



CHAPTER 5

PROFESSIONAL SKILLS AND RESEARCH FOR SECTORAL DEVELOPMENT¹

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ABSTRACT: According to the challenges of Technological Higher Education in Mexico, facing the requirements of graduation profiles that respond to educational competitiveness in the face of the challenges of Industry 4.0 and even towards Industry 5.0. This applied research initiative is oriented to the development of actions to strengthen sector competitiveness, considering the learning curve generated in the strategic sectors of Mexico, through the research work of experts in technological higher education of Mexico and specialists in labor, professional and research skills. The main objective is to present the model to develop Competency Dictionaries Sectoral (DCS) for each Study Program, through Methodology of the Fifth Helix Systemic (in Spanish: Quinta Helice Sistemica - QHS), as a strategic contribution to reduce the gap of the different knowledge of the competencies in the occupational functions in the regional strategic sectors of the North, Center and South of Mexico; under the frame of reference of the State of the Art and frontier research of international knowledge, the foregoing sustained from the scientific work initiative of the Academic Body project of the Department of Economic and Administrative Sciences entitled "Sectoral Competitiveness, Social Innovation and Sustainable Development" of the National Technological Institute of Mexico Campus Tijuana.

KEYWORDS: Fifth Helix Systemic (QHS Methodology), Competency Dictionaries Sectoral, Sustainable Education, Social Economy, Circular Economy.

1. INTRODUCTION

The recommendations of the 2019 Organization for Economic Cooperation and Development [1] report on competencies in Mexico, the current model of the Mexican competency system has an opportunity to rethink actions aimed at strengthening the model. For this reason, the proposal of this article is based on

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the challenges indicated by the OECD to strengthen competitiveness, development and social progress, considering as a basis the impact that education represents at the eight levels indicated by CINE-UNESCO, which makes it necessary to reflect on the progress and current results in the use of labor competency standards in the sectors of society, as well as the national model and the effective methodology to move to the next stage of the development of the strategic economic sectors, facing the challenges of globalization and the needs of relevant and competitive occupational profiles in the face of the Industry 4.0 Revolution and the generational transition to Industry 5.0. Likewise, awareness of empowerment about the Sustainable Development Goals (SDG) of the UN 2030 Goals [2]. Which makes it imperative to build a model and an appropriate methodology for professional skills and research, making clear the differentiation of the eight levels and their requirements for training, alignment, evaluation and eventual certification of job skills, professional skills and applied research skills, with social impact and territorial development, encouraging local capacities with linkages that influence social innovation and with Startup and Spinoff-type ventures.

This article is based on the development of three scientific research projects registered at the national level in the National Technological Institute of Mexico:

1. Observatory for the Integration of Engineering to the Ecosystem of Economic Development of the Peninsula of Baja California [3],
2. Observatory of Sustainable Development in Graduate Programs in Baja California [4] and
3. Prospective of Dictionaries of Labor, Professional and Research Competences for the Sectoral Development of the Social and Solidarity Economy in Mexico.

All the above is intended to generate data on the relevance of the programs of study and the effectiveness of the competitions labor, professional and research, as well as evaluate the results of the graduates in the context of regional development and productive vocations relevant in northwestern Mexico. The purpose of the project is to examine the employability of students and graduates, as well as analyze the causes of student dropout rate engineering, which is about 40% during the first semester. The high dropout rate may be related to the socioeconomic factors affecting northern border" cities, which have experienced an influx of migrants arriving from southern Mexico. Until now, the research has focused on sectoral studies related to the postgraduate Master's Degree in Administration at the Technological Institute of Tijuana and the systematic development of projects related to various strategic sectors industry [5] in which initiatives have been created for applied research programs through Postgraduate Theses, Social Service Programs, Complementary Credits in Educational Programs and Professional Residences (Professional Practices).

This research focused on the development of an electronic survey that could systematically collect key information for the creation of an electronic empirical database for the development of a web page that will serve to assess employability and performance, as well as to track results. economic and strategic of students and graduates of engineering and economic-administrative sciences. The aim was to identify variables that could generate feedback on the causes of student dropout rates, as this can have a significant impact on students' families and futures, as well as their communities. In addition, the development of this survey can provide valuable information on the effectiveness of educational programs and learning tools, especially for students who work and study simultaneously. Also, an empirical database to monitor employability and career outcomes of graduates could be a strategic tool that could provide useful information for other technological institutes, such as those located in Tijuana, Mexicali, Ensenada and other Higher Education Institutions in Baja California and a national benchmark, and thereby strengthen strategies of relevance and social entrepreneurship seeking sectoral well-being through the social and solidarity economy [6].

2. THEORETICAL FRAMEWORK (STATE OF THE ART)

The present academic research is oriented to the development of actions to strengthen the competitiveness of the sector, considering the learning curve generated in the strategic sectors of Mexico, through the research work of experts in technological higher education at the National Technological Institute of Mexico Tijuana Campus. With the aim of developing the methodology of Dictionaries of Sectorial Competencies (DSC) through the QHS methodology, as a systematic contribution to reduce the gap of the different knowledge of professional competences in occupational functions in regional strategic sectors. And with this, strengthen the relevance of graduates of professional careers and the competitiveness of technological higher education.

This research employed a systematic approach with the QHS methodology developed [7, 8] to cover all aspects of society; therefore, sectoral experts were contacted such as government, educational, business, professional associations, chambers, as well as specialized consultants.

Figure 1 presents a chronological review of the state of the art on competencies for professional development. In 1973 the article was published "Measuring competencies and not intelligence" [9] as a result of research in which he searched for variables that would allow a better prediction of professional performance, identifying these variables as "competencies", which were those characteristics that differentiated the people who were successful from those who are not; the foregoing

came to revolutionize a large part of the concepts related to the management of human talent, being that in 1980 derived from various studies it was elaborated a list of general competencies that are characteristic of different categories of management positions, this list is called “competence model” and served as a reference framework for evaluating and training company managers; applying this Methodology for the selection and development of managerial capacity, the method used by management assessment centers when developing competency models to apply in organizations is created.

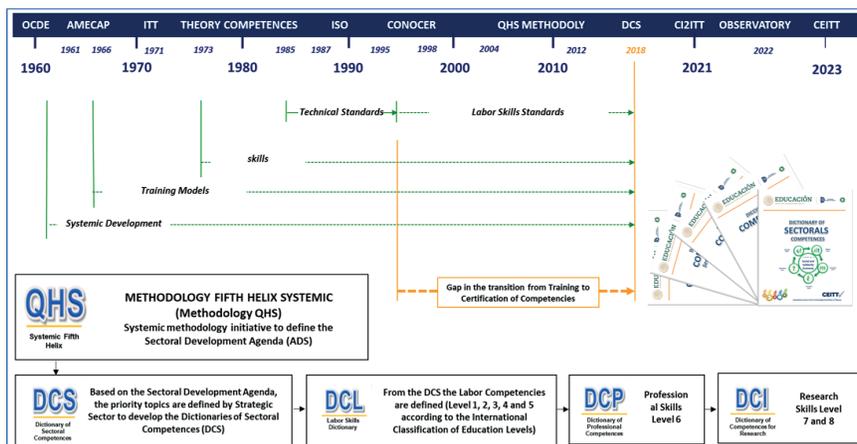


Figure 1. Timeline of the transition from training to competencies

Reference: Own elaboration (2022)

Goals and the implementation of the Circular Economy in SMEs in Baja California, as well as the Social Economy and Social Innovation undertakings and practices. That it can provide information on the detection and evaluation of the evolution of the SDGs to find opportunities, programs and actions to develop; evaluate the critical factors that promote social innovation and sectoral articulation for the benefit of society and the different levels of education; strengthening the skills of future generations.

The results will provide necessary information that may be useful for a program of actions aimed at the formation of Nodes for the Promotion of the Social and Solidarity Economy (NODESS) in Baja California.

In this line of development of human talent management, in 1985 the National Council for the Evaluation and Certification of Labor Competence [10] was created as a Federal Government entity under the Ministry of Public Education, with the aim of contributing to raising the level of economic competitiveness, educational

development and social progress of people in the country, through the National System of People Competences and defines the Labor Competence Standards in light of the challenges identified and indicated by the OECD. In the 90's and as a result of the international standards of the International Organization for Standardization, the competencies of human resources in organizations are defined based on 4 components: education, experience, training and skills, and with it generate Technical Standards for its definition. In 2011, the United Nations Educational, Scientific and Cultural Organization (UNESCO) approved the application of the International Standard Classification of Education (ISCED) [11], and it shows 9 levels from ISCED Level 0, which is the first instance education, to ISCED Level 8, which corresponds to the educational level of Doctorate.

Within the state of the art of the evolution of the concept of competencies, the most relevant definitions are observed in two large groups:

1. The first group is made up of by definitions based on their constituent elements (skills, behaviors and/or aptitudes, actions, knowledge and/or knowledge).
2. A second group made up of the conceptualizations related to the applicability and environment (application, set, capacity and result) [12] Management by competencies based in the applicability and context, they are a set of essential elements combined between the capacities of the individual and the context in which the work activity will be carried out, allowing said tasks to be developed to be clearly defined under the required work context and to be carried out successfully.

Competition is comprised of the result of accumulated experiences, expressed through knowing how to know, knowing how to be and knowing how to do within a context and an implicit knowledge of the individual. As part of their studies, defined that the characteristics of the competences are made up of a set of attributes (enumerated) of the individual, not limited to knowledge, but include skills, attitudes, communication and personality, in other words, it takes into consideration all work elements, not limited to just knowledge [13]. In turn, they suggest that knowledge and skills are the most observable characteristics of the competencies, which are easy to acquire and develop, these in turn are defined:

1. Skills. Capacities that an individual has to perform a task physically or mentally (critical and analytical thinking).
2. Knowledge. Information that an individual has on a specific subject, in order to be able to identify what he can do.
3. The classification of competencies generated the emergence of the labor competencies model has generated a set of nuances and differences between the different types of competencies, resulting in a large number of studies, which have allowed them to be classified according to different criteria and work environment.

In the year 1994 were described four classifications of professional competencies [14]:

1. **Technique:** Mastery at an expert level of the tasks, activities and contents necessary to carry out the work, including the skills and knowledge required to carry it out.
2. **Professional:** Understands the various response capabilities for each of the assigned tasks, including any alterations. The individual has the ability to independently find the necessary possible solutions, through the previous experiences acquired by the individual.
3. **Social:** Includes collaboration with other individuals in a constructive, communicative way, group behavior orientation and interpersonal understanding.
4. **Participatory:** Includes the participation of the individual's job within the organization and its environment, has the ability to decide and assume responsibilities.

The approaches and models of competencies until the eighties, a conceptualization of competency-based management was used in organizations in a simple way, this because competencies were understood as personal qualities isolated from individuals and with a cognitive nature. that were predetermined by successful professional performance, for which the competencies evolve towards a more complex definition that protects competencies as functional personality configurations made up of knowledge, skills, motives, and values. Table 1 describes the typology of competencies necessary for work, professional and research development, as well as soft skills and transversal competencies for managerial development. The professional competence approach and models consolidate the elements necessary to cover the needs of people, companies and society.

Objective of Agenda 2030	Action / Contribution
1. End of poverty	In progress
2. Zero Hunger	Product analysis project not in force in tortilla shops
3. Health and well-being	Nutritional impact of corn
4. Quality education	Through Academic and Research Bodies, offer training
5. Gender equality with equity and equality actions in the processes of orientation	With equity and equality actions in the processes of orientation
6. Clean water and sanitation	In progress
7. Affordable and clean energy	In progress
8. Decent work and growth economic	Analysis of typologies of trades and tasks in ESS of Tijuana

9. Industry, innovation and infrastructure	Development of productive projects with social innovation
10. Reduction of inequalities	Social inclusion and integration projects
11. Sustainable cities communities	Variables of an observatory of SSE in Tijuana
12. Responsible production and consumption	In progress
13. Climate action	In progress
14. Underwater Life	In progress
15. Life of terrestrial ecosystems	In progress
16. Peace, justice and strong institutions	In progress
17. Alliances to achieve the goals	Inter-institutional collaborative work

Table 1 Contribution to the SDGs by the NODESS Tijuana project

In the field of professional competencies, the research-based approach defines three main conceptions [15]:

1. Behaviorist: The competence approach is broad and therefore everything can be covered by it; it does not distinguish between effective and minimal competences.
2. Functional: Establishes comparisons between factors such as knowledge, skills, aptitudes and results of workers in organizations.
3. Constructivist: Conceives competence as collective construction and as the product of successive learning, as a result of the interaction between knowledge and previous experiences and personal contributions of the worker.

3. METHODOLOGICAL STRATEGY

Through sectoral comparison and the use of the Fifth Systemic Helix (QHS in Spanish) methodology [16], an evolution of the Triple Helix component of the economic growth model of the sixties of the 20th century, but contextualized to the reality of the new century and the global trends of economic development, a series of methodological alternatives and systemic variables are proposed according to the QHS Methodology for the Cooperative sector and the Social Solidarity Economy (ESS) for the exploration of research that approaches the determinants of the state of development and its competitiveness. The Table 2 presents a relationship of actions developed with the QHS Methodology, thereby generating indicators for the sectors: Cooperatives, Cooperative Education, Government (public management for Cooperatives), Cooperative Associations (including the perspectives and expectations of society on cooperatives and the social solidarity economy) and Cooperative

Consultants, representing a frame of reference for the systemic evaluation of the development of Cooperatives Local, Regional and International (models of good practices).

Methodology QHS	Bachelor's degree	Postgraduate and Research	Continuing Education and Professional Update
H1. Government	Municipal	UN Goals 2030	Social Economy and Solidarity, Cooperativism
H2. Education	Educational relevance	Entrepreneurship and Spin-off projects	Telecommuting, remote or work from home
H3. Business	Legal compliance and learning curve	tools for continuous improvement	Technological capabilities and innovation
H4. Associations	Legal compliance and Post-Covid Actions	Local and global competitiveness	Development and Training
H5. Consultants	Audit and Legal Regulations	Sustainable development	Professional Certifications

Table 2 Typology of skills necessary for professional development

The vein proposals for future research in the cooperative sector and social solidarity economy (ESS) are raised through a methodology called Fifth Systemic Helix (QHS). Table 3 conceptually describes the different types of skills. One of the great values of solidarity companies is the cooperative nature and their ability to manage organizational work, in education, training and awareness of associativity.

Competences	Conceptual description
Labor	Manual assembly of products, low level of technology in processes
Professionals	Teamwork, responsibility, initiative, interpersonal relationship, willingness to learn, punctuality, interpersonal communication, leadership, organization, analytical skills, knowledge of some software, skills for math or any other basic subject, good spelling and writing, creativity and inventiveness, acceptance of changes, active listening, communication effective from different means, tendency to solve problems and not create them, motivation, accept criticism and offer it appropriately
Research	Pose a problem, develop a contextual framework, review the state of the art, create and validate a data collection instrument, build and validate models, master data techniques, master scientific writing style, present research papers in conferences, languages, knowledge of art and culture. universal
Soft	Communication, Time management, Emotional intelligence, Adaptability, Creative thinking, Empathy, Organization, Teamwork, Resolution of problems, Leadership
Global and Managers	Global and intercultural knowledge, understanding of local issues, appreciation of worldviews, understanding of differences in communication, methods of interaction with different cultures, languages.

Table 3 Typology of skills necessary for professional development

The proposal of the QHS-ESS variables leads to the beginning of a multisectoral relationship with unity and synergies orientation towards the improvement of the conditions of the principles of Cooperatives and the Social Solidarity Economy, in the face of the challenges of an increasingly globalized economy. and with requirements of quality management systems and international competitiveness.

It is worth mentioning the context of the historical development of cooperative companies, it was born at the height of the Industrial Revolution, under two large branches and with a great diversity of activities, the first focused on consumer activities and the second on production or industrial activities. In the same way as a capitalist company, the cooperative company has the function of producing, however its objective or purpose is not to obtain maximum benefit or profit, but rather the development and well-being of its members, thereby covering the essence of the social solidarity economy companies.

Within the systemic approach to cooperativism, it is convenient to mention the seven Cooperative principles, which are:

- a) Voluntary and open membership,
- b) Democratic management by partners,
- c) Economic participation of the partners,
- d) Autonomy and independence,
- e) Education, training and information,
- f) Cooperation between cooperatives, and
- g) Interest in the community. Cooperatives represent the most widespread form of social economy entity in the world.

The cooperative sector represents a fertile scenario for the development of the welfare of the social economy, through the combination of different forms and articulation of efforts of sectors and activities of inter-cooperatives, generating and consolidating the sustainability of the organizations, the approach of the variables of cooperativism, the perspective of the principles of research in cooperativism and social solidarity economy is addressed and that, through systemic research, opportunities are identified to strengthen through education and cooperative values a collective wealth, generating with it, a development of successful cooperative models. Prospective of Sectoral Competences for the design of Dictionaries of Professional Competences and Research, Cooperative Sector in Mexico, Research Topics:

1. National Competence System: Competency training gap.
2. Analysis of the results of the Municipal Development Agendas – INAFED/SG (Articulation of Local Governments)

3. Requirements for the development of a world-class local supplier.
4. Gap between Higher Education and Cooperativism.
5. Competence of the Logistics Actor in the Strategic Sector of Logistics Services in Baja California.
6. Model and methodology for DCS for Cooperativism.

Within the framework of the project to form a NODESS program in the city of Tijuana, through the call of the National Institute of Social Economy (INAES) for the articulation sector through the leadership of Higher Education Institutions, the Technological Nacional de México Campus Tijuana has taken the initiative derived from the development and direction of educational programs for different sectors of society with impact in the social economy, the Research and Information Center for the Social Economy and Solidarity (CIRIEC Mexico North Region), with the objective of systematizing experiences and dissemination of social economy and solidarity models. Active participation in the Honorary Presidency of the Social Economy Commission of the Development Ecosystem Economic Department of the Tijuana City Council, in addition to international links.

Preliminary studies by observatory researchers [17] promoted the design of dictionaries that have been used to define the competencies of the sector as a strategy to improve and promote continuing education and professional updating. Figure 2 NODESS TIJUANA program operation model, necessary for professional development and issues concerning the Master’s in Administration program [18].

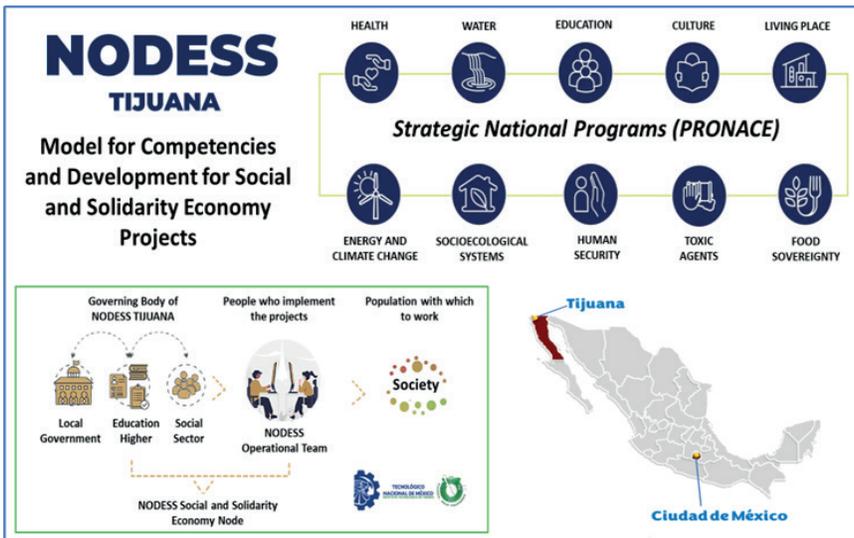


Figure 2 NODESS TIJUANA program operation model

That have been addressed by the academic body project called “Sectoral Competitiveness and Innovation”, which included a multidisciplinary group of Professors and Researchers of the Department of Economic and Administrative Sciences, Division of Graduate Studies and Research, of the Tecnológico Nacional de México Tijuana Campus (TecNM). TecNM Tijuana currently leads the project of the Federal Government Secretariat of the Interior in Mexico to promote Nodes for the Promotion of the Social and Solidarity Economy (NODESS), it is a program that articulates the efforts of Municipal Institutions, Cooperatives and Higher Education Institutions.

Through the Master’s in Administration program, applied research is developed to strengthen the capacities of sectors such as the medical tourism cluster, determining the training and educational skills of all sectors involved in the provision of labor, professional and research services [18, 19]. According to the UN [8] “The SDGs are appropriate mechanisms that will allow the population and its leaders to jointly participate in the search for social consensus and reduce the gaps.” The 17 Sustainable Development Goals, and their 169 goals, affect the structural causes of poverty, combat inequalities and generate opportunities to improve the quality of life of the population within a framework of sustainable development. Table 1 presents the sustainable development objectives that integrate the NODESS TIJUANA Program. This important agenda serves as a launching pad for action by the international community, governments, as well as law enforcement agencies civil society, academia and the private sector, in order to address the three interconnected elements of sustainable development: economic growth, social inclusion and environmental sustainability.

4. RESULTS

The present investigation generated various strategies for the construction of the variables that would generate the elements, constructs and scaffolding necessary for the design of a model based on an Observatory for monitoring the results socioeconomic and employability of students, graduates and even students who failed to complete their professional or postgraduate studies.

For TecNM, it is a matter of concern, since it is national policy to promote professional training, since it affects the future development and social progress of the country. In addition, having an educated population reflects the country’s competitiveness and innovation in the face of global challenges [20].

The first methodological approach of this research was based on a prospective study on the certification of competencies in Mexico. This study generated the current standards for study programs in technological higher education, specifically

those that lead to engineering careers in various economic regions of the nation. In Mexico, there are three regions, known as the North, the Center and the South, and each of these regions has specific needs for commercial vocations and ecosystems based on their natural environments and very different socioeconomic developments, supported by their business vocations associated with their strategic sectors that make up their economic development ecosystems.

This study generated the principles for the design of sectorial competence dictionaries (DSC) that propose competence standards in order to certify the knowledge, skills and understanding acquired according to the occupational profiles of engineering graduates in an effort to produce highly qualified and prepared personnel. to respond to the needs of business sectors [21]. That is why the National Technological Institute of Mexico Tijuana at the national level is the technological higher education institution that generates 50% of the enrollment of engineering graduates in Mexico since 1948, with currently more than 600,000 students with 254 campuses throughout the national territory. As a product of a systematically developed method, the structure of the empirical database was defined for the Observatory's approach to monitor the employability results of engineers trained by the National Technological Institute of Mexico Tijuana.

The results will be of a public nature and may be used to collect information and targeted feedback that will influence strategic decisions and actions in different sectors, not only for this study, but also for research and development programs in different sectors of the industry. Periodic reports from the Observatory will provide feedback on relevant needs and gaps in management education and development programs, including job and business acumen, research and soft skills, according to local, national and global challenges. Described below are the data mining elements that defined the electronic survey inquiries that will be circulated as a plan among students and graduates representing more than 35,000 graduates from the Tijuana campus alone.

The first preliminary results of the in-depth interviews carried out with engineering professionals who have successfully graduated from National Technological Institute of Mexico Tijuana raised central issues which will be considered pillars of the necessary skills for the employability of graduates of engineering study programs, as well as the knowledge and specializations required. Figure 2 describes the road map of the model to develop Dictionaries of Sectoral Competences. The present research work has the purpose of identifying which are the key elements within the municipal governments in Mexico, which could be considered as the most significant areas of opportunity whose strategic attention would be a better performance in the fulfillment of their constitutional attributions, in the promotion of public policies capable of integrating the realities of its inhabitants and their communities, but

also capable of incorporating into them actions and commitments derived from national and global agendas, also playing with the above, a more active role in the scene international contributing successful experiences in its institutional work.

The results will provide necessary information that may be useful for awareness-raising and technical assistance actions at the local level for the development of capacities of SMEs and competence laboratories in Technological Higher Education, Higher Secondary Education and Basic Education. Likewise, to society in general by means of linking and social service through the linking of different sectors such as the Government, Academia, Companies, Associations and sectoral specialists.

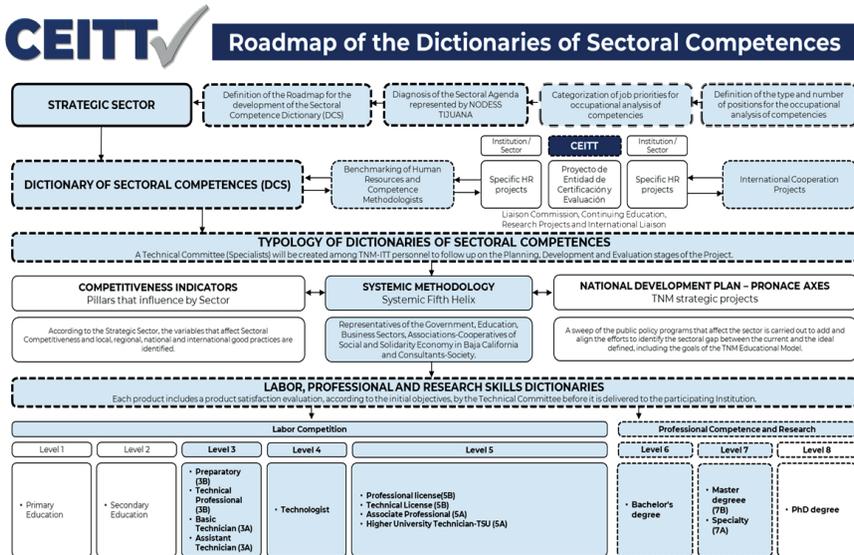


Figure 1 Model for the development of a dictionary of sectoral competences.

The following points detail the data collected by the electronic survey. These will be disseminated through the electronic survey and social networks to more than 35,000 TecNM graduates, as well as to the 12,000 students on average.

Respondent Data

Characteristics of the respondent

Academic training: participants will have 254 current technological institutions to choose and select for their survey.

- Enrollment Status, Student: Individual currently in a program of study (participants may select a professional or graduate option)
- Status of registration, graduate: person who completed a study program, either at the professional or postgraduate level (master’s or doctorate) or exchange.
- Alumni enrollment status: natural person who suspended their studies temporarily or indefinitely.

Statistical data of the respondent

- Year of beginning of professional and/or postgraduate studies
- Year of completion of the study program
- Student, employee, entrepreneur, unemployed or researcher
- Thesis, title and professional license, or in the process of completion
- Personal information; marital status, age, place of birth
- Place of residence and employment (local, national or abroad)

Data of the Labor Sector of the Student or Graduate

Characteristics of employment sectors

- a) Primary sector: livestock, fishing (river and sea), agriculture, mining (mines and rock complements), forestry
- b) Secondary sector: industrial, energy, mining (also considered part of the secondary sector due to various products derived from mining), construction.
- c) Third sector: transportation, communications, business, tourism, health, education, art, finance, administration
- d) Fourth Sector: information and knowledge services, research and development, innovation.
- e) Fifth Sector: health services, security, emergency services, education, culture, science, social, and domestic activities

Employment characteristics

- Sector: private, public, cooperative or social economy
- Type and level of position held in the organization or institution.

Typology of skills necessary for professional development

Research skills

The skills in the research process highlight the ability to theorize and build models and scientific writing skills, as well as the relational capacity of the researcher with the research subjects, data management and certain personality characteristics. of the investigator.

Soft, managerial and global skills

Global competence is a multidimensional and lifelong learning goal. Globally competent individuals can examine local, global and intercultural issues, understand and appreciate different perspectives and worldviews, interact successfully and respectfully with others and act responsibly towards sustainability and collective well-being.

According to the applied research developed on “Labor, professional and research skills for logistics engineers” at TecNM Tijuana, defined the principle of the correlation between competitiveness and education, it is essential to point out that a prepared society will have better and greater opportunities for growth, development and progress. Which makes it necessary to reflect from the Academy, specifically from the Technological Higher Education Sector, on the determinants that impact the innovation of human talent. By developing self-management capacities, the maximum participation of cooperative members is achieved so that the best decisions are strategically made for the benefit of the entire cooperative organization and the relationship with other entities that can contribute to the growth and sustained prosperity of the cooperative under the interaction with society. The development of cooperative companies is linked to the principles of alliances and strategies of sectoral interoperation and solidarity growth. This contribution is a benchmark for exploring the challenges of cooperativism from a systemic approach and that provides a benchmark for sectoral public policy initiatives of the social solidarity economy.

As a result of documentary research and the strategic application of the Fifth Systemic Helix methodology for the Social and Solidarity Economy sector, a consensus has been reached on the development of a Bank of Key Questions for the approximation of the identification and consideration of all comprehensive approaches to develop a Dictionary of Sectoral Competences, which integrates the Dictionary of Labor, Professional and Research Competences, to strengthen the sectoral development of the social and solidarity economy and thereby encourage development and social impact, implicitly considering the 17 objectives for the sustainable development of the 2030 goals of the United Nations Organization.

Focus QHS	Bank of questions by systemic sector
H1. Cooperative Companies	<ul style="list-style-type: none"> ▮ What are the problems or challenges of the Cooperative Sector to strengthen its internal operations? ▮ What do Cooperatives need to integrate at the regional level? ▮ What are the barriers that Cooperatives face at the local and regional level? ▮ What do Cooperatives need to internationalize? ▮ Have cooperative consultants contributed to the success of the Cooperative sector? ▮ What do Cooperatives need to open up to Cooperative educational links? ▮ How can Cooperatives be linked to all sectors? ▮ What is the Cooperative perception of the other sectors? ▮ Do the Cooperatives consider that the profiles of the Professionals have labor, professional and research Competences on Cooperatives? ▮ What do local suppliers need to do to be chosen by Cooperative companies? ▮ What kind of help do Cooperatives need to develop local technology with support from the government and schools? ▮ What is the profile of a successful Cooperative?
H2. Cooperative Education	<ul style="list-style-type: none"> ▮ What are the knowledge and skills (competences) that are provided in the Schools for the Cooperatives sector? ▮ How do the schools update their plans and study programs according to the advances and development of the Cooperatives / ESS? ▮ How are the Professors updated to teach the current issues of Cooperativism and Social and Solidarity Economy? ▮ How do you measure the effectiveness of your study programs, according to the development indicators of Cooperativism? ▮ How is the link between the education sector and the Cooperatives promoted? ▮ How is cooperative education promoted for the development of models and self-management? ▮ What are the main needs of the Cooperative education sector? ▮ What are the main lines of research in the Cooperative sector?
H3. Government – Public Management for Cooperatives	<ul style="list-style-type: none"> ▮ What are the commitments to the health and education of the workers of the Cooperatives? ▮ How can the government be facilitated with actions that contribute to the development of local supply through local professionals, entrepreneurs, for the Cooperatives and Social Economy sector? ▮ What does the government need to develop public policies that encourage and protect cooperative companies? ▮ What initiatives is the government developing in preventive terms of public safety and that do not affect the development and investment of the Cooperatives? ▮ What strategic actions is the government developing in the short, medium and long term for Cooperative development? ▮ What failures does the government recognize that it has had and therefore the local supply for the Cooperative and Social Economy sector? ▮ Would the government be open to creating an agenda for Cooperative development, regardless of what changes exist at the political level?

<p>H4. Cooperative Associations</p>	<ul style="list-style-type: none"> ▮ What are the strategies to help local and national suppliers to insert themselves and contribute to the Cooperative sector? ▮ What programs have generated and encouraged the development and consolidation of the Cooperative sector? ▮ What are the strategies to support Cooperative businesses and the benefits of being a member of a Cooperative Association? ▮ How is cooperative research promoted? ▮ How is communication promoted between Cooperatives? ▮ How is the development of Human Resources promoted in Cooperatives? ▮ How do you promote protection and support gender equality initiatives in Cooperatives? ▮ How is the certification of labor, professional and research skills promoted in Cooperatives?
<p>H5. Cooperative Consultants</p>	<ul style="list-style-type: none"> ▮ What is missing in educational institutions so that their graduates are more entrepreneurial and consolidate the Cooperative sector? ▮ What actions do you recommend to the government sector to strengthen the Cooperative sector and the supply chain through local and national suppliers to promote the development of regional vocations? ▮ What initiatives are considered to be carried out by business organizations and chambers in order for them to be a key actor or agent of change in Cooperative development and the Social Economy? ▮ What are the professional services that Cooperative consultants must provide to help increase competitiveness?

Table 4 Contribution to the SDGs by the NODESS Tijuana project

The scientific research project “Prospective Dictionaries of Labor, Professional and Research Competences for the Sectoral Development of the Social and Solidarity Economy in Mexico” represents the applied research efforts developed during the period 2019-2023, under the framework of the NODESS TIJUANA [22] (Social and Solidarity Economy Node), which implies the best practices in the promotion of the Sustainable Social Economy that are aligned with the objectives of the national development plan to reduce the gaps of social inequality that currently exist in the city of Tijuana, Baja California, as well as the instrumentalization of a social economy observatory that is capable of to identify the goals for sustainable development of the 2030 agenda; Therefore, it is essential to know precisely the needs of the business exercise, of the representatives of the social, solidarity and inclusive economy that is capable of generating development opportunities. It is also essential to analyze the willingness to work as a team in a coordinated manner between the government, academia, the social sector, representatives of civil society, as well as the citizens of Tijuana, Baja California, under a systemic development approach, according to the SDG Agenda. According to INEGI (2020), the city of Tijuana has 57 thousand SMEs that require the implementation of projects that support them and promote their development and growth; It also has over 130 positive highlights, some global and some countrywide. It is a type of quantitative research with a descriptive scope through documentary analysis to support the theoretical framework, as well as

in-depth interviews with experts who have the best practices in the field of social economy; and the application of a questionnaire to a representative sample of SMEs to determine if there is a relationship between the critical factors that affect the degree of implementation of the sustainable social economy.

The city of Tijuana, due to its geographical location in the Baja California Peninsula, represents the opportunity for comprehensive systemic development for all sectors of society. The preliminary results in Phase 1 and Phase 2 show key variables to include in an electronic survey, which will be circulated among TecNM students and graduates, businessmen, graduates in their professional practice, with the data collected will support the development of a database through a web page, and the development of Dictionaries of Sectoral Competences, to strengthen the employability and follow-up at the local, national and international level of graduates and students. The conclusions of this research suggested that the information in the database should include factors that affect student dropout rates, such as business affiliation and sense of belonging, as well as those that affect comprehensive competencies for employability, professional development, continuing education and professional updating through postgraduate studies and research.

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