guarantees through its research lines an interdisciplinary vision of the environmental subject, ensuring the comprehensive analysis combinig the different types of thinking (Gaceta Politécnica, 2009).

At present, MCEAS program is on development level in the PNPC since 2012 (Consejo Nacional de Ciencia y Tecnología [Conacyt], 2020b), and its validity expires in December, 2020. Consequently, this year it will be submitted to examination in order to continue pertaining to PNPC. For this reason, the purpose of this article is to develop the study of societal relevance of MCEAS program in order to fulfill one of the requests of PNPC for the permanency and increasing level, which is unvaryingly justified to keep upgrading and having greater elements to address the different problems in the field of environment and sustainability presented in Mexico and over the world.

1.1. Background of environmental situation and sustainability on an international level

The environmental concern about planet Earth has among its more prominent basis the book titled Silent Spring by Rachel Carson, published in 1962, wherein is explained how dangerous for biodiversity the use of pesticides can be (Carson, 2002). Subsequently, emerged some Works developed in forums like The Club of Rome in 1968, wherein environmental concern was analysed with diverse approaches and subjects, which were taken as precedents in the United Nations Conference on the Human Environment convened under United Nations (UN) auspices held in Stockholm, Sweden from June 5-16, 1972. Another relevant event for the studies on environment, development and, as we know it today, environmental science, sustainability and sustainable development was “First Intergovernmental Conference on Environmental Education” celebrated in Tbilisi (Georgia, URSS), from october 14-26, 1977; the fundamental lineaments of environmental education and strategical importance of national security of the environmental issues were stablished in it (Zabala & García, 2008).

As a consequence of these first global initiatives in 1987, the World Commission on Environment and Development, through the Brundtland Commission, described the deelopment based on the fast-paced exploitation of natural resources and the intense use of conventional energy as processes associated to the environment crisis (Organización de las Naciones Unidas [ONU], 1987).

In 1992, during the Rio de Janeiro Earth Summit some local actions for sustainable development were presented. It is important to mention that as the Agenda 21 was published, the signatory countries implemented some initiatives; however, the goals of the agenda were not fulfilled in a country level, in the instance of Mexico only some municipalities achieved the development of this initiative. During the decade of the nineties, Mexican organizations initiated profound changes, given the impulse of communication and information technology. The entry into force, in january, 1994 of the North American Free Trade Agreement, was an important aspect that generated an accelerated change process in the Mexican organizations at all levels, forcing them to reformulate themselves to try to gain access in the new international economic order, known as globalization; in 1997, with the world agreement denominated Kyoto Protocol, some steps were taken to reduce the greenhouse gas emissions into the atmosphere, causal agents of global warming and climate change (Sánchez, 1991; ONU, 2011; United Nations Framework Convention on Climate Change [UNFCCC], 2008).

During the first two decades of the twenty first century, there has been relevant initiatives promoted by the UN: the United Nations Millennium Declaration and The United Nations Decade of Education for Sustainable Development (EDS) (Martínez Agut, 2015).

In september 2015, the sixty ninth session of the General Assembly approved the Resolution A/70/L.1 related to transform the world: 2030 Agenda for Sustainable Development. 2030 Agenda is a plan of action for the people, the planet and prosperity, as well as it intends to consolidate peace and requires the development of alliances to implement it. These five elements of sustainable development are interconnected, based on the success but also on the deficiencies, on the Millenium Development Goals (ODM), the Sustainable Development Goals (ODS) focus on new areas such as economic inequality, innovation, climate change, responsible consumption, justice and peace, among others (ONU, 2015b).

2. Methodology

The methodology used was the same as in the technical guidance document for the request of creation, redesign or cancellation of postgraduate degree programs (Instituto Politécnico Nacional [IPN], 2015) along with the development of four analytical categories: 1) State of knowledge of the target discipline of the proposed program; 2) Assessment of the socioeconomic status and and the area or productive activities situation where the program expects to influence: macro-regional and micro-regional studies, and labor market research; 3) Alignment of the academic program proposed with the federal, state and municipal programmatic framework; and 4) Study of education supply (national and international) and demand.

The four analytical categories were designed through a literature review on the subject. Moreover, the fourth analytical category included the use of a semi-structured questionnaire to 9 decision makers from bussiness environment.

3. Results

3.1. State of knowledge of environmental science and sustainability

The events held during the sixties decade until 2019 allowed to identify the educational needs required by the postgraduate students in environmental science and sustainability (Gosselin et al., 2018). As a society, they

address many challenges related to a long-term sustainability and global and local community resilience under the human threats.

Doner and Stapleton (2019) consider that environmental science academics should be formed in community resilience but also with an interdisciplinary approach, based on elements combining scientific knowledge, societal and political perspectives, and logistical concerns; as well, they should illustrate the complexity of the human system and natural threats.

The contemporary development problems trascend the traditional frontiers of the States and demand to be atended with effectiveness. On this matter, the primary commitment of the 2030 Agenda is to assure that nobody is left behind in the transition toward a sustainable development model (ONU, 2015a).

The goal 4 of the 2030 Agenda is related to development of high level human capital, which is related to the objective of MCEAS program, specifically on the environmental and development matter (Centro Interdisciplinario de Investigaciones y Estudios sobre Medio Ambiente y Desarrollo [CIIEMAD], 2020b). In order to identify how MCEAS is relevant to develop high level human resources able to address the challenges posed by the 2030 Agenda, it is important to ponder the dimensions of sustainable development: economic, societal and environmental (Organización de las Naciones Unidas para la Alimentación y la Agricultura [ONUAA], 2020).

It should be noted that these subjects of study associated with these Knowledge Generation and Application Lines (LGACs) are consistent with the current international environmental politics (2030 Agenda), ratified by Mexico and incorporated to the environmental normativity, as well as the public politics should result in the identification of the Mexican problems that should be addressed from the academy through science development, technology development and development of high level human resources (Centro Interdisciplinario de Investigaciones y Estudios sobre Medio Ambiente y Desarrollo, CIIEMAD, 2020a).

On the other hand, human beings, in general are experiencing a before and an after the 2020 COVID-19 pandemic (Gobierno de México, 2020). All scientists and technologists of the world are obliged to consider environmental aspects that make possible to move forward to new ways of producing and consuming.

In order to build the state of knowledge on the subject area was also considered the anual publication of the Journal Citation Reports (Web of Science Group, 2019) with diverse search filters related to environment and sustainability. These filters permitted to identify that among 11877 academic journals included in the report only 383 explicitly approach these subjects in its titles as follows: exact science and engineering 207, social sciences 148, interdisciplinary approaches 28. Because the problems with sustainable development and its 17 established goals in the 2030 Agenda are complex, interdisciplinary researches should increase.

In order to know what is published in Mexico about environmental science, sustainability, development, sustainable development and social sciences vinculated to environmental science, Conacyt's Mexican Science and Technology Journals Classification system (Consejo Nacional de Ciencia y Tecnología [Conacyt], 2020d) was revised, and 104 journals were identified. Based on its subjects, economics, politics, sociology, engineering and education are the most discussed topics.

3.2. Assessment of the socioeconomic, environmental and the area or productive activities situation where the program expects to influence

Mexico has a vast natural richness, animal species, vegetation, precious woods and reefs among others. Moving toward to economic growth and development of Mexico, a series of normative guidelines for environment has been settled, acceding to international treaties and conventions, in which it is highlighted how to manage the natural resources (Global Standard Certification, 2017).

The normative framework to regulate the environment in Mexico is the Mexican Constitution, international treaties and conventions in which participates, general and federal laws, regulations, Official Mexican Norms (NOM), Mexican Norms (NMX), decrees and agreements, state constitutions, state and municipal laws (Global Standard Certification, 2017).

The PND 2019-2024 is particularly relevant, it consists of three general axis: rule of law and justice, welfare and economic development. Welfare axis strives to guarantee the right to healthy environment with sustainability of ecosystems and biodiversity for the population approaches. Likewise, from PND emanate the sectoral programs on environment (Gaceta Parlamentaria, 2019).

In the category of regional programs of PND, it is considered the Tren Maya infrastructure megaproject, which strives, among other goals, to protect the environment of that area (daunting activities like illegal logging and species trafficking). Another relevant project is the Development program for the isthmus of Tehuantepec which strives to boost regional economic growth (Gaceta Parlamentaria, 2019).

It is also considered the "Sowing Life" program that promotes agroforestry productive systems among the farmers. Likewise, alimentary self-sufficiency and rescue of the countryside is strived due to nowadays Mexico imports almost half of the food products that consumes, because of that, the aim is to develop programs that permit the alimentary independence (Gaceta Parlamentaria, 2019).

Related to energy area, it is intended to restore the existing refinery and to upgrade the electricity generation industry, property of the State, specially the hydroelectricity (Gaceta Parlamentaria, 2019).

In the contemporary Mexico important transformations in the educational system are required, because of that, it is intended to enhance the reading comprehension, written and oral expression, analytical and critical thinking, creativity and, highlighted learning to learn skills (Secretaría de Educación Pública, 2018). Aligned with this philosophy, MCEAS is based on interdisciplinary scientific knowledge taking into account the complex connections between society, economics, culture, technology and nature.

In a micro-regional level, the Metropolitan Area of the Valley of Mexico (ZMVM) is the economic, financial, political and cultural center in Mexico. Regarding to its population, the Valley of Mexico is the third biggest metropolitan area of the Organisation for Economic Co-operation and Development (OECD) and comprises the 16 territorial demarcations of Mexico City, 59 municipalities of the State de Mexico and 1 municipality of the State of Hidalgo. Head offices of federal government are located in Mexico City, as well as the urban area of the metropolitan area. In addition, it has more than 20 million population and produces almost a fourth part of the national Gross Domestic Product (GDP) (Organisation for Economic Co-operation and Development [OECD], 2015).

Industry in the Valley of Mexico is concentrated in high added value services, specially, insurance and financial services; in addition, communication and transportation, real state and business services represent a relatively high percentage of employment. It is considered that nearly half of the municipalities and all, except one, of the boroughs of Mexico City have a very low degree of "alienation", which means that in those areas most of the families have access to basic services according to Mexican standards. Notwithstanding, basic services in some neighborhoods in the downtown as well as in the suburb area are precarious, wherein more than 40% of homes does not have electricity, potable water or drainage (OECD, 2015).

In terms of distribution of educated population, the people with the highest educational level (higher education) resides in Mexico City and in the boroughs at the north of the city, they are those which enjoy higher wages compared to the people living in the suburb area. However, the challenges related to water, quality of air and

management of solid waste endanger drastically the goals of sustainability and green growth of the Valley of Mexico (OECD, 2015).

In the laboral area, everyday the attention that the government institutions pay to the environment and sustainability care is higher; in coordination with them, public and private industry work together to revert the negative effects experienced until these days, through education, culture and organization.

3.3. Alignment of the academic program proposed with the federal and state programmatic framework

By nature, being a state educational institution whose primary object is to train professionals and researchers in the diverse fields of science and technology according to the economical, political and social requirements of the country, the National Polytechnic Institute (Instituto Politécnico Nacional [IPN], 2003) guarantees the right of every mexican youth to receive higher education. This is aligned with the PND 2019-2024, in its chapter 1: politics and government – paradigm shifts in security, subparagraph ii: ensure employment, education, health and welfare (Gaceta Parlamentaria, 2019).

Additionally, MCEAS program is also aligned with PND 2019-2024 in its chapter 3: Economics - Science and technology and Economics – Alimentary self-sufficiency and rescue of the countryside, due to the science and technology implementation in the resolution of national problems such as preservation of soil and water, as well as renewable energy systems and biodiversity conservation (Presidencia de la República, 2019).

According to the Framework and Policy for Higher Education Transformation 2019-2024, a document released by the General Directorate of Higher Education of Secretariat of Public Education (SEP), the educational policy poses a special emphasis in growing the coverage of higher education with academical excellence (Rodríguez Armenta, 2019).

Related to the Special Program for Science, Technology and Innovation 2014-2018, this situate the highly qualified human capital for research functions as a relevant element to impulse the development of a National System for Science Technology and Innovation well-balanced and high potencially to build a knowledge economy (Consejo Nacional de Ciencia y Tecnología [Conacyt], 2014).

On its behalf, MCEAS program is also aligned with the Government Program 2019 – 2024 of Mexico City in its chapter 1. Equality and rights, subparagraph 1.1 right to education and subparagraph 1.1.4. reinforce and extend the coverage of public higher education; in its chapter 6. Science, Innovation and Transparency, subparagraph 6.2 Science and divulgation, subparagraph 6.2.1 Research, technology and innovation and in its chapter 2. Sustainable city. All of this, in order to implement scientific research, technological development and innovation to address the primary demands and needs of the population in the city (Gobierno de la Ciudad de México, 2019).

Regarding to the Institutional Development Plan 2019-2024 of IPN (2020), in its Transversal Axis 1. Sustainability, points out: Consolidate an environmental culture that meet the challenges of sustainability and fight the climate change through the formation of critic professionals, generation of knowledge, technology and innovations for sustainability. As well, the fundamental axis 2 is related to equality and student services. On this behalf, MCEAS aligns and contributes itself to the matters stated since MCEAS creation in 2009, it satisfies the demand of high level human resources, with competences and skills to comprehend, analyze and resolve the diverse and complex problems related to environment and sustainable development through the definition of policies and specific projects to assist the population, reduce the pollution, assure the water supply, prevent natural disasters and manage natural resources, among others (Gaceta Politécnica, 2009).

3.4. Study of education supply (national and international) and demand

In order to analyze the international offer, the best global educational institutions in environment, development and sustainability matter were selected based on their reputation and research, reported by the U.S. News & World Report (2020), wherein subjects as environmental health, monitoring, environmental management and climate change, among others can be found.

Classifications on this subjects are promoted by Clarivate Analytics InCites. Clarivate, the company that provided to U.S. News & World Report (2020) the data and metrical used in the classifications, and the bibliometric data were based in the Web of Science. This classifications are based on the academic research efficiency of the subject. Moreover, diverse bibliometic measures were used, including publications and quotes, as well as global and regional reputation markers for each specific subject.

The bibliometric markers are based on data from a period of five years between 2013 and 2017. However, the citations to those documents came from all the publications, including the more recent available data. The deadline date for the 2020`s classification was 2 june, 2019.

As a result, 35 institutions and its master programs were selected, in total 98, which are offered in the following regions: Canada, United States of América, Latin America, Europe, Oceania, Asia and Africa. In such a way hat the global offer is covered. For practical purposes, the best five institutions by region were selected, Mexico was left out due to this country is analysed in the national offer. Additionally, Canada and the United States were included separately according to the quantity and quality of their academic programs, and due to their proximity with Mexico represent institutions with an academic offer of interest for the students in this country. In Latin America, being constituted by various countries, was used the report of the best universities in the subcontinent (from Mexico to Chile). In this, prevail Brazilian institutions. Likewise, the same criteria was used about the information of Europe, Oceania, Asia and Africa. As an example, table 1 displays some of the master degree programs world level, related to environment, development and sustainability.

Table 1
International Master degree Programs related to environment, development and sustainability

Country or region	Institution	World university ranking for environmental studies	Master degree
Canada	University of British Columbia	11	Resources, environment and sustainability
United States of America	University of California-Berkeley	2	Sustainability
Latin America	Universidade de São Paulo	54	Environmental engineering science
Europe	Wageningen University & Research	1	Environmental science
Oceania	University of Queensland	6	Environmental management
Asia	Tsinghua University	30	Environmental science, engineering and management
Africa	Stellenbosch University	97	Forestry and wood science

Source: School of Environment, Tsinghua University (2020), Stellenbosch University (2020), The University of British Columbia (2020), The University of Queensland (2020), University of California, Berkeley (2020), Universidade de São Paulo (2020) and Wageningen University & Research (2020).

Regarding to the analysis of the national supply, it was executed by consulting the database of the PNPC from Conacyt (2020b) for the master degree programs using keywords such as environment, development and

sustainability. The results display 30 mexican institutions offering academic programs oriented to research, in total 40 (including MCEAS program offered in CIIEMAD), related to environment an sustainability; covering the social sciences and the exact sciences fields.

A relevant element of competence is the register in the PNPC of Conacyt. On that matter, it was found that out of the 40 programs in the PNPC, 8 are recently created (20%), 18 are in development process (45%), 10 are consolidated (25%) and 4 are from international competence (10%).

Because of the geographic location of CIIEMAD, the master programs offered in the Metropolitan Area of the Valley of Mexico are the ones that represent its closest competence, in this case Mexico City and to State of Mexico are included. In this sense, in Mexico City, the offering programs by the Metropolitan Autonomous University and the National Autonomous University of Mexico are noticeable.

From the State of Mexico, The Autonomous University of the State of Mexico , the Technological Institute of Toluca, the Postgraduate College and the Chapingo Autonomous University are noticeable (Asociación Nacional de Universidades e Instituciones de Educación Superior, ANUIES, 2020). It is important to note that neither of them meet the criteria for interdisciplinarity, as it is stated in MCEAS program of CIIEMAD, since its research lines are focused either on the exact sciences or on the social sciences.

The enrolment for the mentioned institutions was consulted in the website of ANUIES (2020), wherein the total enrolment for master programs related to environment, development and sustainability from cycle 2015-2019 was searched. For the cycle 2015-2016, the highest enrolment was registered in four programs: one in Baja California Sur, one in Mexico City, one in San Luis Potosí and one in Sonora (table 2). It is noteworthy that these institutions also mantained the highest enrolment during the 2018-2019 cycle, as shown in table 2, compared to other states.

Table 2
Institutions with highest enrolment related to environment, development and sustainability during 2015-2016 cycle and 2018-2019 cycle

Institution and State	Program	2015-2016 enrolment	2018-2019 enrolment
Northwestern Center of Biological Research S.C., Baja California Sur	Master in use, management and preservation of natural resources	82	86
National Autonomous University of Mexico, Mexico City	Master in Environmental engineering	57	81
Autonomous University of San Luis Potosí, San Luis Potosí	Master in Environmental science	65	72
Sonora Institute of Technology, Sonora	Master in Natural resources science	45	74

Source: ANUIES (2020)

In the thirty two states bachelor’s degrees and associate's degrees related to environment, development and sustainability are offered. The states with the highest enrolment during 2018-2019, according to the census of ANUIES are: Mexico City, followed by State of Mexico, Tabasco, Puebla y Michoacán, as shown in table 3. These states offer bachelor’s degrees and associate's degrees such as environmental engineering and sustainability, renewable energy and sustainable engineering, environmental biology, energy and sustainable engineering, higher technician in chemistry in environmental technology field, environmental science, environmental technology engineering, among others. All of them, related to MCEAS offered by CIIEMAD.

Tabla 3
States with the highest enrolment in bachelor's degrees and associate's degrees related to environment, development and sustainability during the periods 2015-2016 y 2018-2019

State	Bachelor's degrees and associate's degrees	Enrolment 2015-2016	Enrolment 2018-2019
Mexico City	Environmental engineering and sustainability, environmental science, environmental engineering, energy and sustainable engineering, environmental science and climate change, environmental technology engineering, renewable energy and sustainable engineering	8,357	5,902
State of Mexico	Higher technician in renewable energy, environmental technology engineering, higher technician in chemistry in environmental technology field, environmental engineering and sustainability, environmental biology, environmental science, environmental engineering, sustainable agricultural innovation engineering and renewable energy engineering and renewable energy engineering	3,237	3,943
Tabasco	Environmental engineering and sustainable development, higher technician in chemistry in environmental technology field, environmental technology engineering, natural resources management engineering, renewable energy engineering, environmental management, energy and sustainable engineering, environmental engineering, environmental management and sustainable agricultural innovation engineering	2,995	3,724
Puebla	Sustainable and protected agriculture engineering, renewable energy engineering, higher technician in renewable energy, higher technician in environmental technology, renewable energy engineering and environmental engineering	2,242	3,270
Michoacán	Higher technician in renewable energy in solar energy field, renewable energy, environmental engineering, environmental technology engineering, ecology and environment, environmental engineering, energy and sustainability engineering, sustainable engineering and sustainable agricultural innovation	1,948	3,009

Source: ANUIES (2020)

Considering the geographic location of CIIEMAD, it is expected that the graduate highest influx proceed from neighbouring states such as Guerrero, Hidalgo, Michoacán, Morelos, Puebla, Querétaro and Tlaxcala, even when the states of Michoacan and Puebla are the ones with the highest enrolment, 3,009 y 3,270, respectively, followed by Guerrero 1,678, Hidalgo 1,363, Tlaxcala 1,344, Querétaro 1,137 and Morelos 319. However, based on enrolment and location, it is proposed that the potential demand of MCEAS graduate procedes from the State of Mexico and Mexico City, due to they are the entities with the highest enrolment since 2015 until 2019, which has been maintained during that time. It is important to note that, even though it is observed a decrease in the enrolment of Mexico City during the cycle 2018-2019, for the cycle 2015-2016, it continues being the entity with the highest enrolment.

It is important to emphasize that the number of institutions offering bachelor's degrees and associate's degrees related to environment, development and sustainability is higher to the number of master degree programs pertaining to the PNPC. For example, Mexico City has 11 institutions (Technological University of Mexico, National Autonomous University of Mexico, La Salle University, University of the Valley of Mexico, Metropolitan Autonomous University, Autonomous University of Mexico City, National Open and Distance Learning University of Mexico, Monterrey Institute of Technology and Higher Education, Institute of Technology Tlahuac II , Institute of Technology Gustavo A. Madero and National Polytechnic Institute of Mexico) altogether, they offer 15 bachelor's degree; meanwhile the number of instituions with master degrees pertaining to the PNPC are 3: the Metropolitan Autonomous University, the National Autonomous University of Mexico and the CIIEMAD with its

MCEAS program. All of this, suggests the relevance of new master degree programs creation or the permanency of the existing already in order to address the national demand, which justifies the permanency in the PNPC of MCEAS.

As well as addressing the national demand, it was also studied the societal relevance of MCEAS, for this purpose a questionnaire of 22 questions was elaborated and sent to employers in electronic format. From the survey respondents, 33.3% were men and 66.7% women; regarding age, 50% ranks from 30 to 39 years old, 16.7% ranks from 40 to 49 years old and 33.3% ranks from 50 to 59 years old. For the maximum study degree 16.7% was doctorate and 83.3% master.

Among the positions refered having in their organization are: project coordinator, project coordinator, consultant, quality engineer, teacher, project manager and socio environmental consultant. 66.7% of the survey respondents pertain to the private area, 16.7% to the public area and 16.7% public-private area, and all of them pertain to the federal government.

At moment of questioning about the characteristics of their organization, 50% refered working in a big organization (> 250 people), 33.3% in a small organization (16-100 people) and 16.7% in a micro-organization (until 15 people). The classification of the economic activity of the organization where the survey respondents pertain is mining (33.3%),education (33.3%), agriculture activity (16.7%) and fishing (16.7%).

The 100% mentions that in their organizations develop projects related to environment and sustainability, and the level of studies of the contributors are the following: technician (33.3%), bachelor (33.3%), master (66.7%), doctorate (16.7%) or high school (16.7%), while the level of studies of the project manager are the following: doctorate (33.3%), bachelor (33.3%), master (16.7%) or high school (16.7%).

At the moment of questioning the academic specialty of the project managers, the survey respondents metioned maintenance, administration, foreign affairs, engineerings, doctorate in social responsibility, environment and integrated development, diverse majors or without any major. The primary activities executed by the project managers are to propose, coordinate projects with the researchers field, construction of the results, coordination of vision and implementation. It was also questioned if the organization wherein they labor has detected the necessity of employ masters in cience specialyzed in environment and sustainability, 66.7% responds positive and 33.3% responds negative. These results suggest that the labor market is requiring staff with higher academic preparation.

The knowledge that employers consider the Masters in science specialized in environment should have to provide value to the organization is the following: having an interdisciplinary vision, environmental normative and regulatory framework, formulation of technical and economical suggestions to apply for projects, multidisciplinarity, quality, processes and security, management tools techniques oriented to knowledge between social groups and economical, cultural and natural environment. Graduates of MCEAS have the necessary required knowledge due to its LGACs, which provides an interdisciplinary vision to students.

At the moment of questioning the respondents which competences consider the most important to employ the professionals, they mentioned leadership, communication, emotional control, critic thinking, teamwork and interdisciplinarity. In MCEAS program, the student develops interdisciplinarity, critic thinking, teamwork and communication. As for the soft skills as leadership and emotional control, it is necessary to mention that CIIEMAD presented this year a proposition in the Strategic Change Agenda of IPN to include courses that satisfy the coverage need of these skills and provide the students the tools that education 4.0 and contemporary labor market demands.

At the moment of questioning the employers about the most significant factor of the laboral promotion in their organization, they highlighted the following: environmental systems domain, ability to work in interdisciplinary ambiances, presentation of work products (design, format, organization, ortography), efficient and proactive performance, capacity to coordinate activities according to the company, quantity and project scope.

The data obtained in the survey, displays that the offer of MCEAS with the research lines suggested in CIIEMAD is relevant due to the environmental problems requiring people with knowledge in the subject. The MCEAS is important because it is one of the five master programs in environment and sustainability, oriented to research, in Mexico City and pertaining to the PNPC, attending the national and international demand, and it is interdisciplinary; a feature required in the graduate by the employers and offers the necessary tools for the student to develop competences required for the present laboral field.

4. Conclusions

The historical and social development of science in environmental studies, the way it is organized, the fundamental knowledge, the tendency to interdisciplinarity in sustainability research and its field of application displayed its relevance and convenience to address the current environmental and sustainability challenges. As well, the international framework, such as the 2030 Agenda, link essential and necessary elements in the educational area to reach the goals toward the transformation of societies for a sustainable planet. It is necessary to mention that the subjects of study associated to the LGACs of the MCEAS are consistent with the current environmental international politics, which derives in the identification of the Mexican problems that need to be solved by the academy through development of science, technology and formation of high level human recources.

In another note, Mexico published the legal instruments to regulate the environmental matters. Therefore, to get a complete development of the country, the PND 2019-2024 contemplates 3 fundamental axis that strives for the guarantee of the right to a healthy environment with a focus on ecosystems and biodiversity sustainability for the population.

A rigorous academic formation in the field of environmental science is key to preservate and make the most of the richness of the country. This has increased the demand of programs related to environmental studies and sustainability offered in higher education and postgraduate. Due to this, an expert in environment should know how to influence in people to instill the necessity of taking care of the environment as in an important working position in a corporation as in government institutions, and fulfill most of the ODS of the UN 2030 Agenda.

To attend the demand, it is displayed the international and national educational offer of 35 international universities and 40 national universities. In this context, the challenge of CIIEMAD, precisely through the posgraduate program of MCEAS, is remaining and ranking in a superior level in the PNPC of the Conacyt.

The study of relevance indicates that the postgraduate of MCEAS is adequate to the present raility experienced in the geographical settlement areas nearest to CIIEMAD, as well as in the country, in general. As a consequence, it is expected the permanency of the PNPC program and increase its development level to consolidated, and the primary aim for the future is to be included within the 8% of the programs in an international level of compertence. For that purpose, the objectives that need to be reinforceded as they do in present are: i) to form research in science with a rigorous academic preparation in the field of environmental science and sustainability; ii) to capacitate them to participate in research activities; iii) to contribute providing solutions to the national and international environmental problems; iv) to capacitate them to continue their doctorate studies; and v) to incorporate full-time professors with a high scientific productivity to reinforce the LGACs of the MCEAS.

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