

ANALYSIS AND PROPOSAL FOR TEACHING PROJECT DESIGN AND MANAGEMENT AT THE POSTGRADUATE LEVEL IN IBERO-AMERICA
ANÁLISIS Y PROPUESTA SOBRE LA ENSEÑANZA EN DISEÑO Y GESTIÓN DE PROYECTOS A NIVEL POSGRADO EN IBEROAMÉRICA

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ABSTRACT

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Project management has evolved globally, bringing improvements to the life cycle of projects carried out throughout history. However, training professionals in this field in Mexico has proven to be a difficult task to implement. As mentioned in Estrada (2015), project management is a profession in constant growth and currently represents an alternative for achieving job differentiation in an increasingly competitive world. Nevertheless, in Mexico, professionalization in this area is practically nonexistent at the undergraduate level and insufficient at the postgraduate level. Undergraduate programs are typically technical in nature and do not include courses focused on the managerial skills required of a project manager. At the postgraduate level, programs are more commonly offered by private institutions, either as specializations or full master's degrees. In some cases, these programs include preparation for obtaining certifications from organizations such as PMA and IPMA. Additionally, the range of options has expanded through educational platforms such as Coursera, Udemy, Crehana, edX, Domestika, and Future Learn, which offer courses on project management as well as on tools and software that support project execution. While these platforms allow for self-directed

professional development, higher education institutions in Mexico continue to lag in training professionals in this field.

RESUMEN

Palabras clave:

gestión de proyectos,
profesionalización, posgrado,
certificación.

La gestión de proyectos ha evolucionado a nivel mundial, generando mejoras dentro del ciclo de vida de los proyectos ejecutados a lo largo de la historia. Sin embargo, formar profesionales en esta disciplina en México ha resultado una tarea difícil de implementar. Como menciona Estrada (2015), la dirección de proyectos es una profesión en constante crecimiento y representa actualmente una alternativa para lograr la diferenciación laboral en un mundo altamente competitivo. No obstante, en México, la profesionalización en esta área es prácticamente inexistente a nivel licenciatura y deficiente en el nivel de posgrado. Las opciones disponibles en licenciatura suelen ser programas de educación técnica que no incluyen asignaturas orientadas al desarrollo de habilidades gerenciales propias de un director de proyectos. En cuanto a los programas de maestría, estos se ofrecen con mayor frecuencia en instituciones privadas, ya sea como especializaciones o como programas formales de maestría. En algunos casos, se brinda preparación para la obtención de certificaciones emitidas por organismos como el PMA o IPMA. Asimismo, el abanico de opciones se amplía mediante plataformas educativas como Coursera, Udemy, Crehana, edX, Domestika y Future Learn, las cuales ofrecen cursos sobre gestión de proyectos o sobre el uso de software y herramientas de apoyo para dicha gestión. Si bien estas plataformas permiten acceder a una profesionalización mediante el aprendizaje autodirigido, las instituciones de educación superior aún se encuentran rezagadas en la formación de profesionales especializados.

Introduction

Higher education policy requires that national programs be aligned with international standards and respond to trends in the global economy, as higher education is a key driver of economic competitiveness, which makes high-quality university education even more important, according to the Organization for Economic Co-operation and Development (OECD, 2019).

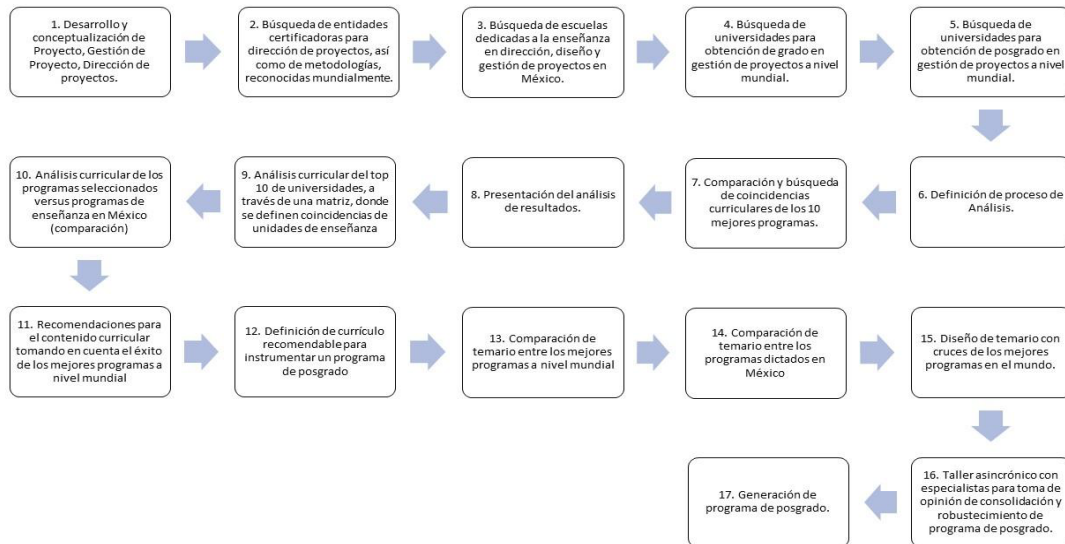
The curriculum in “Project Design and Management (PDM)” is relevant to professional practice because we often assume that a single discipline produces specialists, when in fact problem-solving requires multidisciplinary skills and interdisciplinary approaches; this is why skills in PDM contribute to solutions that employ multidisciplinary approaches.

This article identifies project management education programs in Mexico and around the world with the aim of presenting the range of options available and exploring how to adapt them to the Mexican context to train professionals in this field. As a rapidly growing profession, it is considered an alternative for achieving a competitive edge in the job market, according to Estrada (2015), where project management skills and competencies are of vital importance.

Materials and Methods

The methodology consists of three phases, as shown in Figure 1; the analysis was conducted using the following steps.

Figure 1
Methodology



***Analysis and Proposal on DGP Education at the Graduate Level in Ibero-America
Project Development and Conceptualization, Project Management and Leadership***

Projects are found in everyday activities; their conceptualization goes beyond tangible or intangible objects that provide services to users. According to the PMBOK (Project Management Institute, 2008), a project is defined as a time-bound endeavor undertaken to create a unique product, service, or result. As can be seen in this definition, it is time-bound, indicating a beginning and an end, the latter of which is reached when the project's objectives are either achieved or not. Similarly, this temporary nature does not imply a short- or long-term duration, since this characteristic does not apply to the project's outcome; most projects aim to create a lasting result, regardless of whether it is a product, service, or good.

Another definition is provided by the International Project Management Association, which defines a project as an operation in which human, financial, and material resources are organized in a novel way to carry out a set of tasks according to defined specifications, subject to cost and time constraints, and following a standard life cycle to achieve beneficial changes through quantitative and qualitative objectives; This definition, like that of the International Organization for Standardization—which defines a project as a temporary endeavor to achieve one or more defined objectives—leads us to conclude that projects must possess at least the following characteristics:

1. To be a one-time operation.
2. Keep a beginning and an end.
3. Require financial, technical, human, and material resources.
4. To achieve a result or meet a goal.

According to various schools of thought, project management as defined by the PMBOK involves applying knowledge, skills, tools, and techniques to project activities in order to meet project requirements, while project management is the application of knowledge, skills, tools, and techniques to project activities to meet those requirements. This is achieved through the application and integration of 49 project management processes organized into 5 groups: Initiation, Planning, Execution and Control, Monitoring, and Closure.

According to the IPMA [2019]: it is the planning, organization, monitoring, and control of all aspects of the project and the motivation of all stakeholders to achieve the objectives safely within the agreed-upon criteria for time, cost, and performance. For the IPMA, project management refers to a person who possesses a set of skills and applies them based on their technical knowledge, distinguishing between three types of competencies: behavioral, technical, and contextual.

Based on the above definitions, it can be concluded that a project manager is the person assigned to achieve objectives in line with the management skills that enable projects to be completed efficiently. It is also understood that project management education should be based on the acquisition and consolidation of skills for project design, management, and leadership.

With regard to the teaching of design, project direction, and project management, there are various models, guidelines, and methodologies; among the most widely recognized are the following:

- PM BOK Guide — PMI, Project Management Institute
- ISO 21500.—ISO, International Organization for Standardization
- ISO 10006.—ISO, International Organization for Standardization
- ICB Competence Baseline — IPMA, International Project Management Association
- APM BOOK.—APM, Association for Project Management
- PRINCE 2 - OGC, Office of Government Commerce
- ANCSMP—AIPM, Australian Institute of Project Management
- PM4R—IDB, Inter-American Development Bank

The various schools of project management focus on candidates' skills and experience in managing and working on projects. These institutions have created and developed methodologies and standards for project management, in some cases combining methodologies that make it possible to shorten timelines or modify phases and steps. When it comes to these project management training schools, the PMI and the IPMA are considered leaders in this field; these institutions base their instruction on the knowledge and use of tools, techniques, and skills for project management.

According to QS Quacquarelli Symonds (2022), there are 550 project management programs worldwide, of which only 1.09% are located in Mexico; this corresponds to 6 programs in the QSTop Universities ranking. However, according to research conducted in Mexico, it appears that these types of skills are developed through continuing education activities and graduate programs, such as master's degrees or specialized programs at private institutions. The schools in Mexico that offer these programs are listed below:

- Public | National Autonomous University of Mexico (UNAM) | Specialization and Certificate Program
- Private | Monterrey Institute of Technology and Higher Education | Specialization
- Private | Universidad del Valle de México (UVM) | Certificate Program
- Private | Technological University of Mexico (UNITEC) | Master's Degree
- Private | Universidad Panamericana (UP) | Master's and Specialization Programs
- Public | National Council for Science and Technology (CONACyT) – CIATEQ | Master's Degree
- Private | La Salle University | Master's Degree
- Private | University for International Cooperation (UCI) | Master's Degree
- Private | International Ibero-American University (UNINI) | Master's Degree
- Private | International University of La Rioja (UNIR) | Master's Degree
- Private | ICEL University | Master's Degree
- Public | Tecamachalco University of Technology (UTTECAM) | Bachelor's Degree
- Public | Izúcar de Matamoros University of Technology (UTM) | Bachelor's Degree
- Public | Huejotzingo University of Technology (UTH) | Bachelor's Degree
- Public | Tecámac University of Technology (UTT) | Bachelor's Degree

As can be seen, technical schools offer bachelor's degree programs; however, a review of the curriculum reveals that these programs focus on business management, indicating an opportunity to strengthen these educational programs and align them with DGP starting at this academic level. At the master's level, options are limited, as these programs are concentrated in private schools and offered at only 15 educational institutions, with a total of 17 general programs, most of which are located in Mexico City.

According to the list, 47% of the programs offered in Mexico are graduate programs, 29% are continuing education or specialty programs, and 24% are bachelor's or advanced technical degree programs, presenting an opportunity to address the shortage of professionals in this field. Although there are 11 more programs than those listed in the QS Top Universities ranking, this number remains minuscule compared to what is offered worldwide. It is also important to recognize that there is a demand for professionals in this field and that, with the right tools, it is possible to train professionals in this area—whether through a technical degree or, as has been the case, through specialized bachelor's or master's degrees—in accordance with areas of interest and in line with national development projects.

Thematic Analysis at the Regional Level and Curriculum Definition for DGP Education at the Graduate Level

Curriculum analysis is a research exercise based on various data. To address this topic, the top programs worldwide were identified, with a limit of 10 programs per ranking. Based on various databases and the scoring structure of global rankings, different results were obtained.

Data from Mundo Posgrado (2021) highlights Spanish schools such as EAE Business School, Universidad Europea, UNIR, and IMF Business School. Meanwhile, the Master of Project Academy ranking (2022) lists U.S. institutions such as Bellevue University, Capella University, the University of Colorado, and the University of Maryland among the top schools. The QS Top Universities ranking (2022) takes a global perspective, including UCL—London's Global University, The Australian National University, and The University of Manchester on its list. This variation in the rankings is due to the fact that some focus on geographic criteria, while others evaluate academic units based on skills and other factors.

An analysis of the number of programs by region, according to the QS Top Universities ranking, shows that, out of a total of 550 programs, Europe has the largest share at 67.5% (371 programs, of which 296 are master's programs), followed by Oceania with 19.8% (109 programs, including 98 master's programs). Latin America and North America have far fewer programs—26 and 25, respectively—almost exclusively at the master's level.

As for bachelor's degree programs, the top 10 reveals that most are located in Australia and the United Kingdom, with a strong focus on construction project management or civil engineering, as seen in the programs at UCL—London's Global University and the National University of Singapore.

Finally, the landscape for master's-level graduate programs shows that most of the top-ranked programs are concentrated in the United Kingdom and are offered by just three universities. Programs such as UCL's "MSc in Strategic Management of Projects" and the University of Manchester's "MSc in Engineering Project Management" were analyzed to compare their syllabi and verify the topics and skills taught to students enrolled at these universities.

Universities vary depending on the ranking; this is because some rankings are based on geographic location, while others are based on the capabilities and characteristics of the academic units. The QS World University Rankings cover the global landscape; Europe accounts for 67.5% of all programs ranked by this organization, followed by Oceania with 19.8%.

Curriculum Analysis of the Top 10 Master's Programs

The courses offered by the top 10 master's programs were identified by verifying matches in course names and topics. It was found that all programs include a course titled "Project Management," referring to both the course and the program name. According to the syllabus, this course focuses on establishing the arguments necessary for students to undergo a paradigm shift and develop a narrower perspective based on project management tools, thereby moving toward an inclusive approach to project management. It also introduces students to the principles and theoretical framework of project management and information technology. This course appears most frequently among the top 10 master's programs.

A second course is titled "Governance and Control" or "Project Monitoring and Control." This course has similar objectives depending on the academic institution offering it; these include exploring the strategic framework surrounding any project, establishing project goals and objectives, and understanding the control framework and measures that are part of project management (University for International Cooperation [UCI], 2022).

The third common element identified was a course titled "Project Management and Business Activities" or courses related to companies specializing in project management; 6 of the 10 programs include a course dedicated to this subject.

Other courses found to align with the programs—either in terms of syllabus or course title—are those related to:

1. Problem and Risk Management,
2. Personnel management,
3. Project Finance,
4. Management of large or complex projects.

Other common features among the programs include a two-year duration dedicated to developing the competencies and skills of these professionals. The teaching modalities are varied, with an emphasis on in-person instruction; however, the three universities offering the top 10 programs have specified that some courses will be taken online.

There are also extracurricular courses designed to help students prepare for PMI certification or accreditation. This serves as a reminder that teaching must focus on the entire project life cycle—from design through management to closure—as well as on the skills required to earn a certification from the PMI or IPMA.

Curriculum Analysis of the Selected Programs (Top 10) Compared to Education in Mexico

Undergraduate programs in DGP are becoming increasingly competitive, as there are few options for studying this field; as for graduate programs, they are mostly offered at private universities, and based on the curricula and syllabi, the content is similar to that of the top 10 programs.

Of the five graduate programs ranked by QS Universities in Mexico, one common feature is the course titled "Project Management," which is the top-ranked course for the best master's programs worldwide. According to the educational institutions that offer this course in Mexico, its objective is for students to identify the main elements of project management, including planning, organization, motivation, and control.

However, unlike the top-ranked programs (top 10), the second most common subject is project finance and resource management, while the third most common is the subject related to identifying and managing risks and changes in projects. Although these subjects are indeed part of the set of common topics in the world's top graduate-level

programs, they do not specifically rank second and third; however, they are among the skills required of a project manager.

The courses that receive the least attention in the curricula of programs in Mexico are those focused on project communication or marketing; according to the QS University Rankings, this subject is included in at least two of the top 10 programs.

As we can see, the courses with the greatest overlap between programs worldwide and those in Mexico are Project Management and Project Monitoring and Control, meaning that Mexico's curriculum is similar to that of the top programs; however, as Cruz et al. point out, (2020), managing projects requires the implementation of planning, execution, and control processes, as well as meeting specific deadlines and making rational use of all the resources necessary for the project. According to Sáenz et al. (2019), it is essential to study the following constructs: time management, human resource management, quality management, and cost management. This relates to the need to supplement teaching models on DGP, since, although models and methodologies exist, technologies and global challenges have changed, and various project management and monitoring tools have been developed and implemented.

Definition of a Recommended Curriculum for Implementing a Graduate-Level Program

Based on the findings discussed in this article, and with the aim of developing a regionalized graduate program in accordance with the constructs and principles that have been documented, a core curriculum was defined to implement a graduate program in DGP for Mexico.

Based on the above, it was concluded that the following courses are recommended for the implementation of a graduate program.

1. Project Management and Design,
2. A Management Framework for Business Projects,
3. Design Management,
4. Project Problem and Risk Management,
5. Project Monitoring and Control,
6. Financial Reports and Analysis
7. People and Organizations,
8. Strategic Human Resources Management
9. Project Announcement
10. Projects and Information Technology.

This stems from the fact that projects are a process that involves planning, execution, and control, as well as the project manager's precise actions based on information, time, costs, and other resources necessary to achieve the objective; therefore, it is important to note that future project managers must maintain the knowledge and skills needed to apply their expertise in these areas.

Similarly, we must understand that a project does not operate based on a single technique or methodology, as each involves unique processes; therefore, it is considered necessary to combine systems, techniques, methodologies, and people to achieve the established objectives. Consequently, these subjects are seen as the foundation for a project manager to acquire the necessary skills, in conjunction with the use of state-of-the-art technologies.

It is also recommended that the program be hybrid, combining in-person and online classes through a collaborative learning environment that includes both

synchronous and asynchronous activities, and making use of all available tools to develop skills in technology and project management. In addition, it is suggested that there be programs or workshops designed to develop students' skills both inside and outside the classroom; therefore, it is proposed that this curriculum be flexible and promote mobility and collaboration with other educational institutions as well as with industry.

Another point to consider when designing a flexible graduate program for Mexico is that students should be able to complete the program on a full-time basis within two years and, within that timeframe, submit a project and take the corresponding degree exam.

With regard to areas of knowledge application, the following were considered:

1. Design and Management of Engineering and Infrastructure Projects.
2. Design and Management of Quality and Environmental Projects for Development.
3. Design and Management of Innovation and ICT Projects.

Proposal for Implementing a Flexible Project-Based Learning Program at the Graduate Level

To determine a program and its corresponding curriculum, a comparison was made of the curricula of the top 10 programs in the QS World University Rankings, followed by a comparison of the five highest-ranked programs in Mexico. Finally, a syllabus was designed by combining elements from the world's top programs and adapting them to the regional context, with a focus on the knowledge and skills that Mexican students—and, where applicable, students applying for study abroad programs in Mexico—should acquire.

With this in mind, it is proposed that this program be implemented at the National Polytechnic Institute (IPN) within the Interdisciplinary Professional Unit for Engineering, Social Sciences, and Administrative Sciences (UPIICSA), as this institution already offers a graduate-level program in the field of project management that is included in the QS World University Rankings, and it possesses the necessary regulations and technical, technological, human, and financial resources to implement a graduate program of this nature.

Therefore, in addition to the implementation at that institution, the National Polytechnic Institute's Regulations on Graduate Studies were taken into account, which specify that students must earn 115 credits in accordance with the Academic Credit Allocation and Transfer System (SATCA) and complete a thesis on their chosen project (54 credits); and for the doctoral level, a total of 4 academic terms (4 years), including the thesis (108 credits) and the comprehensive exam.

In accordance with the above, Figure 2 shows the proposed curriculum map for the DGP master's degree program.

Figure 2

Proposed Curriculum Outline for the Master's Program in DGP

Maestría en Diseño y Gestión de Proyectos				
Modalidad	Híbrida	Orientación	Profesional	4 semestres
Unidades de aprendizaje de:	Periodo escolar I	Periodo escolar II	Periodo escolar III	Periodo escolar IV
Tronco básico multidisciplinario	Diseño y gestión de proyectos	Seguimiento y control de proyectos	Gestión de problemas y riesgo de proyectos	Infomes y análisis financieros
	Gestión estratégica de recursos humanos	Comunicación del Proyecto		
Seminario de proyectos multidisciplinario	Seminario I	Seminario II	Seminario III	Seminario IV
Optativas	Un marco de gestión para proyectos empresariales	Proyectos y tecnologías de la información	Personas y organizaciones	Temas selectos
Línea de aplicación del Conocimiento 1:	La contratación de construcción, ingeniería y servicios profesionales	Gestión de la construcción	Sustentabilidad ambiental en el sector de la construcción	Integración de los sistemas de información del proyecto con el modelado de información de construcción
	Proyecto financiero para proyectos de infraestructura	Gestión financiera estrategia para proyectos de construcción e infraestructura	Evaluación de impacto ambiental, social y económica del proyecto	Marketing y desarrollo de negocios de proyectos.
Línea de aplicación del Conocimiento 2:	La gestión de grandes proyectos y programas	Evaluación ambiental	Reforma y gestión del sector público	Gestión de la calidad en el desarrollo
	Género y desarrollo	Planificación y gestión del desarrollo	Características y habilidades de la práctica del desarrollo	Evaluación de impacto ambiental, social y económica del proyecto.
Línea de aplicación del Conocimiento 3:	Estrategia tecnológica	Gestión de proyectos con TIC	Diseño de sistemas	Gestión de la innovación y la tecnología
	Sistemas de defensa y seguridad	Análisis de datos para gerentes de proyectos	Planificación y gestión del Desarrollo de Proyectos de innovación y TIC	

The program structure presented in Table 1 lists the following six core courses for project management:

1. Project design and management,
2. Project monitoring and control,
3. Project Problem and Risk Management,
4. Financial reports and analyses,
5. Strategic Human Resource Management,
6. Project Announcement.

Similarly, three courses were identified that, although they overlap, are not offered in all programs; therefore, it is proposed that they be offered as electives based on student interests:

1. A management framework for business projects,
2. Projects and Information Technology,
3. People and organizations.

With regard to the three areas of knowledge application, it should also be noted that they are aligned with the best graduate programs. Similarly, and in line with the program’s regionalization, the research found that these areas are included in the programs offered by Mexican institutions, thereby adding value and fostering professionalization in strategic fields.

Figure 3 shows the proposed curriculum map for the DGP doctoral program.

Figure 3
Proposed curriculum outline for the DGP program

Doctorado en Diseño y Gestión de Proyectos				
Modalidad	Híbrida	Orientación	Profesional	4 semestres
Unidades de aprendizaje de:	Periodo escolar I	Periodo escolar II	Periodo escolar III	Periodo escolar IV
Seminario de proyectos multidisciplinario	Seminario I	Seminario II	Seminario III	Seminario IV
Línea de aplicación del Conocimiento 1: <i>Dirección y Gestión de proyectos de ingeniería e infraestructura</i>				
Línea de aplicación del Conocimiento 2: <i>Dirección y Gestión de proyectos de calidad y medio ambientales para el desarrollo</i>				
Línea de aplicación del Conocimiento 3: <i>Dirección y Gestión de proyectos de innovación y TIC</i>				

As we can see, the doctoral program focuses on seminars for the presentation of a multidisciplinary project, which may be a continuation of the one presented during the master’s program or a different one; furthermore, this project must be aligned with one of the three areas of knowledge application. This project is expected to require only minimal guidance from teachers; therefore, a hybrid model is proposed, combining in-person and remote sessions accessible from any device that facilitates communication, thereby fostering long-distance teamwork skills and effective communication.

Overview of courses with a thematic analysis based on the top 10 programs worldwide and existing programs in Mexico

Undergraduate and graduate university programs have an academic mission and vision, but the primary goal is to build students’ skills. Below are the objectives for each of the required courses, with the aim of creating a program that covers the appropriate topics in line with the top 10 universities in the world.

The course on project management is included in all the programs reviewed, and the objective of this course is similar at all three universities: it is designed to provide a foundation for the practice and profession of project management, as well as to familiarize students with and help them recognize the management topics encompassed by the term “project management,” along with the challenges these professionals may face.

In the case of universities in Mexico, the objective is no different, since what they offer is the opportunity for students to use the methods and methodologies required for the management and coordination of all stages of a project, applying techniques and tools specific to project management; however, the topic of project design is largely overlooked,

with the exception of the program offered by the Universidad Internacional Iberoamericana (UNINI), which provides this graduate program online and includes a module dedicated to project design and another dedicated to project management. Each of these modules covers different subjects that allow for a holistic integration of project design and project management at every stage.

It is worth noting that the second most important course is “Project Monitoring and Control”; at UNINI, this course is offered as part of the “Project Management” module. Among the top 10 universities, this course is offered in 6 of the 10 programs, the objective of which is to direct and ensure the proper execution and monitoring of a project, as well as the environment in which these projects are carried out. According to the University of Manchester, the following are key topics: the importance of project planning and control, project selection, project planning, and project monitoring and control

The third course in the selection is problem and risk management; among the programs analyzed in Mexico, only two universities offer it, and its core topics include trust management—quality and risk, and ISO 45001 (International Ibero-American University [UNINI], 2022)—as well as risk management and its implications for projects (Universidad Panamericana, 2022). With regard to the objective of this course, students should be able to analyze how risks and problems influence project decision-making, as well as manage risks and problems throughout the project's lifecycle.

The course titled “Financial Reports and Analysis” is another offering inspired by an analysis of the world’s best programs; at the regional level, it is offered by only two institutions and covers the following topics: Economic and financial evaluation of investment projects and project financing; UNINI also offers a course dedicated to the economic aspects of projects. According to the international rankings, it is offered in 3 of the top 10 programs.

The objective of this module is to provide an introduction to project economics and its importance in the discussion of project management. It also offers insight into the role of accounting, financial reporting, and the dissemination of economic information, as well as how to communicate resource allocation and financial statements to support better decision-making.

The course titled “Strategic Human Resource Management” is offered in 5 of the top 10 international programs, as well as in 3 programs reviewed under the national framework. This course is designed to address conflicts and support the leadership of project managers within work teams; therefore, it aims to provide theories and frameworks for leadership and organizational change so that students can develop interpersonal skills that can be effectively applied in organizations, enabling them to lead people.

Another course selected based on its similarity and overlap with curricula at the global and national levels is the course titled “Project Communication,” This course is offered at the Australian National University in two of its programs, and its focus is on introducing topics in marketing and communications, with an emphasis on audience selection, message development, stakeholder identification, and problem-solving through project communication. This provides students with the opportunity to develop communication skills by tailoring messages to the target audience.

It also aims to ensure that marketing focuses on stakeholders to provide valuable solutions for the identified audience, with the following learning outcomes: identifying stakeholders’ interests and requirements, employing evidence-based decision-making, and establishing stakeholder groups.

Based on the above, there are six course units designed in accordance with the curricular similarities of the world’s top programs. Additionally, the selection process was

guided by the development of the competencies necessary for project management and design.

The following three courses were selected as electives; although these subjects overlap significantly across the various programs, they either cover some overlapping topics or focus on a specific area of specialization. These courses are:

A management framework for business projects, which is offered in 5 of the top 10 programs, and covers project management concepts within an organizational structure, highlighting the following topics: businesses, competitive strategies, business development, decision-making and negotiation, continuous improvement, and relationship management.

Information Technology Projects: This course is offered in three of the top 10 programs worldwide, and it is also offered in one of the programs in Mexico. The course focuses on introducing the fundamentals of systems engineering and establishing a framework for designing engineering systems in response to client needs and expectations. It also aims to foster a combination of systems thinking, planning, and sound engineering practices.

The last of the elective courses is “People and Organizations,” which aims to examine the nature of organizations and the ways in which they conceptualize human relationships with people both within and outside the organization, as well as the ways in which work is carried out within an organization or within a project. It also seeks to develop leadership and motivation skills and integrate them with project management.

Asynchronous analysis

The evaluation was conducted asynchronously with 13 participants, who were asked to review the proposed program in an institutional setting and then complete questionnaires via Google Forms, as well as freely submit comments or suggestions.

The workshop participants who reviewed and validated the program come from 12 organizations around the world, providing a wide range of proposals and observations. Below is a list of the organizations that contributed their expertise to the review of this proposal.

1. Argentina - Argentine Ibero-American University Foundation
2. Korea - Korea Advanced Institute of Science & Technology (KAIST)
3. Spain – Polytechnic University of Catalonia – UPC
4. Spain – Cantabria Center for Industrial Research and Technology – CITICAN
5. Spain - Loyola University Andalusia
6. France - Engineering School – ESTIA
7. Mexico – Ibero-American University Foundation, Mexico
8. Mexico – National Polytechnic Institute (IPN) – Office of Graduate Studies
9. Mexico – IPN – Interdisciplinary Center for Research on Comprehensive Regional Development, Oaxaca Unit
10. Mexico – IPN – Center for Computer Science Research
11. Mexico - IPN - Interdisciplinary Professional Unit for Engineering, Social Sciences, and Administrative Sciences
12. Venezuela - University of the Andes; Inter-American Center for Environmental and Territorial Development and Research

The questionnaire consisted of questions related to each course and included both multiple-choice and open-ended questions for comments. There were a total of 234 questions per participant, resulting in a total of 2,808 responses analyzed for the master’s

program, and a total of 864 for the doctoral program. The survey focused on pedagogical and functional aspects of the courses and topics; participants were also asked to specify whether they believed the IPN had sufficient and necessary resources to establish a new program that would expand the range of academic offerings provided by the institution.

Analysis Results

This process is carried out manually by reviewing each of the questions and recommendations, yielding the following results:

Between 82% and 91% of participants stated that the objectives and topics are appropriate and cover or enable them to develop the required skills.

Between 64% and 91% of participants stated that the syllabus aligns with the competencies described for developing skills in DGP students.

Between 45% and 72% of the participants felt that it was not necessary to add any more topics or subtopics; for the remaining percentage, the analysis focused on areas of opportunity to determine whether they were relevant or not.

With regard to the pedagogical and functional aspects of the syllabi for each course, the following results were obtained for the 13 courses: the participants considered them to be highly relevant. The pedagogical and functional aspects of the courses evaluated were:

1. The topics help students achieve the course objectives
2. There is alignment with other international and national programs
3. The course is interesting, engaging, and motivating
4. The course has shortcomings
5. The course has potential
6. There are sufficient resources, content, and activities
7. There is diversity in assessment
8. The course takes an applied, creative approach
9. The course encourages self-directed learning, initiative, and decision-making
10. The course fosters project management skills

Therefore, the proposed syllabus is designed to help students achieve the objectives of each course; however, the workshop leaders made recommendations and observations, all of which emphasized the inclusion of practical activities as well as the incorporation of flexible and hybrid teaching methods.

With regard to the proposed doctoral program, the same feedback was received regarding the validation of the pedagogical and functional aspects of the courses; however, this program consists of four seminars dedicated exclusively to the completion of a project for the doctoral dissertation defense. Therefore, the objectives were adjusted so that each seminar has a specific objective aligned with the stages of the project currently being worked on.

Based on the analysis of the workshop, out of 3,672 responses, more than 50% of the participants felt that the program was suitable for students to acquire the skills and competencies of professionals in the field; therefore, this proposal could lead to the consolidation of a program offered by the IPN.

Proposed Graduate Program

In accordance with the recommendations from the asynchronous workshop, modifications were made to the course objectives. Regarding the areas of knowledge application, no comments or changes were made, as these were not subject to evaluation

due to the approach of developing an ad hoc and general syllabus to train professionals in DGP, as shown in Figure 4.

Figure 4
Proposed Curriculum Framework for the DGP Program

Maestría en Diseño y Gestión de Proyectos				
Modalidad	Híbrida	Orientación	Profesional	4 semestres
Unidades de aprendizaje de:	Periodo escolar I	Periodo escolar II	Periodo escolar III	Periodo escolar IV
Tronco básico multidisciplinario	Diseño y gestión de proyectos	Seguimiento y control de proyectos	Gestión de problemas y riesgo de proyectos	Informes y análisis financieros
	Gestión estratégica de recursos humanos	Comunicación del Proyecto		
Seminario de proyectos multidisciplinario	Seminario I	Seminario II	Seminario III	Seminario IV
Optativas	Un marco de gestión para proyectos empresariales	Proyectos y tecnologías de la información	Personas y organizaciones	

As we can see, the required courses offer a wide range of options in line with the best master's programs. For the doctoral program, only four seminars are offered, in which students must develop a feasible project that includes all phases, thereby allowing them to transition from coursework to work on their doctoral dissertation.

Discussion

The teaching of DGP across Ibero-America is diverse; however, one area where the region is in agreement is the use of globally recognized methodologies led by PMI and IPMA. With regard to the situation in Mexico, which focuses on continuing education or master's degree programs, the landscape is precarious and heavily concentrated in master's programs at private institutions that offer accreditations from leading schools that have developed project management methodologies.

It is considered necessary for students to begin applying their skills and knowledge starting in technical schools and building on the knowledge gained during their undergraduate studies, thereby focusing on both technical and general knowledge in order to transform it into valuable projects that result in products or services users need.

Based on the foregoing, the creation of a graduate program for the IPN—which is considered a public institution of higher education—was considered. This program consisted of six required courses, as well as three areas of knowledge application in engineering and construction, environmental, social, and development projects, and information technology, in conjunction with the development of an applied project as part of the dissertation.

It should be noted that the above is used to identify these courses, and similarities between programs were sought in order to align and regionalize a program in accordance with the top programs.

In addition to the above, it is considered necessary—in order to implement a program of this nature—to take a regional approach and determine what types of project professionals companies and organizations in Mexico are seeking, since such a program

must have at least three objectives: first, to train DGP professionals for Mexico; second, to enable these professionals to be deployed to projects in other parts of the world; and third, to allow students from other regions to pursue professional training in Mexico.

Conclusions and Future Work

The conclusions drawn from this research are significant because, based on the assessment conducted, it was possible to propose a hybrid master's program for an institution in Mexico that is accessible to a wider audience, is aligned with the best master's programs in the world, and aims to develop the skills recommended by the PMI and the IPMA.

However, it will be necessary to adapt this program to regional contexts and update it in line with new developments and innovations in order to produce well-trained professionals; furthermore, there is little interest on the part of public institutions in incorporating these skills into the relevant curriculum.

Similarly, it is considered that the proposed areas of knowledge application are aligned with national and international challenges.

As part of future efforts, it will be important to increase the dissemination of this type of information, which will help highlight the opportunities available to trained professionals so they can rise to the challenges and seize the opportunities they will face in today's workforce.

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