MEXICO

GOVERNMENT OF THE REPUBLIC

National Council of Science and Technology

Nuevo Leon's Innovation Agenda

Executive Summary

Message from Dr. Enrique Cabrero
Director General of Conacyt

The 2014 Global Innovation Index, published by the World Intellectual Property Organization (wipo), ranks Mexico 66th out of 143 nations, based on the role played by people and teams in the innovation process as a driver of economic growth.

At the National Council of Science and Technology (Conacyt) we are determined to improve this position, which is still below the goals of our country and our capabilities. The State and Regional Innovation Agendas seek to support the growth of productive sectors based on the development of their competitive advantages, through investments in various areas of knowledge, the generation of innovations and the adoption of new technologies. In this way, the two axes of the Special Program for Science, Technology and Innovation (peciti) are addressed: regional strengthening on the one hand, and the link between the productive sector and academia on the other.

We know that each of the country's entities is different; the challenge is to find, promote and strengthen their scientific and technological vocations, so that they all have the same opportunities for development and increase their productivity.

Under this premise and aligned with the objectives of the National Development Plan of the Federal Government and the peciti, Conacyt, together with each of the entities, developed 32 State Agendas and three Regional Innovation Agendas. These are added as a public-private tool to help the states to innovate and guide decision makers to direct resources strategically, without forgetting the importance of investment. It should be recognized that developed countries where the government and the private sector have invested in cti show greater social development and sustained economic growth.

The Agendas will help the entities to strengthen their productive vocations and become generators of competitive technologies and solid infrastructures to attract greater investment and talent. This will allow us to compete globally in markets that demand great scientific and technological capabilities.

Through the Agendas, more than 400 priority projects have emerged that will help detonate several of the most productive sectors in the country.

At Conacyt we know that it is necessary to reverse traditional thinking and work to achieve a new system of knowledge distribution, which allows us to build innovative ecosystems that influence people's quality of life and contribute to technological and scientific progress.

Enrique Cabrero

Message from Dr. Elías Micha
Deputy Director of Regional Development of Conacyt

The preparation of the State and Regional Innovation Agendas is an initiative promoted by the National Council for Science and Technology (Conacyt), which seeks to support the country's states and regions in the definition of smart specialization strategies to promote innovation and scientific and technological development based on economic vocations and local capabilities.

The document presented here shows the result of the work carried out to obtain a clear vision of the opportunities that exist in various industries and economic activities in our territory. We know that Mexico's diversity is broad and complex: we face the challenges of contributing to a more equitable development and to ensure that the regions with the greatest lag in their scientific, technological and innovation systems have the tools to become stronger and more productive. This has been considered in the definition of public policy of the current administration, and has been identified as a priority to be addressed in the National Development Plan 2013-2018, as well as in the Special Program for Science, Technology and Innovation 2014-2018.

We are currently facing important challenges to generate new high-value products and add greater value to what we already produce in order to increase national competitiveness. We need to improve the functioning of public institutions, for this we need to strengthen the scientific and technological infrastructure, and train talent to meet the needs of the nation and the challenges facing the economy to compete favorably in the global environment.

It is expected that the State and Regional Agendas will become a public policy instrument to coordinate the interaction of the states with different innovation support agencies and, in particular, with Conacyt programs, in order to promote joint investment in high-impact sectors.

The Agendas are also intended to support greater private sector investment in technological development and innovation, to strengthen infrastructure, promote the insertion of key technologies and generate synergies between sectors and regions to increase competitiveness and improve living conditions for the population.

Thus, the Agendas are part of the new regional development policies promoted by Conacyt, which aim to foster economic growth by helping regions improve their performance, achieve greater levels of equity and efficiency, empowering and strengthening them with capabilities that are fundamental for progress.

Elias Micha

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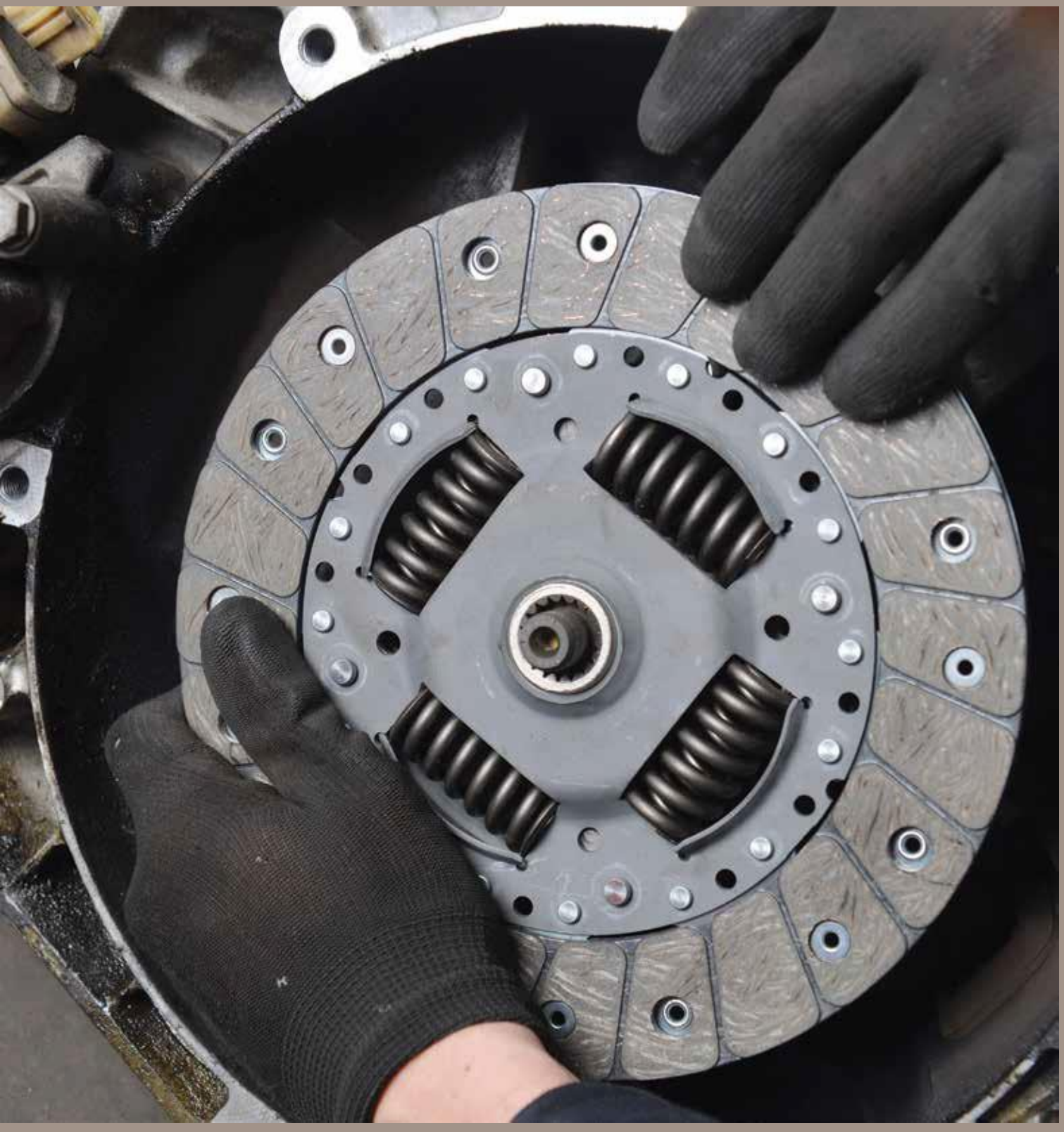


1. Introduction

The transition to a knowledge-based economy requires the implementation of state policies to strengthen the chain between education, basic and applied research, technology and innovation, with a view to fostering sustainable economic development.

With this in mind, the National Council for Science and Technology (Conacyt), in coordination with the Government of the State of Nuevo Leon, sought to reach a consensus on the definition of priorities for the development of a knowledge-based economy, based on the productive vocations of Nuevo Leon. To achieve this, the ris3 methodology (*Research and Innovation Smart Specialisation Strategy*) was used, which, based on a shared vision of the future, helps to design a strategy for the transformation of the regional economy through the concept of smart specialization.

Smart specialization refers to a framework of public policies (industrial, educational and innovation) that promotes new growth opportunities in a select number of priority areas, with an emphasis on knowledge-based activities rather than sectors (oecd, 2013). Based on this exercise, the Nuevo León Innovation Agenda was defined.

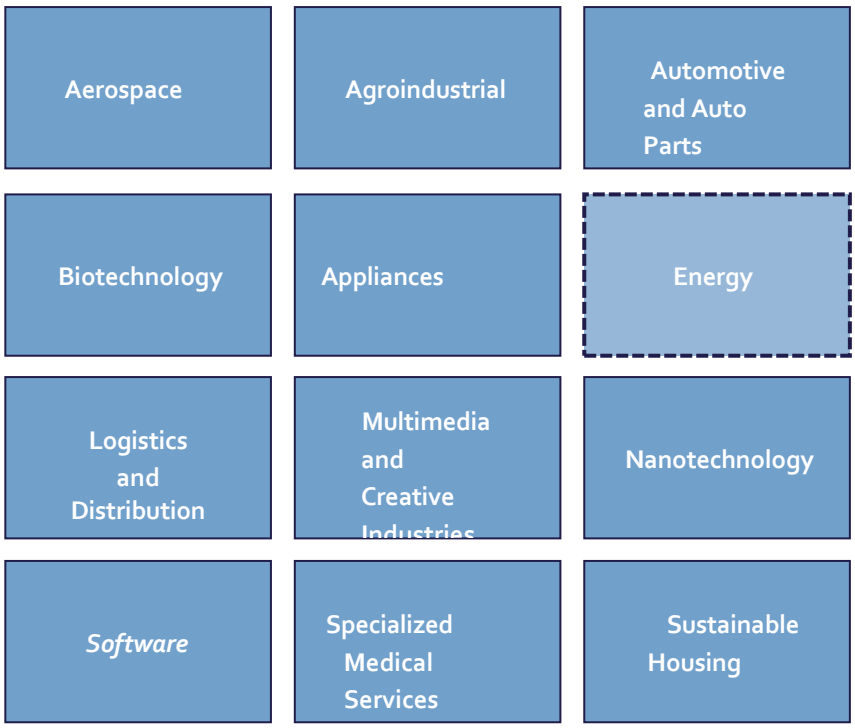
The complete Nuevo León Innovation Agenda can be consulted at **www.agendasinnovacion.mx.**

2. Summary executive

Nuevo León has been characterized as one of the most industrialized states in the country, where innovation in companies has been fundamental in maintaining its development dynamics. In 2003, the state government began efforts to transform the city of Monterrey and its metropolitan area into an international city of knowledge and innovation, with the vision of making it one of the 25 most competitive regions in the world.

Following this objective, actions were focused on boosting the competitiveness of eight priority sectors, which were selected on the basis of the analysis of different socio-economic factors carried out in 2009 by the Instituto Tecnológico de Estudios Superiores de Monterrey, in coordination with the various government agencies of the State of Nuevo León. Subsequently, new sectors were integrated, which together currently make up eleven strategic *clusters*, with one more in the process of integration; all of them financed by public and private funds, with a long-term strategic plan, a strategic agenda and committees specialized in human resources, investment and growth and innovation. The *clusters* mentioned are (Gobierno del Es- tado de Nuevo León, 2010):

Illustration 1 Clusters in the state of Nuevo León



Cluster in the process of being created.

Source: CamBioTec, A.C. based on: Government of the State of Nuevo León (2010) and Parada Ávila (2014).

This document gathers the planning efforts previously made in each state *cluster* and presents them through the identification of a series of strategic projects, linked to the *clusters* operating in the entity, respecting their different planning processes and recognizing the broad leadership that, in terms of

The government, through the Institute for Innovation and Technology Transfer (i2t2), together with academia, research centers and companies, has succeeded in working cooperatively based on the concept of the triple helix.

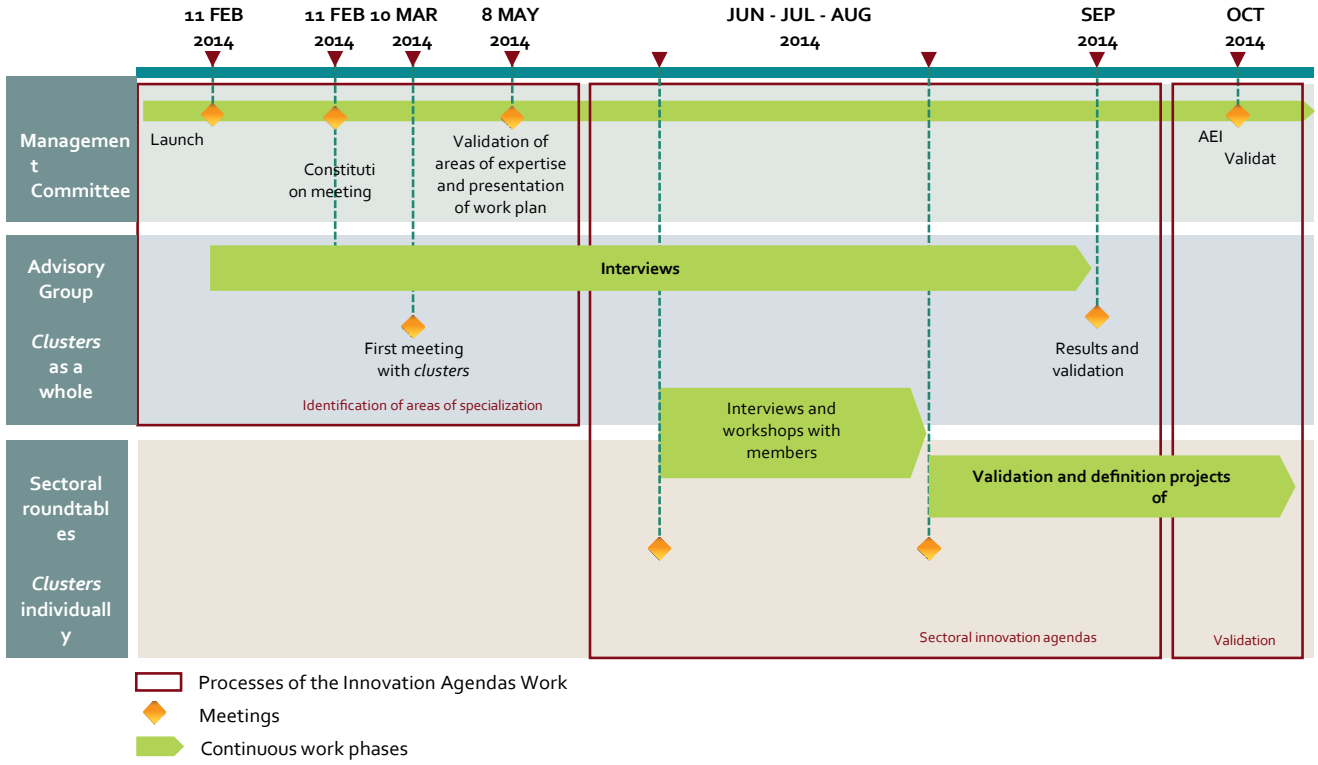
3. Governance structure of the Agenda

The ris3 strategy is based on a planning exercise that results in the definition and execution of an Innovation Agenda. However, in order to build a shared vision of the future and establish a feasible implementation plan, it is necessary to develop a governance scheme that allows for the acceptance of the strategy through a broad-based process.

participation of stakeholders, leading them to manage and implement the Agenda.

The development of the Agenda was carried out over a period of ten months, including both desk and field work, the latter being the most important.

Illustration 2 Timeline of Agenda governance activities



Source: CamBioTec, A.C.

The governance model of the State Innovation Agenda contemplates three levels of structure from the perspective of the triple helix, thus guaranteeing a participatory scheme in its definition. For Nuevo León, the organization of the process was simplified since the innovation ecosystem is already made up of scientific research centers and higher and higher education institutions, the i2t2, the Nuevo León Secretariat of Economic Development (SEDEC) and the companies in each of the *clusters. In* this way, the governance scheme is adjusted to the needs of each of the clusters.

The following table was used to cover the three levels of support in intelligent selection:

- **Management Committee:** this is the body responsible for decision-making in the project and for monitoring progress together with the Consulting Team.[1] In the case of Nuevo León, it was made up of the state authorities (i2t2 and the Secretariat of Economic Development), Conacyt and ProMéxico.

- **Advisory Group:** responsible for advising the Management Committee on key decisions, such as the selection of areas of specialization and priority projects. This group was made up of *cluster* managers,

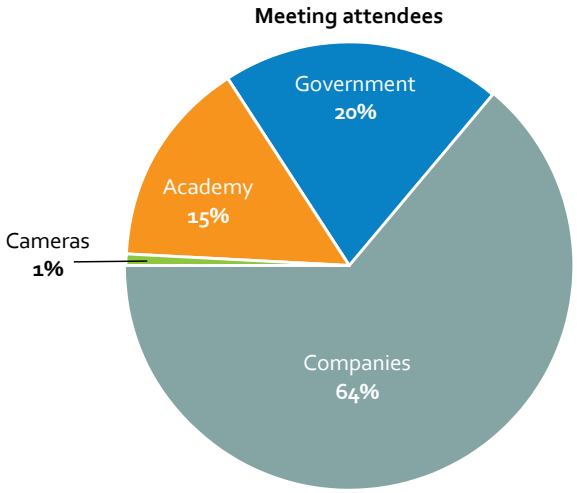
[1] The consulting company in charge of this Agenda was CamBioTec, A.C.

together with representatives of educational and research institutions of the entity.

- **Sectoral Roundtables:** responsible for defining the specific strategy for each area of specialization, as well as priority and complementary projects. In the state they were coordinated with each of the *clusters*.

Given that field work and broad participation were essential to ensure representativeness, the process included the organization of 30 different activities, including workshops, interviews and meetings with the different members of the innovation system, with the participation of 197 specialists.

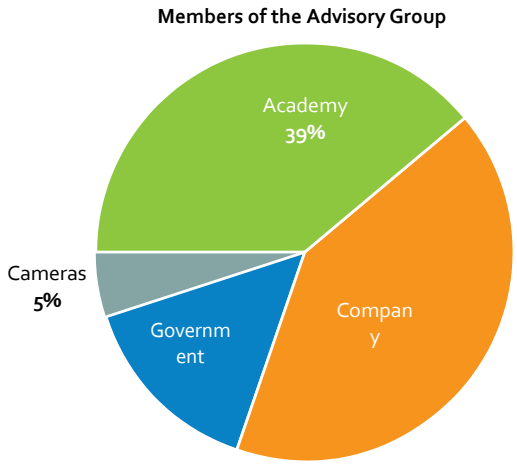
Illustration 3 Participation and representation in the process



Source: CamBioTec, A.C.

The Consultative Group was made up of 43 participants from academia, government and business organizations; their percentage distribution is shown below.

Illustration 4 Participation and representation in the Advisory Group



Source: CamBioTec, A.C.


Universidad de Monterrey


Education
Financial Highlights
Revenue
Total Expenses
Program Service
GRANTS

4. Overview and contextual framework

The following is a first overview of the differential aspects of the state, specifically its competitive advantages, its track record in R&D&I and an analysis of the policies and entities that govern the development of innovation activity.

the state. Finally, the main sectoral prioritization exercises that served as a starting point for determining the areas of integral specialization are detailed.

4.1. Brief characterization of the state

Nuevo León has a surface area of 64,220 ^{km2}; it is made up of 51 municipalities of which 88% of the population (3.7 million) lives in the Monterrey Metropolitan Area, which is made up of the following municipalities: Monterrey, San Pedro Garza García, Santa Catarina, Guadalupe, San Nicolás de los Garza, Apodaca, General Es- cobedo and Juárez. Other major cities in the state are Linares and Montemorelos (Gobierno del Estado de Nuevo León, 2013).

In 2013 its population was 4,199,292 inhabitants (4% of the country's population), Nuevo León is the second state with the least illiteracy in the Mexican Republic (only 2.2%).

The state has the third largest economy in the country and is characterized by being one of the most industrialized states, where large companies with national and international presence have emerged. The size of the economy is similar to that of countries such as Morocco ($65,635 million dollars) and Vietnam ($59,835 million dollars) and is growing above the national average, which tends to increase its relative weight in national economic activity.

It also stands out as the second most competitive entity in the country and the fourth with the greatest innovation potential, according to the performance recorded in the 2006 imco State Competitiveness Index and the State

Illustration 5 . Main state indicators

Main cities (inhab. ZM, 2010)

- Monterrey: pop. 1,135,550 (9th in MEX)
- Guadalupe (678,006 inhab.)
- Apodaca (523,370 inhab.)
- San Nicolás de los Garza (443,273 inhab.)
- General Escobedo (pop. 357,937)

Main economic and social magnitudes of

Indicator	State value	National value or % of national	National position
GDP (constant billion pesos, 2012)[1]	949	7.3%	3
GDP growth (%, 2003-2012)[1]	4.4%	2.8%	6
GDP per capita (pesos, 2012)[2]	194,923.7	110,510.9	3
IMCO Competitiveness Index (2010)[3]	90.1	66.2	2
Economic units (2014)[4]	161,661	2.9%	11
Average years of schooling (2010)[5]	9.8	8.6	2
% of population illiterate (2010)[6]	2.2%	6.9%	31
Human Development Index (2012)[7]	0.79	0.746	2
% of households with TV (2014)[8]	98%	94.9%	4
% of households with computer (2014)[8]	52%	38.3%	4
% of households with internet access (2014)[8]	55.6%	34.4%	1
% of households with telephone* (2014)[8]	61.6%	63.4%	19

Source:
[1]INEGI. System of National Accounts of Mexico. Date of consultation: 07/04/2015 13:14:41
[2]INEGI. System of National Accounts of Mexico. Accessed on: 07/04/2015 13:14:41 and http://www.conapo.gob.mx/en/CONAPO/Proyecciones_Datos, accessed April 7, 2015.
[3]Mexican Institute for Competitiveness A.C.
[4]INEGI, Denue 2014
[5]Banco de Información INEGI, Average level of schooling of the population 15 years of age and older. http://www3.inegi.org.mx/sistemas/biinegi/
[6]Society and Government data, percentage of illiterate population aged 15 and over by state; http://www3.inegi.org.mx/sistemas/temas/default.aspx?s=est&c=21702.
NOTE: This indicator presents in the first position the state with the highest illiteracy rate, while in the last position is the state with the lowest illiteracy rate.
[7]United Nations Development Programme, http://www.mx.undp.org/content/dam/mexico/docs/Publicaciones/PublicacionesReduccionPobreza/InformesDesarrolloHumano/PNUD_EDHEstatal_Infografia.pdf[8]INEGI. Módulo sobre Disponibilidad y Uso de de las Tecnologías de la Información en los Hogares. 2014. http://www3.inegi.org.mx/sistemas/sisept/default.aspx?t=tinf235&s=est&c=26494.
*Includes fixed and mobile telephony. Preliminary figures as of April.

inegi: National Institute of Geography and Statistics,
imco: Mexican Institute for Competitiveness. ,
UNDP: United Nations Development Programme;
CONAPO: National Population Council.

Nuevo León Highlights

- Privileged location in the backbone of NAFTA.
- The state has the highest level of productivity according to studies conducted by the Centro de Investigación para el Desarrollo, A.C. (cidac, 2011).
- Nuevo León has inaugurated the Research and Technological Innovation Park (piit) to boost the state's cyt efforts.
- It has high levels of human capital, quality of education, as well as high rates of university education and i e s recognized among the 100 best in Latin America.

In 2012, Nuevo León was the third entity with the highest Foreign Direct Investment (only after the Federal District and the State of Mexico), and has remained between the second and third position in this category during the last decades. It also contributes 7.35% of the national Gross Domestic Product (gdp). The state is among the first three states in terms of contribution to GDP.

In terms of employment, 45% of the population is economically active, 3% work in the basic sector (Exploitation of Natural Resources), 33% in Manufacturing and 64% in Services (Government of the State of Nuevo Leon, 2013). The Monterrey Metropo- litan Zone has as its strategic cities of influence San Antonio and Laredo in Texas, Saltillo and Monclova in Coahuila, Nuevo Laredo, Reynosa, Matamoros, Ciudad Victoria and Tampico in Tamaulipas, as well as Zacatecas and San Luis Potosi.

4.2. Existing sectoral planning and prioritization exercises in the state

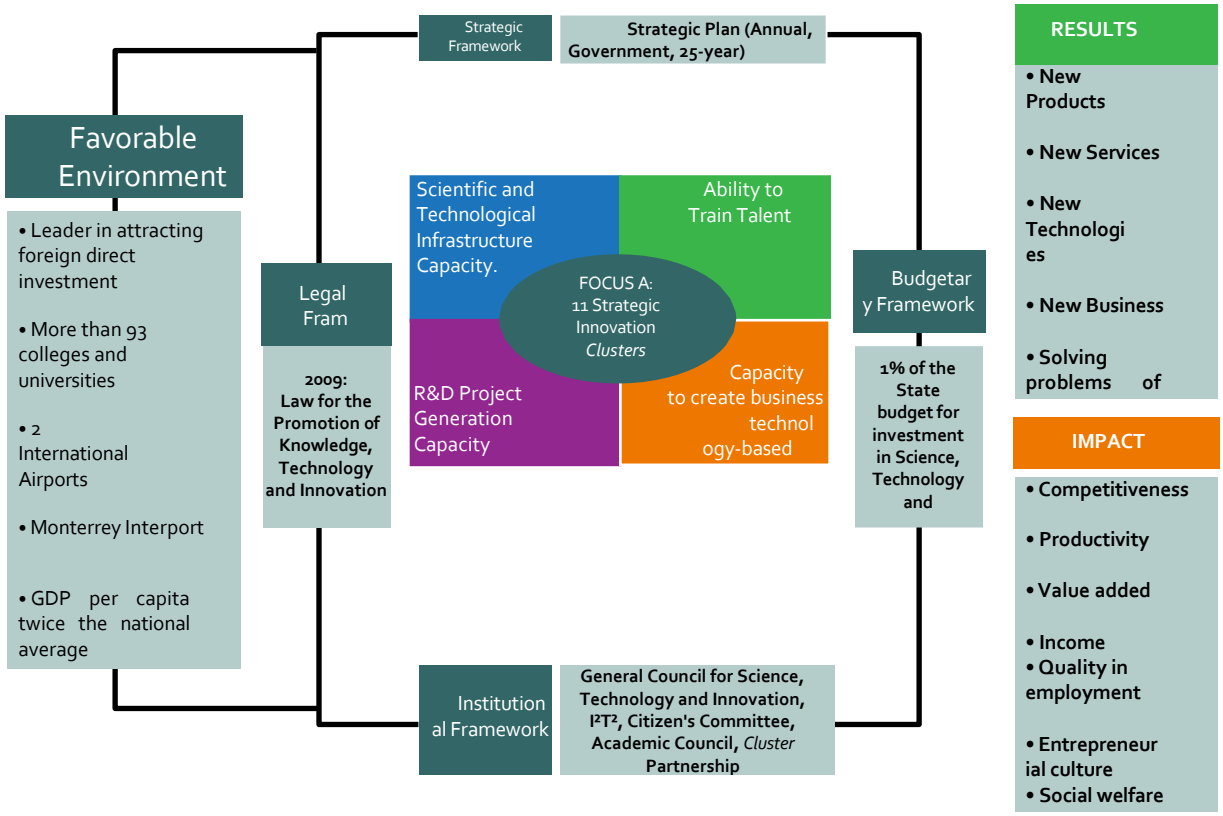
It is important to mention that several existing exercises have been used as a starting point to select the state's sectors of specialization. These exercises have been carried out at the federal, state and sectoral levels.

Previous state planning exercises are compiled in a set of documents that include laws, development plans and government programs in the field, which mention the following as strategic areas

following: Aerospace, Agroindustrial, Automotive, Biotech- nology, Appliances, Nanotechnologies, ict and Medical Services, Transportation and Logistics, Creative Industry and Sustainable Housing.

As shown throughout the document, Nuevo León has had a clear vision in the design of innovation for priority areas of specialization.

Illustration 6. Map of the innovation system



Source: Parada Avila, I T²² (2014).

Existing sectoral planning and prioritization documents in the state

Law for the Promotion of Knowledge and Technological Innovation for the Development of the State of Nuevo León

• Published in September 2009

• Last reformed in December, 2010

• It establishes the bases, instruments, mechanisms and organization for the promotion of knowledge and technological innovation, with a long-term vision, which will allow the economic and social development of the entity.

Strategic and Transversal Plan for Science and Technology of the Northern Border, Innovation Ecosystem in Nuevo León

• Published in 2012

• It contains the diagnosis of institutional capacities in STI and the definition of priority sectors, as well as recommendations for the implementation of an institutional strengthening program with a focus on results-based management in STI.

State Development Plan 2010-2015

• Developed during this governorship, it is the guiding document for action at all levels of state government.

• It groups 4 guiding principles: generation of wealth, social development and quality of life, comprehensive security, and productive and quality government. Based on these axes, 12 strategic projects and their actions are integrated.

Strategic Program for Science, Technology and Innovation

• Published in 2009

• It is the instrument that establishes the medium and long term research and technological development and innovation policies according to the Law for the Promotion of Knowledge and Technological Innovation for the economic development of the state of Nuevo León.

Nuevo León: Agroindustrial Innovation Agenda

• Define the requirements and actions to address the problems and needs of research and technology transfer in the short, medium and long term for the priority agroindustrial chains and strategic issues for the rural sector of the State.

OECD Regional Innovation Studies 15 Mexican States

• Describes the State Innovation System and identifies attributes and areas of opportunity, making recommendations for instruments and policies to support strategic sectors.

Detailed initial implementation plan of the strategy defined for MIMEC.

• This plan details the objective of having with a realistic and useful tool to direct and monitor the daily actions to be carried out by the personnel in charge of the *Cluster* operation.
of Creative Media and New Media of Nuevo León.

Source: CamBioTec, A.C.

In order to obtain an additional element for the selection of candidate sectors, the following exercises have been analyzed with different economic and scientific-technological approaches:

- INADEM, study of priority sectors, both with current and emerging potential.
- ProMéxico, priority export sectors and foreign direct investment.
- State Development Program 2010-2015 (ped), in which reference is made to several sectors in which this development is focused.
- The state's Strategic Science, Technology and Innovation Program, which, aligned with the ped, establishes the sectors to be developed in terms of science and technology.
- The Innovation Stimulus Program (pei) focuses on business development and reflects the business response of the sectors being supported in each federal entity.

The diagnosis of these documents supported the identification of the state's key sectors with a solid argument for their selection.

Below is a table with the analyzed exercises and the sectors highlighted for their relevance based on the concept of smart specialization.[2] This table shows the coincidence with the areas of specialization of the *clusters* in the entity.

Table 1 . Map of strategic sectors by relevance and focus.

	Focus on economic potential	Focus on CTI				
	INADEM	PECTI	FRONCYTEC COLEF	PEI	FCCYT	Frequency
Aerospace		X	X		X	3
Agribusiness		X	X		X	3
Automotive and Auto Parts	X	X	X		X	4
Household Appliances and Electronic Products	X	X	X		X	4
Specialized Medical Equipment		X	X		X	3
Manufacture of Electrical Generating Equipment and Electronic Appliances and Accessories				X		1
Transportation Equipment Manufacturing				X		1
Manufacture of Non-Metallic Mineral Based Products				X		1
Manufacture of Metal Products				X		1
Food Industry				X		1
Chemical Industry				X		1
Waste Management and Remediation Services				X		1
Machinery and Equipment	X					1
Multimedia and Creative Industries		X				1
Other Telecommunications						0
Construction Products	X					1
Information Technology		X	X		X	3
Renewable Energy		X				1
Sustainable Housing		X				1
Biotechnology		X			X	2
Nanotechnology		X	X		X	3

Source: CamBioTec, A.C., INADEM, FROCYTEC, FCCYT and Conacyt.

[3] "The prioritization at the regional level of a series of sectors and technologies that are potentially competitive and generate new activities in a global context as opposed to the specialization of other locations" (Foray et al., 2009 and McCann and Ortiz-Argilés, 2011). (Foray *et al.,* 2009 and McCann and Ortega-Argilés, 2011).

4.3. State strategic projects

As indicated above, the Innovation Agenda seeks to make policy recommendations on innovation and technological development that will help to take advantage of opportunities and close any disadvantage gaps in each of the sectors, promoting growth based on sustainable innovation and knowledge, as well as a green, efficient and competitive economy. The above seeks to foster a high level of employment and economic, social and territorial cohesion.

As part of the strategic science and technology program, there are cross-cutting projects that have strengthened the state's infrastructure. Among them are:

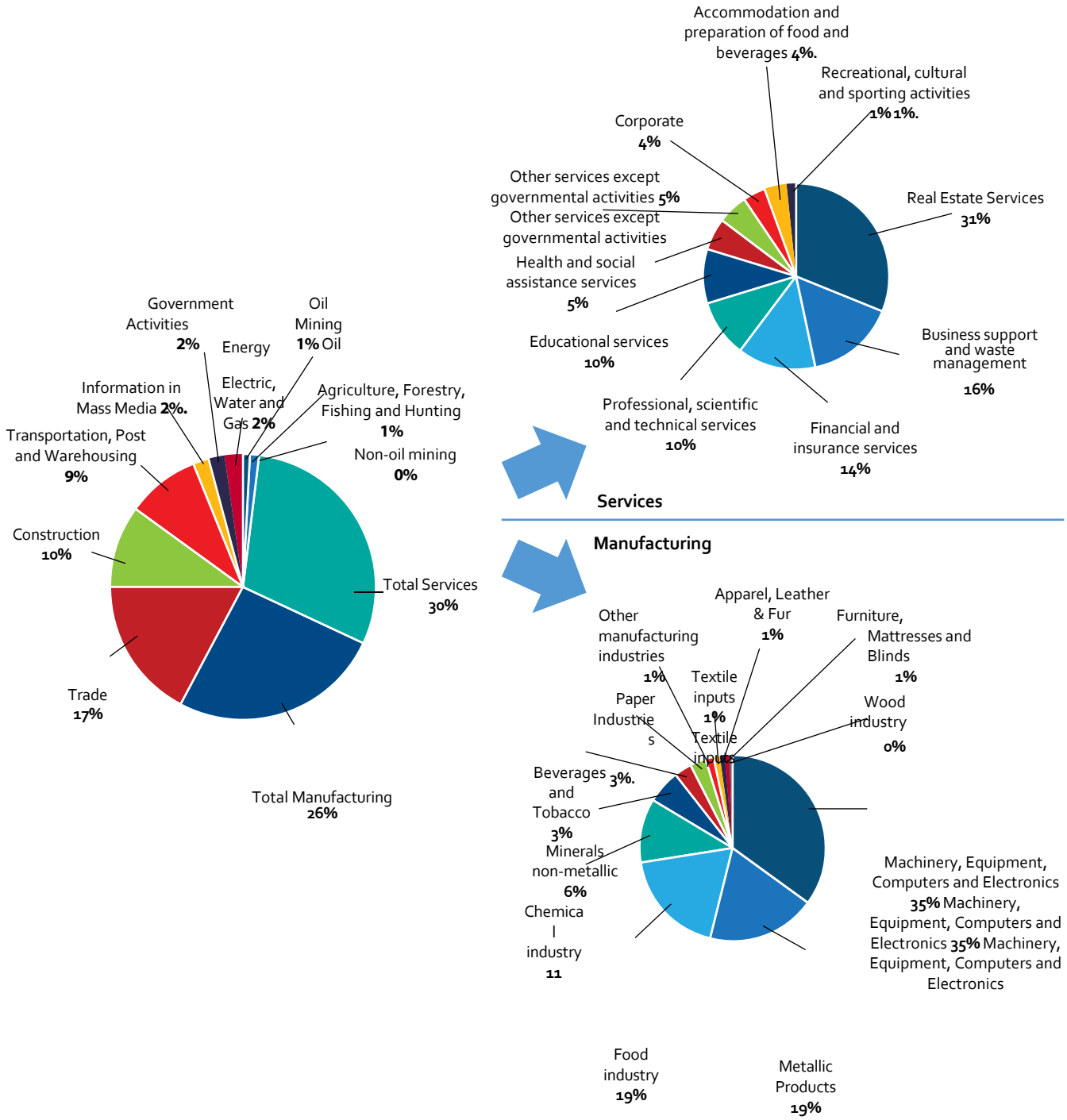
1. **Technological Research and Innovation Park (piit). It** is one of the fundamental projects and the centerpiece of the Monterrey, Knowledge Economy and Society Program; it is located in the municipality of Apodaca, where 40% of the industry of the Monterrey metropolitan area is concentrated. The PIIT has served as an impetus for new technology-based companies: it currently houses 22 research centers and two high-tech incubators (i2t2, 2014). By the end of 2015 it expects to have a total of 50 public and private research centers, four high-tech incubators, 6,500 active people and an estimated total investment of $1,000 million dollars (Parada Ávila, 2014).
2. **High Technology Incubators Program.** Its objective is to support entrepreneurs and companies in the development and commercialization of new products or products with new technological attributes. It provides services to various *clusters* (support in the evaluation of technical, financial and market feasibility, legal and administrative advice, marketing and sales, and even physical space, equipment, logistics, financing and seed capital). The use of technological platforms for Nanotechnology, Biotechnology and Sustainable Housing is in full development (i2t2, 2014).
3. **Nuevo León Fund for Innovation.** This is a financial instrument that fosters innovation for the state's economic growth by supporting innovators to develop, protect their products and/or services and create companies to turn them into successful businesses. This fund was created by the Instituto de Inno- vación y Transferencia de Tecnología de Nuevo León (i2t2) for the purpose of operating the Programa de Apoyo a Empresas Innovadoras, and seeks to be strengthened in the medium term through the expansion of resources for greater coverage and scope (i2t2 and Parada Ávila, 2014).


Synthesis and Self-assembling of Iron Nanoparticles With High Size-Control

5. Characterization of the productive fabric

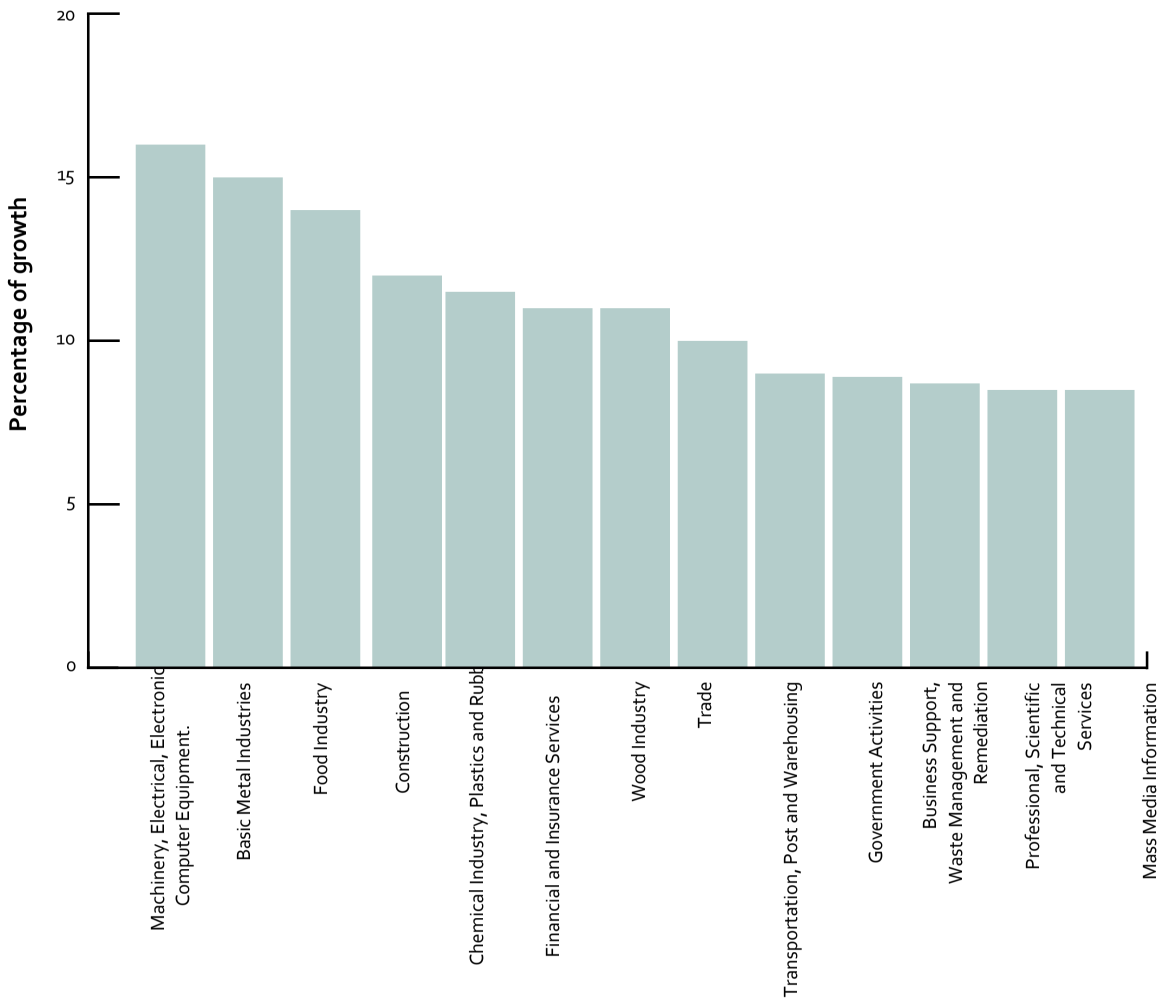
5.1. Productive vocations of the state

Figure 8. Conformation of the state's GDP



Source: CambioTec, A.C., with data from INEGI (2014) and GDP data (2012).

Sectors with the highest average growth between 2003 and 2012 in Nuevo León



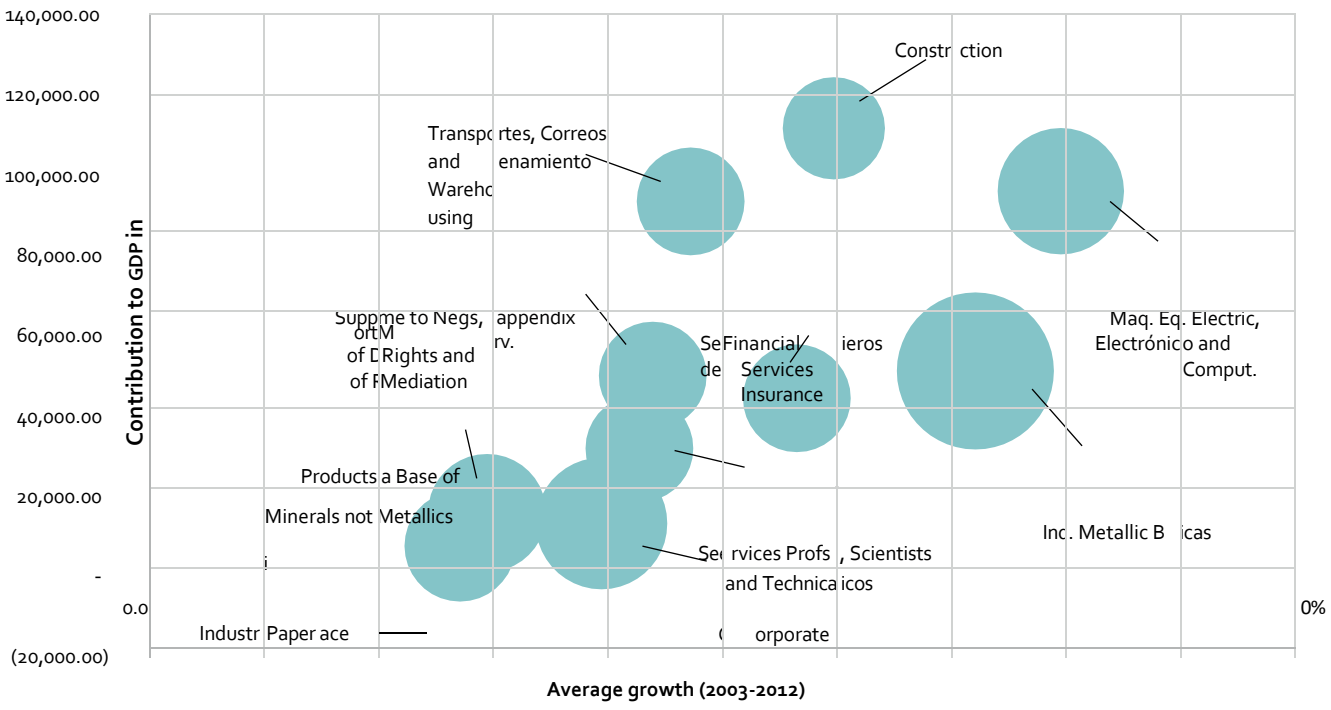
Source: CamBioTec, A.C. with data from INEGI

To identify the areas of specialization, we first analyze the composition of the state's GDP (see Figure 8). With respect to the Manufacturing Industry, the sectors with the highest participation in the state's GDP are: Manufacture of Machinery and Equipment, Computer Equipment and Accessories, Electronic Devices (subsectors 333-336), followed by Basic Metallic Industries and Manufacture of Metallic Products (subsector 331-332); in third place, in terms of participation, is the Food Industry (subsector 311), followed by the Manufacture of Petroleum and Coal Products, the Chemical Industry, and the Manufacturing of Petroleum and Coal Derived Products (subsector 331-332); in third place, in terms of participation, is the Food Industry (subsector 311), followed by the Manufacturing of Petroleum and Coal Derived Products, the Chemical Industry, and the Manufacturing of Metal Products (subsector 331-332).

Plastics and Rubber (subsectors 324-326). The subsector Manufacture of Non-Metallic Mineral Products (subsector 327) and the Beverage and Tobacco Industry (subsector 312) contribute about 6 and 3 percent, respectively, to the state's total GDP.

Combining both variables, growth rate and GDP share, and applying the Economic Specialization Index (*Location Quotient*) according to INEGI criteria, the following illustration identifies the ten sectors with the highest indices for the three criteria.

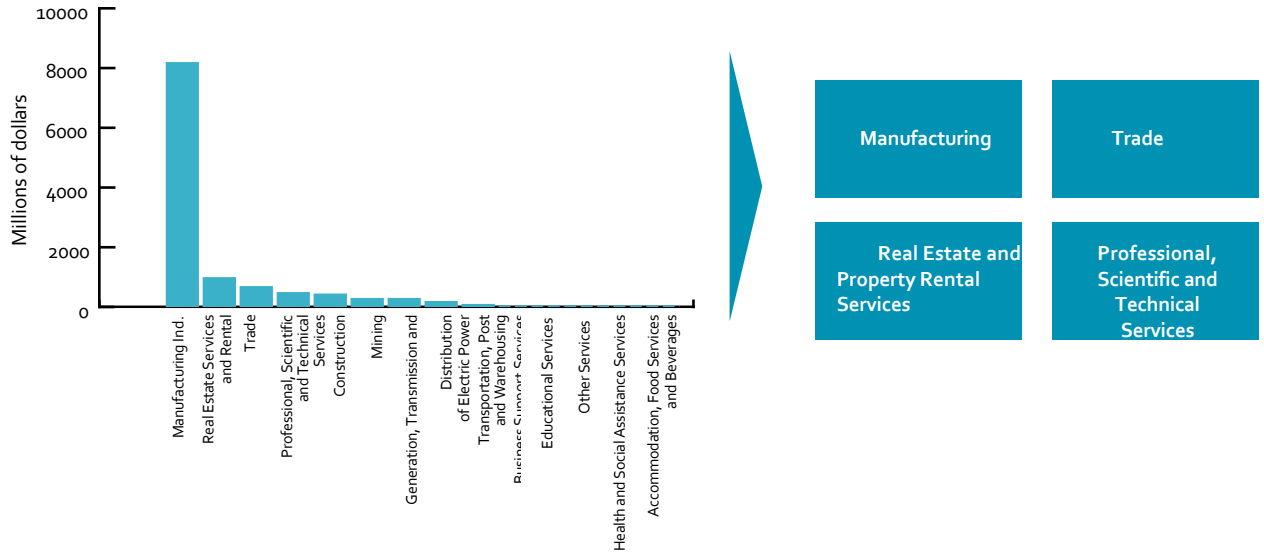
Illustration 10. Economic Specialization Index



Source: CamBioTec A.C. with data from INEGI (2012).

NOTE: The economic or local specialization index is the weight of the sector measured in Gross Value Added (GVA), divided by the total GVA of the state, this quotient is divided by the sector's share in the national economy and divided by the value added generated by such sector at the national level.

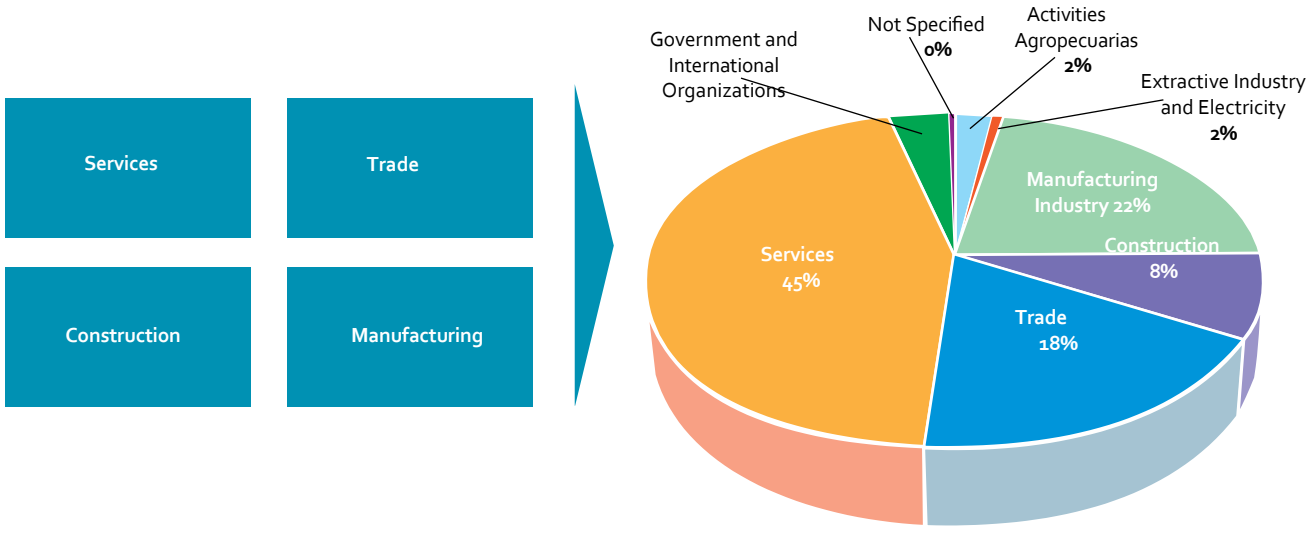
Areas with the highest foreign investment in Nuevo León (mdd, 2013)



Source: CamBioTec, A.C., with data from INEGI (2012).

In the entity, a complete productive structure can be seen in terms of employment, with the Services sector accounting for the majority of employment. However, it does not cease to the strong emphasis of the manufacturing sector within the productive fabric, as it provides almost a quarter of all paid jobs.

Participation by sectors in employment in the state of Nuevo León



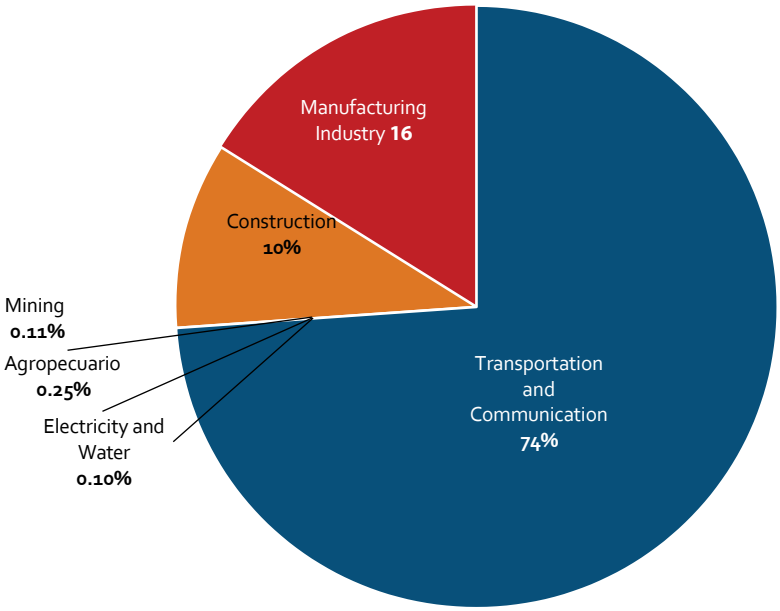
Source: CamBioTec with data from INEGI (2012) (Encuesta Nacional de Ocupación y Empleo. Strategic Indicators. Fourth Quarter 2012)

5.2. Main actors in the business system

According to data from the Mexican Business Information System (siem), the Transportation and Communications subsector stands out in the state (by number of units), followed by the Manufacturing and Construction subsectors (by number of units).

(excluding Commerce). At the opposite extreme, the presence of units from the Agriculture and Mining sector is much lower (siem, 2014).

Illustration 13 . Economic units by sector and subsector excluding commerce.



Source: CamBioTec, A.C., based on SIEM, 2014.

5.3. Support structures for the productive fabric

In 2010, the Mexican System for the Promotion of Industrial Parks (SIMPPI) had a registry of 64 industrial parks, a figure that increased to 103, according to the 2014 *Doing Business* report, most of which are located in the municipality of Apodaca (35 of the 103 parks). In addition, INADEM reports that as of 2014 there were seven business incubators and one high-impact incubator, as well as three business accelerators.

Other important players are business organizations such as the Nuevo Leon Chamber of the Transformation Industry (caintra), the Chamber of Real Estate Owners (caprobi), the Mexican Chamber of the Construction Industry (cmic), the National Chamber of Commerce, Services and Tourism of Monterrey (canaco), the National Chamber of Small Commerce (canacope), the National Chamber of the Restaurant and Condimented Food Industry (canirac), and the representation of the Employers' Confederation of the Mexican Republic (coparmex), as well as the aforementioned *clusters*. (Secretaría de Economía, 2012).

Table 2. Industrial parks in the state

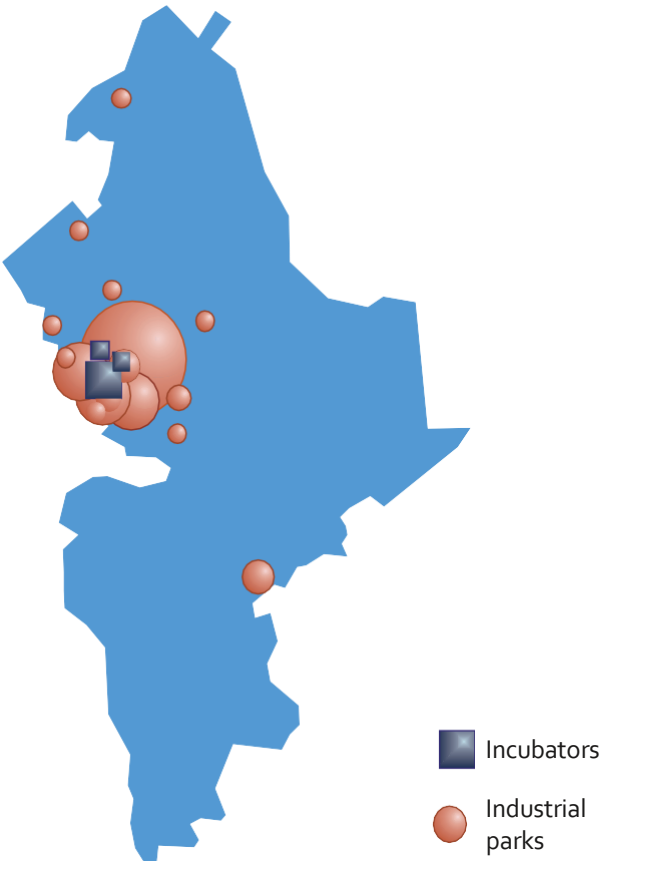
Municipality	Park
Apodaca	Agua Fria Industrial Park
	American Industries / Apodaca Complex
	cpa Almacentro
	cpa Apodaca Technology Park
	cpa Business Center Apodaca
	Finsa Apodaca Park
	gp Apodaca I
	gp Apodaca II
	gp Kronos
	gp pimsa
	gp Pueblo Nuevo
	Huinala Industrial Park
	Kalos Apodaca
	Kalos Huinala
	The Apodaca Chair
	Landus Santa Rosa Apodaca I
	Landus Santa Rosa Apodaca II
	Martel Apodaca
	Milenium Apodaca
	Milimex Apodaca
	Milimex Santa Rosa
	gp Monterrey Business Park
	Multipark
	Nexxus Apodaca
	P.I. J.M
	Americas Huinala IP
	IP Intermex Apodaca Campus
	P.I. Kuadrum
	IP Mexico
	Technological Research and Innovation Park
	Prologis Monterrey Industrial Center
	Prologis Park Apodaca
	Regio Park
	Stiva Airport

Municipality	Park
Cienega de Flores	cpa - adn Logistics Center
	Gov. Ciénega de Flores
	Landus Ciénega de Flores
	Las Americas
	Metroalianza Multiparque adn
	Milimex Ciénega de Flores
	Monterrey Technology Park
	Nexxus dna
	P.I. El Nacional
Dr. González	Gov. Dr. González
El Carmen	Gov. El Carmen
Escobedo	cpa Logistics Center Escobedo
	cpa Nexxus Escobedo
	Gov. General M. Escobedo
	gp Tecno centro
	P.I. IGS Escobedo
	Kalos Escobedo
	Landus Road Arch
	Multiparque Escobedo Metroalliance
	Nexxus Anahuac
	Nexxus Escobedo
	Nexxus Escobedo Downtown
	P.I. Peripheral
	Stiva Escobedo
Garcia	Avante Industrial Park Monterrey
	P.I. Mitras
Guadalupe	Avante Guadalupe Industrial Park
	cpa Business Center Guadalupe
	Finsa Guadalupe Park
	Kalos Guadalupe
	Kalos Ruiz Cortines
	Kalos San Rafael
	The Guadalupe Chair
	Interpark Metroalliance
	Nexxus Guadeloupe
	P.I. Aqueduct
	Intermex IP
	P.I. San Rafael

Municipality	Park
Linares	Gov. Linares
	Gov. Linares
	gp Linares
Monterrey	cintermex
	convex
	Kalos Financial Center
Fishery	Pesquería Gov.
	Landus Sweet Names
Sabinas Hidalgo	P.I. Sabinas Hidalgo
Salinas Victoria	Metroalliance Multiparque Noreste
San Pedro Garza Garcia	Mitras Industrial City
	cp Americas
	Prologis
San Nicolas de los Garza	ad hoc
	Kalos San Nicolas
Santa Catarina	Kalos of the West
	Kalos Santa Catarina
	Landus Santa Catarina
	Martel Santa Catarina
	Multiparque Santa Catarina Metroalliance
	Milenium Santa Catarina
	Milimex Santa Catarina I
	Milimex Santa Catarina II
	Nexxus Santa Catarina
	P.I. Cumbres
	P.I. Diamond
	P.I. DIM
	Las Palmas IP
	P.I. Los Nogales
	P.I. Sierra Madre
	Stiva Santa Catarina

Source: CamBioTec, A.C., with data from DataNL and SIMPPI.

Illustration 14 . Support structures for the productive fabric



Source: CamBioTec with data from INADEM, DataNL and SIMPPI.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6. Analysis of the innovation system

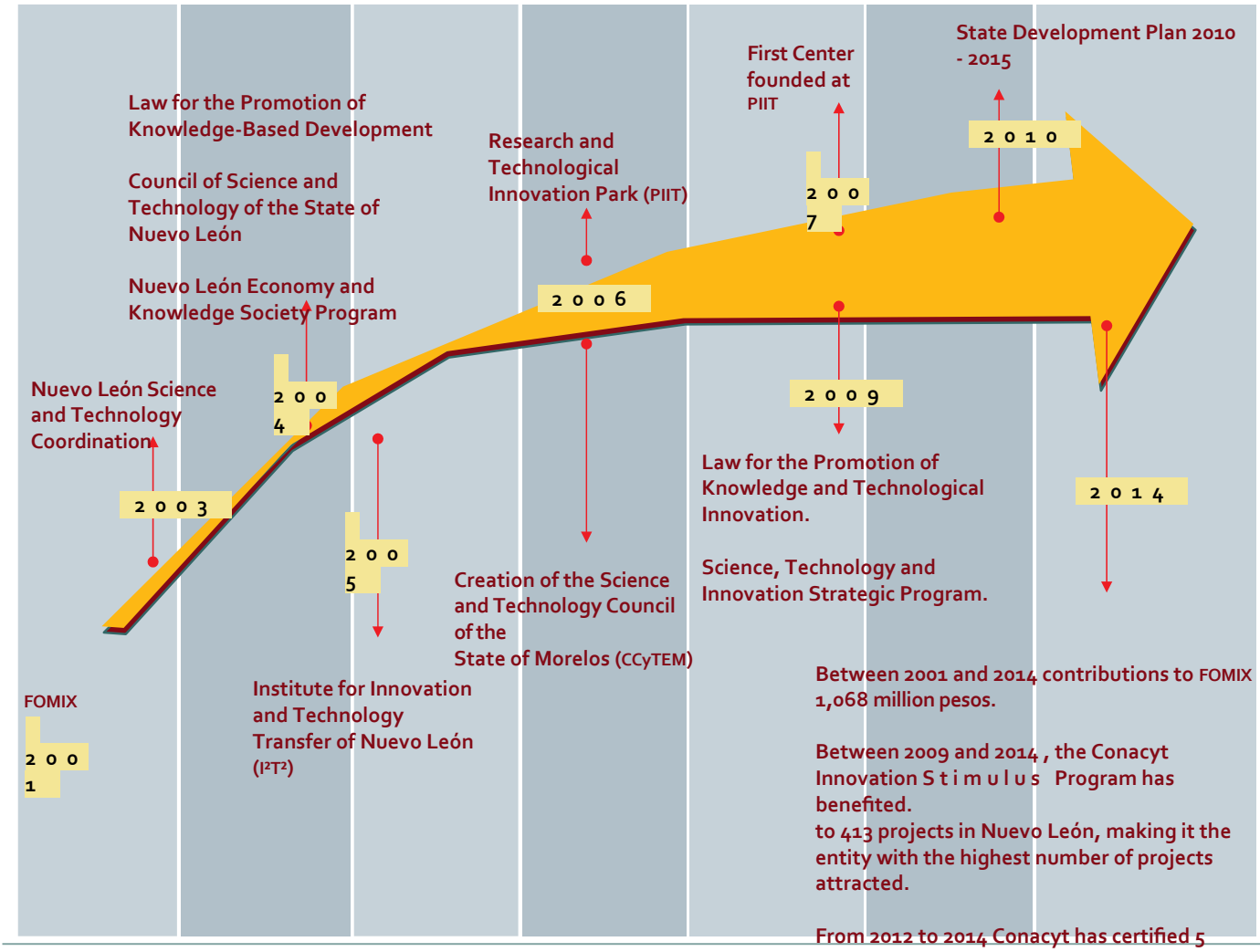
6.1. State track record in the field of R&D&I

In 2001, the Conacyt-State of Nuevo León Joint Fund was established to strengthen the state's R&D capabilities, thus initiating the transformation of the Monterrey metropolitan area into an international city of knowledge and innovation, with the vision of making it one of the 25 most competitive regions in the world.

At the local level, 2003 marked the beginning of the institutionalization of the State Innovation System with the creation of the State Innovation Coor-

The state of Nuevo León's Science and Technology Department. However, as can be seen in the illustration, it was in 2004 when the entity was endowed with a law, a program and an organization responsible for the matter. The strategies, actions and projects derived from the planning resulted in the Monterrey Model, International City of Knowledge (mtycic), with the Nuevo León Institute for Innovation and Technology Transfer (i^2t^2) as the executing arm.

Illustration 15 . Main milestones of R&D&I in the state of Nuevo León.



Source: Dutrénit Bielous et al, I T[22] and Parada Ávila (2014).

In 2005, i2t2 was created, responsible for the design and operation of financial instruments, funds and infrastructure that enable the transfer of applied research and technological development to the market.

After four years of work to consolidate the system, 2009 was once again a milestone because in that year both the legal instruments and the action programs were renewed with a 25-year vision. It was confirmed that the entity's most important strategic project is the PIIT, which had been created in 2006 as a trust managed by i2t2.

6.2 Main actors of the scientific-technological system

One of the entity's main strengths in academic terms is the establishment of 185 public and private Higher Education Institutions (HEI) and technical schools, which provide education at the undergraduate and higher technical university level, 72 of which have academic programs for scientific and technical education.

The Monterrey metropolitan area is home to 30 universities, including the Universidad Autónoma de Nue- vo León (uanl), the central campus of the Instituto Tecnológico y de Estudios Superiores de Monterrey (itesm), the Universidad de Monterrey (UDEM) and the Universidad Regiomontana (ur),

Considered the best universities in northeastern Mexico, they collectively receive more than 150,000 students per year.

According to the National Association of Universities and Institutions of Higher Education in Mexico (anuies), enrollment in the 2010-2011 school year by technical area indicates that health sciences (12%) and engineering and technology (35%) represent 47% of the state's enrollment. Although they have a lower relative importance, agricultural sciences (1.1%) and natural and exact sciences (0.7%) have a combined enrollment of more than 2,500 students (anuies, 2012).

Illustration 16. Quality postgraduate programs in the state

Institutions with quality postgraduate programs			
Autonomous University of Nuevo Leon (98 programs)	Technological Institute y de Estudios Superiores de Monterrey (38 programs)	ipn Center for Research and Advanced Studies (2 programs)	Nuevo Leon Institute of Technology (2 programs)

Source: CamBioTec, A.C., with data from FCCYT (2013).

According to the pnpc consultation system on the Conacyt portal, the state has 140 quality postgraduate programs, which places it in second place nationally, only behind Mexico City. however, only four institutions have all 140 programs, with the uanl accounting for 70% of them and the Tecnológico de Monterrey for 27%.

Within the engineering and technology area, the enrollment of master's degrees and doctorates in civil, computer and systems engineering; master's degrees in industrial, electronic and mechanical engineering stand out, while in the health sciences area, the enrollment of master's and doctoral degrees in medicine and biotechnology are the most relevant.

Research centers with a presence in the state

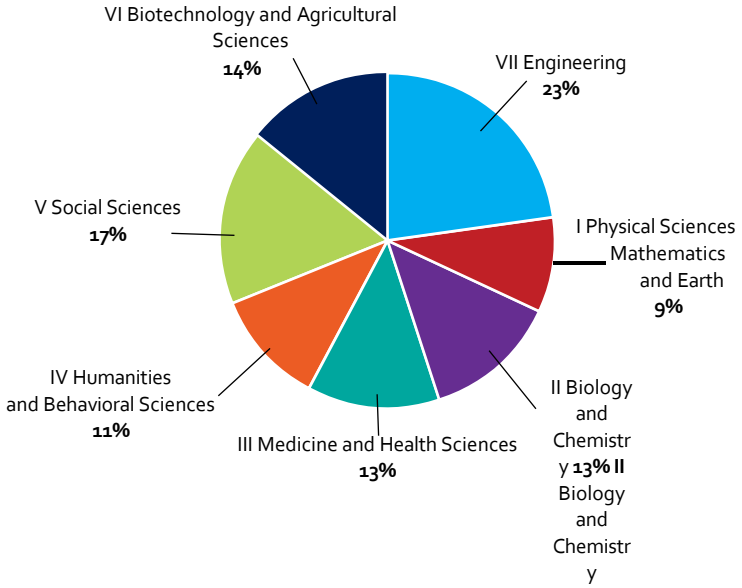
Center for Scientific Research and Higher Education of Ensenada Baja California (cicese)	Center for Engineering and Industrial Development	Center for Research on Advanced Materials (cimav)	State Technology and Design Research and Assistance Center of Jalisco (ciatej)
Center for Research and Higher Studies in Social Anthropology (ciesas)	Center for Research in Mathematics, A.C. (cimat)	The College of the Northern Border (colef)	Center for Research in Applied Chemistry (ciqa)
ipn Center for Research and Advanced Studies (cinvestav)	University Pole of Advanced Technology (punta-unam)	The UANL has 24 Centers/Institutes, itesm with 16, udem with 10 and u-erre with 3.	

Source: CamBioTec, A.C. with data from I T[22]

With respect to research centers, the state has eight Conacyt centers and two cinvestav units, the Polo Universitario de la unam, in addition to 53 centers of local universities. It should also be noted that in Saltillo, Coahuila, very close to Monterrey, there are two Conacyt centers with which there is collaboration, the Corporación Mexicana de Investigación en Materiales (comimsa) and the ciqa. The Centro de Investigación Regional No- reste del inifap has the General Teran Experimental Field in Nuevo Leon.

The members of the National System of Researchers (SNI) are leading players in research. at the end of 2013, there were 779 researchers in this system. Of this total, 176 were candidates, 477 belonged to level I, 97 to level II and 29 to level III, which places it in fifth place nationally in absolute terms, behind Mexico City, the State of Mexico, Jalisco and Morelos. Considering the area of knowledge, 23% of the sni members in the entity belong to engineering.

Areas of knowledge of SNI members in Nuevo León, 2013.

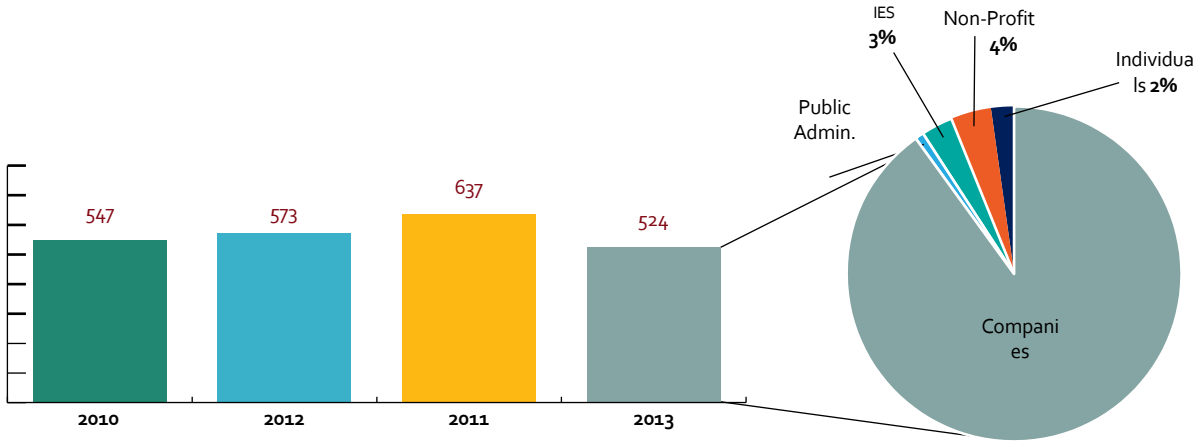


Source: CamBioTec, A.C., with data from SIICYT (2013).

Finally, statistics from the Conacyt Registry of Scientific and Technological Insti- tutions and Companies (reniecyt) show that in 2013 Nuevo León was ranked number one in the world.

The country ranks third nationally; however, when considering only companies, it is in second place nationally, since 90% of the registered entities are economic units.

RENIECYT Registrations between 2010 and 2013 in Nuevo Leon



Source: CamBioTec with data from SIICYT, 2013.

The data shown indicate that Nuevo León has sufficient critical mass in its state innovation system to consolidate the areas of intelligent specialization planned by the state.

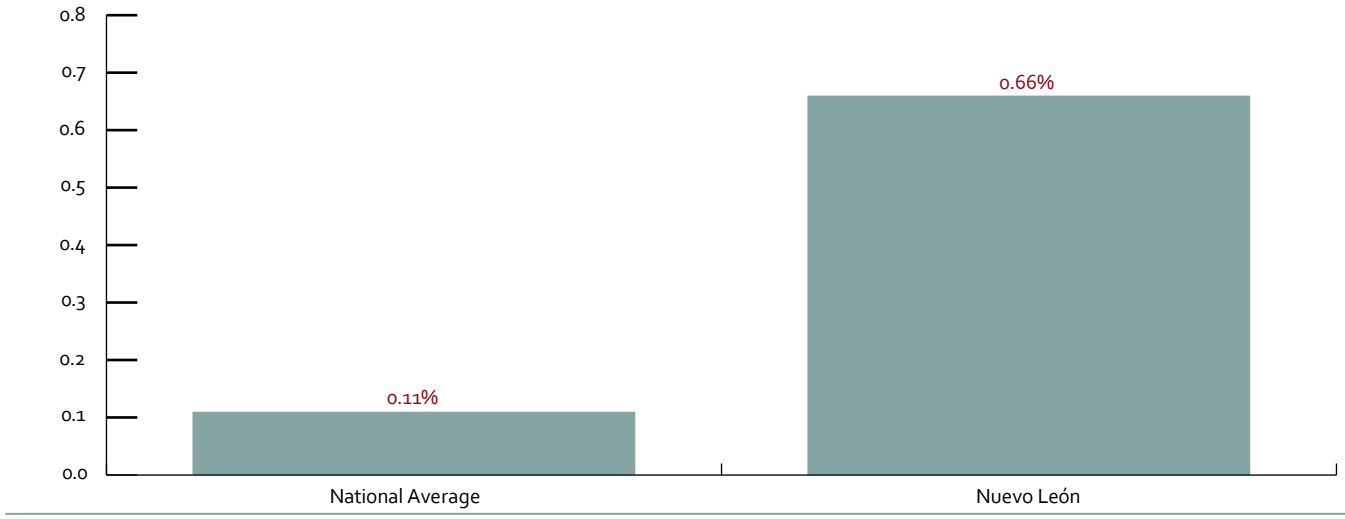
The Agenda includes researchers, human resources training, research centers, promoting organizations and, most importantly, innovative companies.

6.3. Financing of R&D&I in the federal entity

The Nuevo León State Development Plan (2010-2015) sets as a goal to increase state spending on science and technology from 0.8% in 2009 to 1.2% of the state budget by 2015 (Gobierno del estado de Nuevo León, 2010). According to data from the Integrated Information System (Sistema Integrado de Información

on Scientific Research, Technological Development and Innovation, in the 2012 fiscal year this entity was the one that allocated the most pre-supposedly to scientific, technological and innovation activities (cti), with a total of 0.66%; this contrasts with the 0.11% that is the average for the states (siicyt, 2012).

STI budget as a percentage of the total government budget



Source: CamBioTec, A.C with data from SIICYT (2012).

Currently, the federal government has also set a six-year goal of reaching 1% of GDP invested in Research and Experimental Development Spending (GERD), for which it is essential that both the private sector and other levels of government assume the same commitment.

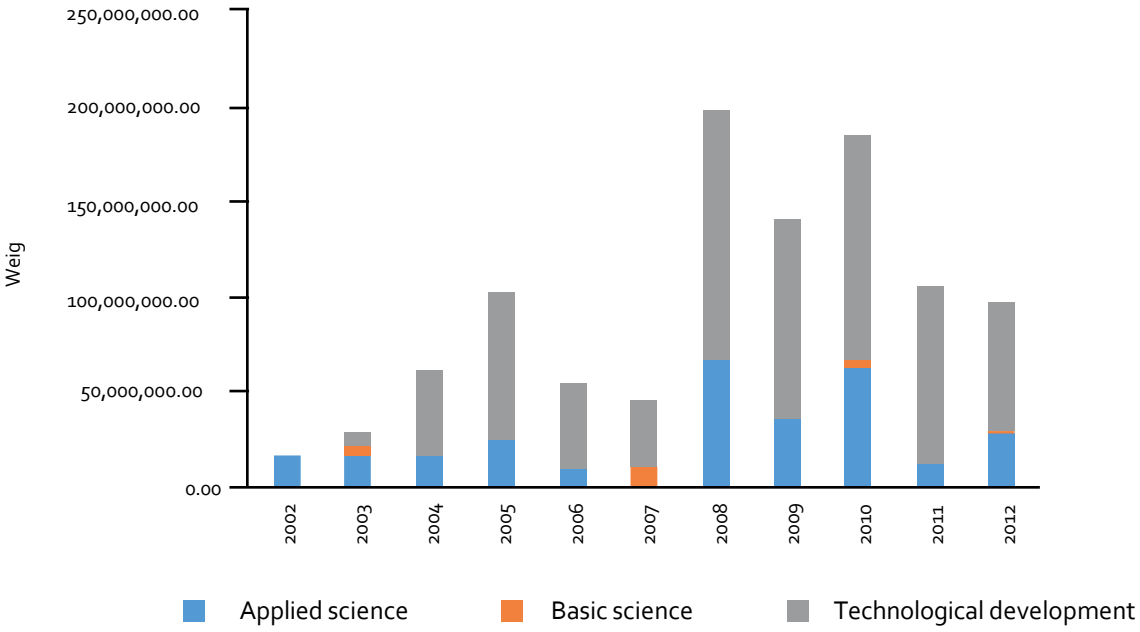
Nuevo León has been one of the states that has attracted the greatest amount of federal resources through the different federal funds that promote cti. In the case of the Conacyt-State Government of Nuevo León Joint Fund, between 2002 and 2012, support amounted to 1,031 million pesos, which is equivalent to an average of 172 million pesos per year. This amount allowed support 203 projects between 2002 and 2012, i.e., a promise of 18 projects per year.

This amount of fomix resources places Nuevo León as the entity that has obtained the most resources from this fund. Historically, the resources granted have been destined mainly for investment in technological development, secondarily in applied research, and a minimal percentage for basic science. This is due to the fact that the main beneficiaries of the fund are companies, followed by academic institutions.

Illustration 21 . Amount of support in Mixed Funds by category (2001-2013).

The fomix has had a budget of $1,085.39 million pesos. in the period 2001- 2013, which were distributed

In 2012, through the infrastructure strengthening and consolidation program, Conacyt allocated 30 million pesos: 10 million for comimsa and 20 million for ciqa.



Source: CamBioTec with data from SIICYT, 2012.

The Sectoral Funds have also been well utilized; between 2002 and 2007 they captured 12.9% of all resources channeled through this program. For their part, the state's companies were able to capture 18% of all resources granted by the Federal Government through the Tax Stimulus Program (fccyt, 2010).


ISO

7. Main conclusions of the diagnostic

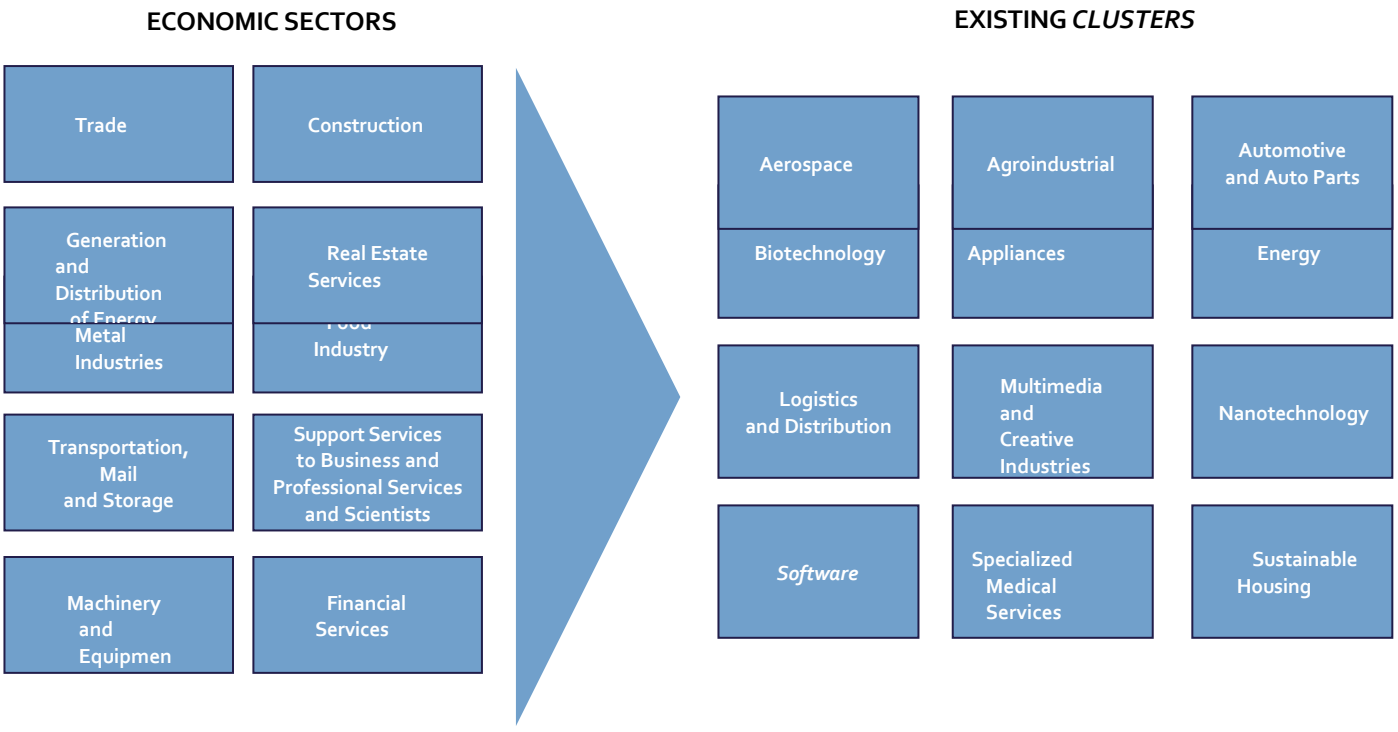
Based on the analysis of the different socio-economic and market factors, the state's infrastructure and the competitive advantages that Nuevo León has, due to its geographic and commercial location, sectors stand out which, due to their strategic importance, coincide with the *cluster* structure and are candidates for smart specialization. At the same time, these have been recognized in previous exercises and are also candidates for the Innovation Agenda.

Cross-cutting technological areas are the driving force behind innovations that can give the state a competitive advantage.

to consolidate in the coming years. The most outstanding platforms are Information and Communication Technologies, Biotechnology and Nanotechnology.

The work that the authorities have carried out in the state to strengthen the innovation ecosystem, through the design of a framework for the operation of the triple helix, the strengthening of the state's innovation infrastructure, and the construction of support for the environment, has generated a clear orientation to strengthen strategic sectors.

Identified economic sectors and existing clusters in the State



Source: CamBioTec, A.C. with data from the Government of the State of Nuevo León (2010, 2013), INEGI and Parada Ávila (2014).

8. Strategic framework of the Agenda

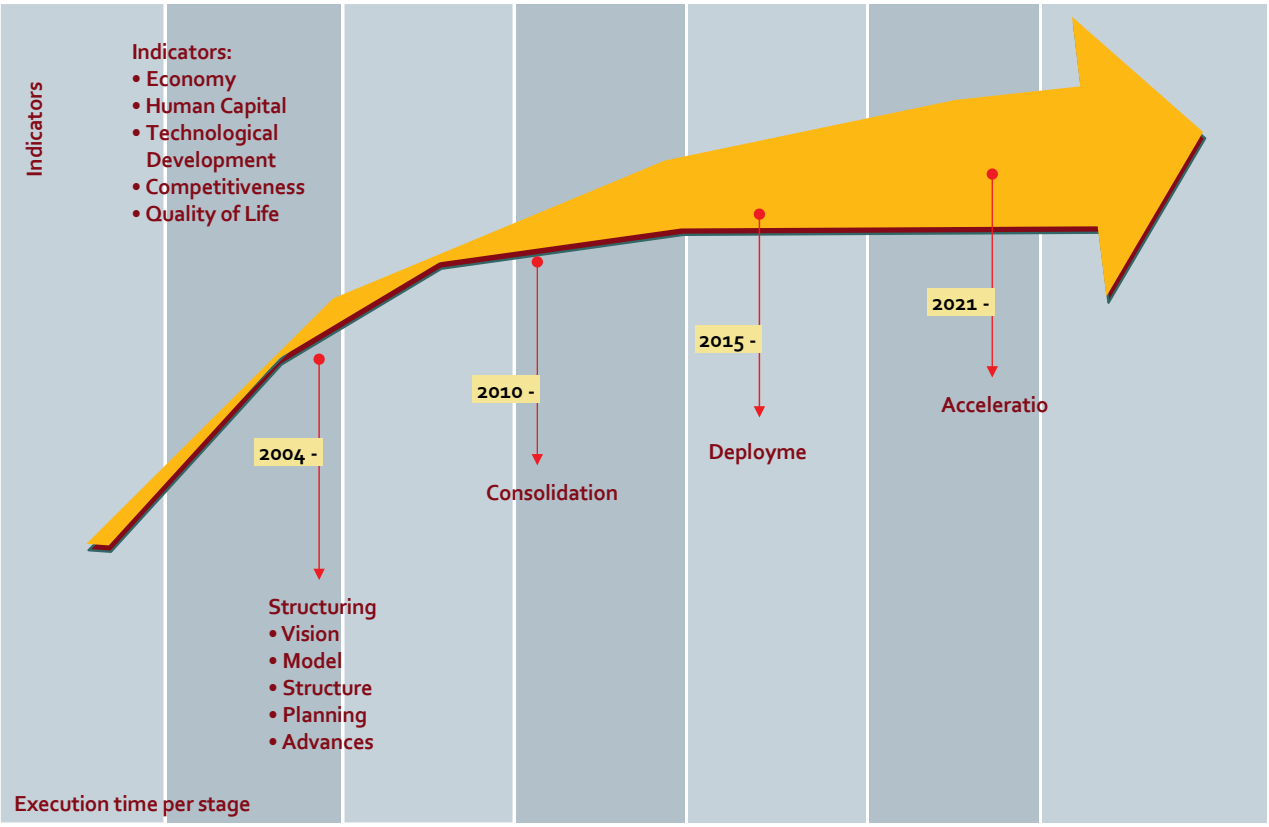
8.1. Vision and strategic objectives of the Agenda

In Nuevo Leon, the Institute for Innovation and Technology Transfer has led the actions and has made a significant planning effort to coordinate the activities of the productive and academic sectors. Likewise, as the body that heads the Agenda's governance, it determined that the objectives, plans, programs and actions would be aligned with the previously established strategy.

The Nuevo León State Innovation Agenda adopts the objectives and vision of the Strategic Program for Science, Technology and Innovation 2010-2015, which, by law, must h a v e a scope of up to 25 years and be updated every three years.

Vision: Nuevo León will have one of the best installed capacities in the country in terms of high-level human resources, research and innovation in its universities, research centers and companies to boost the competitiveness of its productive sector and the integral social development of its inhabitants. This will allow boosting the economy and the knowledge society to maintain national leadership in per capita income, increase the capacity to attract and retain investment and, produce innovative goods and services with high added value for the global market. Source: Go- vernment of the State of Nuevo León (2010).

Illustration 23. 25-year work plan for the state of Nuevo León



Source: Government of the State of Nuevo León (2010) and Parada Ávila (2014).

In order to achieve this vision, a sequence has been proposed that began in 2004. The phases of this planning are summarized in Figure 23.

Finally, the performance measurement indicators that the government of Nuevo León itself, through [i2t2], has planned are:

Performance indicators

Improving the quality of life to reach the average of oecd countries

Increase Nuevo León's GDP per capita from US$18,000 to US$35,000 (OECD average).

Rank among the 25 most competitive regions (wef, imd, oecd).

Consolidate the world-class educational and regional innovation system.

Dissemination of knowledge culture and the impact of science, technology and innovation on daily life.

Source: Government of the State of Nuevo León (2010) and Parada Ávila (2014).

In addition to these general target indicators that provide the state vision with an element of measurement, there are more specific performance and innovation indicators.

The innovation ecosystem map is based on the four elements of the innovation model presented in Illustration 6 of the innovation ecosystem map.

Table 3. Cluster performance indicators in Nuevo León

Target	Indicators of success
1. Investment (increase in investment in N.L.)	• Amount of investment by companies in the *cluster* and the sector. • Amount of foreign investment in the sector.
2. Economic growth (increased investment in sti)	• % sales growth of the *cluster* and the sector. • Proposals incorporated from the *cluster* in: National Development Plan, sectoral and state plans, programs, policies, standards, regulations, etc. • Number of companies and sales of the *cluster vs.* the sector.
3. Employment (labor force)	• Increase in the number of personnel employed by category.
4. Value added (sales minus raw materials)	• % increase in the value added of the *cluster* and the sector.
5. Staff competencies and quality of employment (increase of competencies and skills).	• Number of personnel trained by personnel category. • Number of specialists and postgraduate professionals employed. • Wages and salaries by personnel category.
6. Exports (exports of products and services)	• Volume and % increase in exports. • Export diversification.
7. Local content of products and services (public policy in favor of private investment in sti in companies).	• % of local integration of the *cluster* and the sector. • Sales of new products from supplier development programs.
8. Research and innovation (areas of opportunity to improve the relationship with companies for cti projects).	• Number of companies registered in reniecyt of the *cluster* and sector and that invest in STI. • Number of patents and inventions generated by companies in the *cluster* and the sector. • Number of company projects presented in Innovation Funds and Incentives and % of projects approved in cti. • Annual amount of business sector investment in innovation as a % of sales and % share in the state and in the national total for the sector. • Federal and state budget proposal in favor of cti for companies in the sector. • Number of research and technology centers of the companies in the *cluster* and the sector.
9. The use of best business practices (cti projects of high national or regional impact with business participation).	• Number of best business practices shared and personnel benefited. • Value created by the implementation of shared best business practices.
10. Care for the environment and sustainability (legislative, regulatory, financial and fiscal support framework for cti-based companies).	• Number of proposals and programs implemented with the help of the *cluster* in favor of the environment and sustainability. • Impact and value created by the projects of the quan-

	to the environment and sustainability.

Source: Institute for Innovation and Technology Transfer of the state of Nuevo León.

Thus, the performance indicators of the four dimensions (capacity to train talent, physical infrastructure capacity, knowledge generation capacity and entrepreneurship capacity) described in the innovation model are as follows:

Table 4. Indicators measuring STI performance in the State

Environment/Capacity	Indicator
Ability to develop talent	Number of researchers registered in the sni
	Number of science and engineering faculty in universities
	Number of workers in research and development departments in private enterprise and universities
	Number of workers in the high and medium technology industry as a percentage of total jobs
	Number of university graduates in science and engineering as a percentage of total number of graduates
	Number of master's degree graduates in science and engineering from universities in Nuevo León as a percentage of the total number of master's degree graduates.
	Number of Conacyt and i2t2 scholarships for master's and doctoral studies abroad
	Number of scholarship holders who graduated in postgraduate programs abroad and return to the state as a percentage of the total number of Conacyt and i2t2 scholarship holders.
	Number of students completing basic education as a percentage of the total number of children in the relevant group.
	Average number of years of education of the population
	Number of students completing high school as a percentage of the total number of people in the relevant group.
	Number of people by highest level of education as a percentage of total population
	Level of knowledge of basic science and technology concepts.
	Level of recognition of leaders in science and technology
	Number of visits to museums per 1,000 inhabitants
	Average educational level of immigrants
	Number of foreign students enrolled in the universities and percentage of total number of students
	Average salary of recent science and engineering graduates
	Average annual income by level of education
	Percentage of fully immunized children at 24 months of age as a percentage of all children in the state
	Number of children and adults with obesity as a percentage of total population
Physical infrastructure capacity	Foreign direct investment as a percentage of gdp
	Hectares of constructed and functioning research parks
	Number of Internet users per 1,000 inhabitants
	Investment in Information Technology infrastructure as a percentage of gdp

Environment/Capacity	Indicator
Knowledge generation capacity	Patents issued per million inhabitants
	Investment in university research and development
	Federal and state government investment in research and development
	Investment in private sector research and development
	Investment in research and development as a percentage of gross domestic product
	Scientific publications from universities
	Private sector scientific publications
	Scientific publications per million inhabitants
	Number of tax incentives applied to companies in Nuevo León for investment in Research and Development
	Patent applications with co-authors located abroad as a percentage of the total number of applications
Entrepreneurship	Companies created as a percentage of total companies
	Companies closed as a percentage of total companies
	The value of exports of high-technology industries as a percentage of total exports
	Per capita income
	Venture capital invested as a percentage of gdp
	Number of Initial Public Offerings of companies based in Nuevo León
	Value of Initial Public Offerings of companies based in Nuevo León
	Income from licensing of intellectual property developed by universities
	Revenues from licenses for intellectual property developed by the private sector
	License revenues as a percentage of gross domestic product
	Cash flow allocated to entrepreneurs through fonlin
	Number of projects that received cash flow from fonlin
	Sales of new products in the market as a percentage of total company sales
	Sales of new products for the company as a percentage of total sales of the companies.
	Number of gazelles (with sales growth of 20% per year for the last four consecutive years)
	Number of companies with new products on the market as a percentage of total number of companies
	Number of companies with new services to the market as a percentage of total number of companies
	Value added per employee in manufacturing in Nuevo Leon. Value added is the difference in value between inputs and products/services sold.

Source: Institute for Innovation and Technology Transfer of the state of Nuevo León.

8.2. Sectors/candidate areas

By agreement of the Management Committee and the Advisory Group, it has been indicated that the candidate areas for specialization are as follows

The twelve *clusters* located in the state (one of which is in formation) represent the twelve *clusters.*

8.3. Prioritization criteria

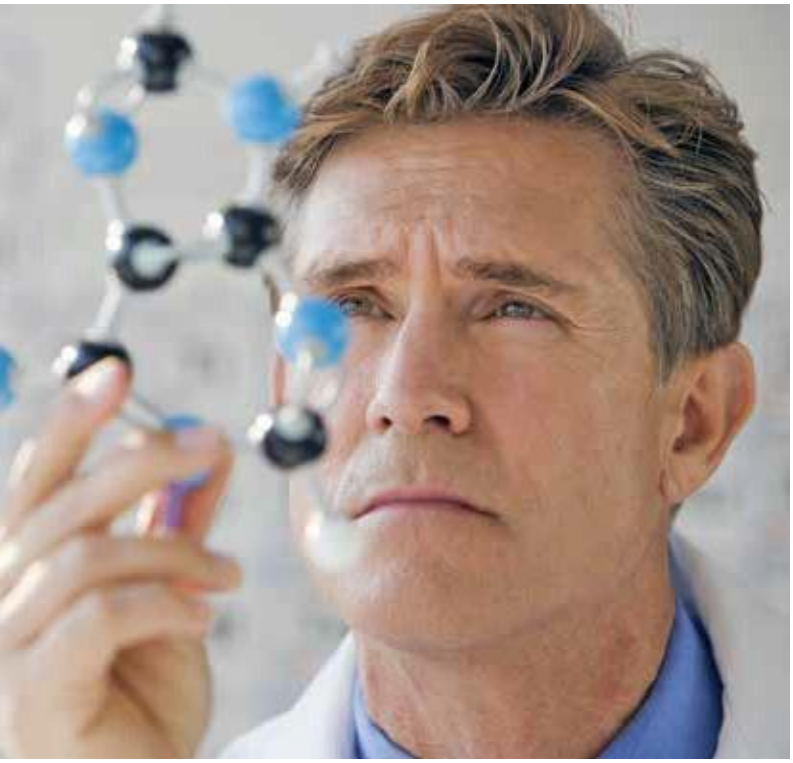
The process of prioritizing the sectors and areas of specialization was carried out through the analysis of key variables discussed by opinion leaders and representatives of the business, academic and governmental sectors that make up the agenda's Consultative Group. The consensus was that the candidate areas correspond to those of the *clusters* already established in the entity.

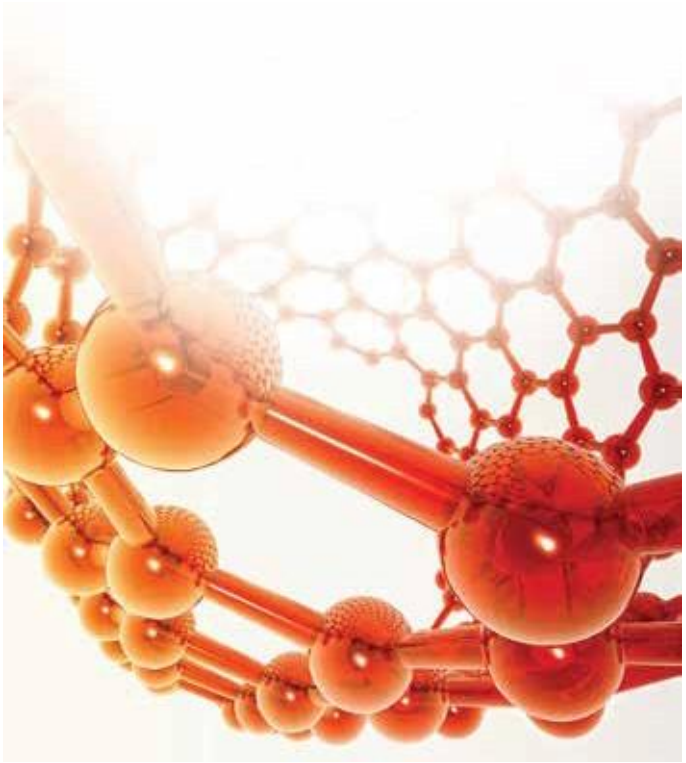
Thus, high-impact innovation projects were identified for the twelve sectors (represented by the *clusters*). In order to identify these projects, consultations were held with the management of all the *clusters*, who shared their innovation priorities with the consulting group. In addition, several of these *clusters* provided information derived from their internal planning exercises; five *clusters* agreed to update such exercises to define strategic innovation projects.

For the remaining seven sectors, a portfolio of projects is compiled taking into account the previously defined plans, the proposals made during the interviews, a review of the technological trends in each sector and the strategic lines expressed by their leaders.

8.4. Selected areas of expertise

In accordance with the previous section, the following is a summary of the selected areas of specialization in accordance with the sectoral *cluster* strategy implemented in the state of Nuevo León.[3]





[3] It is worth mentioning that, at the request of their managers, workshops and Sector Roundtables were held for the areas that opted to update their strategy: Automotive, Biotechnology, Creative Industries and Multimedia, Nanotechnology and Health (Specialized Medical Services).

Sectors selected according to the sectoral cluster strategy

Nanotechnology
- New product development
- Financing

Biotechnology
- Food industry
- Human capital development

Automotive and Auto Parts
- Technology management services
- Supplier development

Health Services
- Medical tourism
- Medical devices
- Clinical information
- Continuing education for medical and paramedical personnel

Interactive Media and Entertainment
- Technology management services
- Strengthening of infrastructure

Aerospace
- Supplier development

Agroindustrial
- Environment and sustainability
- Food safety

Appliances
- Environment and sustainability

Energy
- Environment and sustainability

Logistics and transportation
- Transportation

Software
- E-government

Sustainable housing
- Environment and sustainability

Source: CamBioTec, A.C., with information provided by the Nuevo León clusters.

9. Agenda by area of specialization

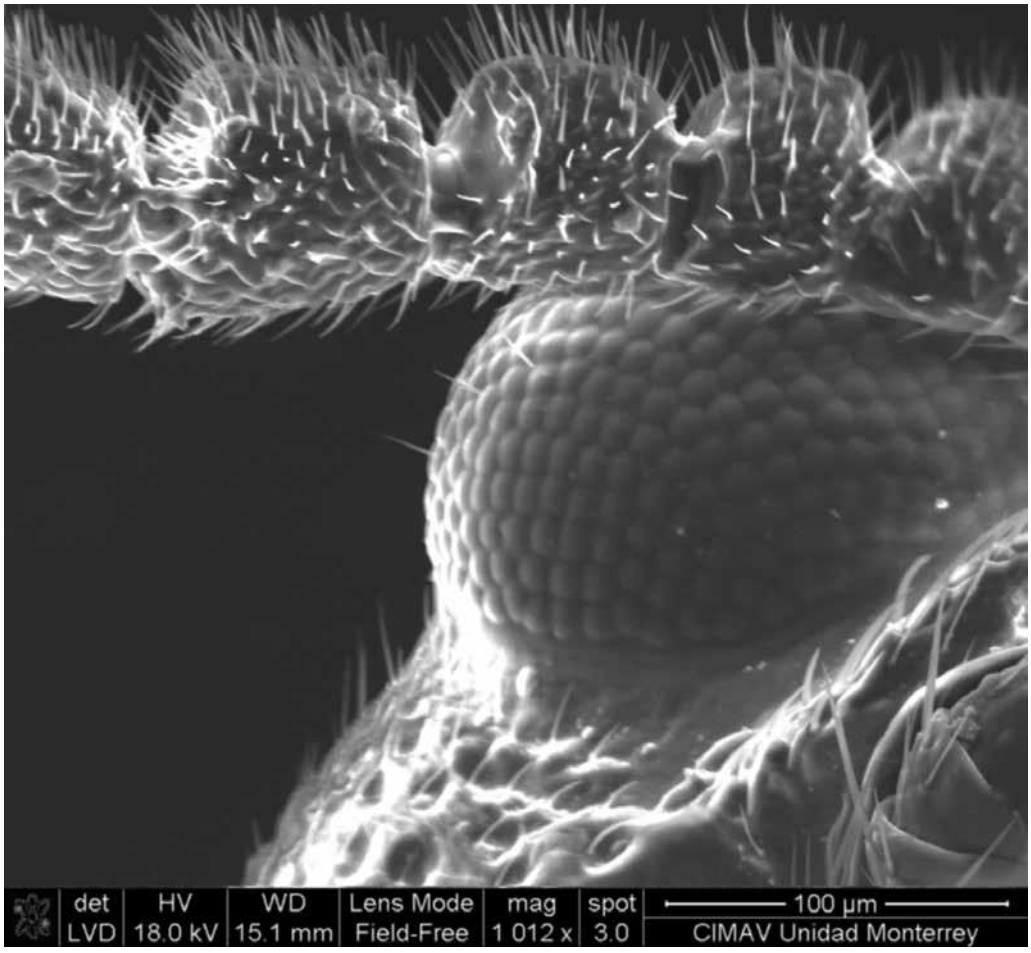
This section defines the Innovation Agendas for each of the areas of specialization in which the planning was carried out.[4] Initially, the area is described together with a brief characterization to continue with the analysis of Strengths, Opportunities, Weaknesses and Threats (analysis of the strengths, weaknesses and threats).

The report also includes the strategic framework, consisting of sectoral objectives, specialization niches and lines of action. Finally, a brief description of the projects identified as priorities for each of the areas of specialization is provided.

9.1. Nanotechnology

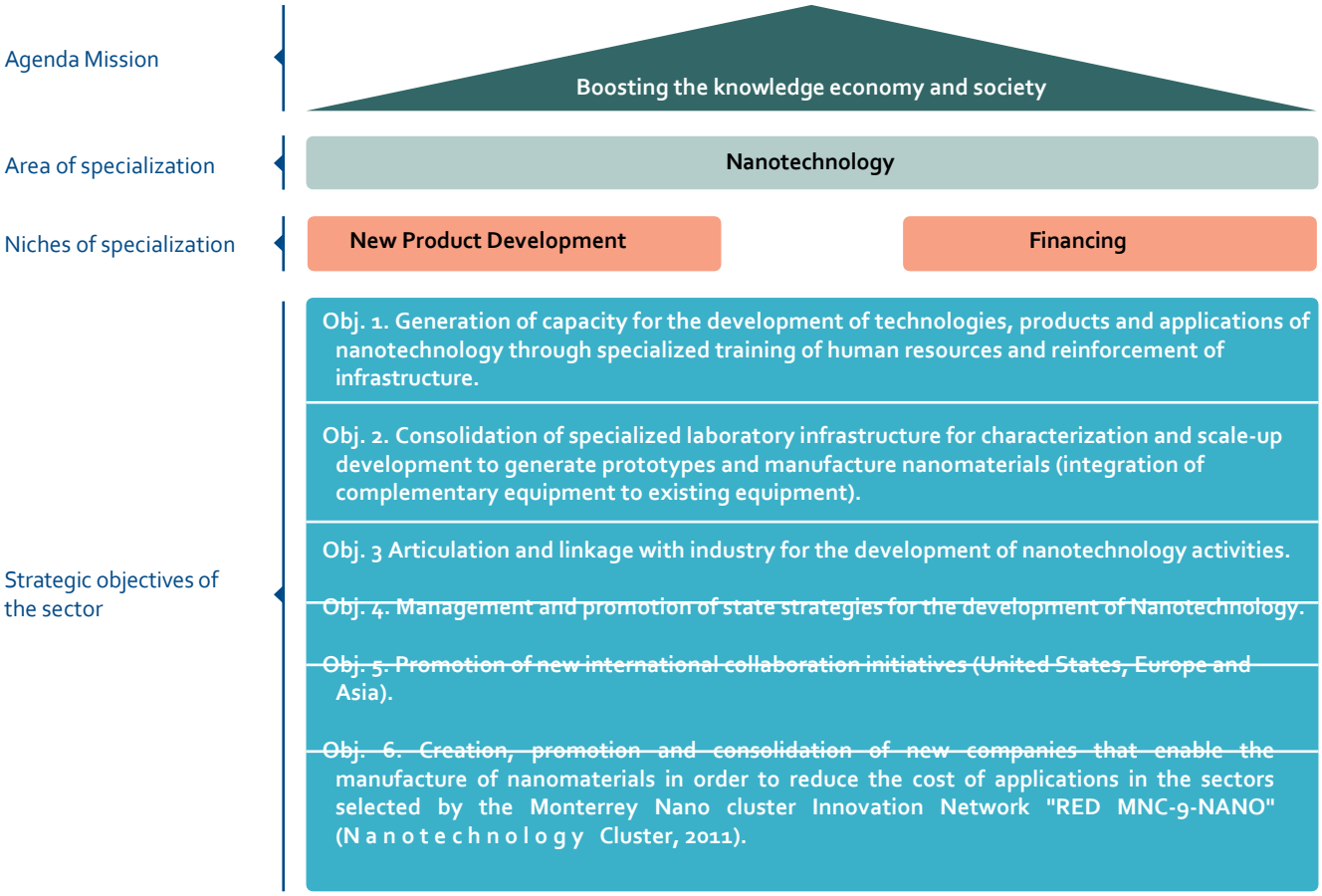
Among the areas of opportunity for the economic development of Nuevo León, one of the greatest challenges for the state is the consolidation of the trans- versal nanotechnology industry. Nuevo León has a Nanotechnology *cluster*, founded in July 2008.

The Nanotechnology cluster has defined six sectoral objectives as part of the Agenda's work.



[4] It has already been mentioned that the identification of projects for the remaining areas was made on the basis of their previous exercises, through a consultation with the directors of each *cluster*.

Illustration 26 . Outline of the strategic sectorial framework for nanotechnology in Nuevo León.



Source: CamBioTec, A.C., with information provided by the Nanotechnology cluster.

9.1.1. Brief description of the area of specialization

Nanotechnology has recently become a field of applied sciences focused on the design, synthesis, manipulation, characterization and application of materials and devices at a nanometer size scale, which are functional and satisfy the needs of different industries.

A classification that refers to products or processes according to their location in the value chain and that serves to understand the magnitude in the number of applications that nanoscience can adopt are (Lux Research, 2004):

- Nanomaterials: are raw materials on the nano-metric scale that obtain quantum advantages from their size and that have been partially processed, such as fullerenes, nanotubes, dendrimers and nonporous materials, among others.

- Nanointermediates: products that incorporate nanomaterials and acquire their functional advantages such as coatings, chips, superconducting cables or paints.

- Nano-enabled: these are final manufactured products such as automobiles, aircraft, pharmaceuticals, food and beverages. nanostructured products, cell phones or computers, where nanomaterials or nanointermediates are incorporated to improve their characteristics.

- Nano-tools are instruments and equipment for manipulating, visualizing and modeling materials or components at the nano-scale, e.g., atomic force microscopes and nano-printing.

A definitive feature of this area is that it requires interdisciplinary work depending on the intended application, with physics and chemistry playing the most important roles. Thus, physicochemistry will be the fundamental discipline for the development of any nanotechnology.

There are multiple areas in which nanotechnology has potential applications, among the main ones are:

- Materials
- Life sciences
- Electronics
- Environmental protection

9.1.2. SWOT analysis

SWOT analysis in the area of Nanotechnology of Nuevo León

STRENGTHS

- Existence of a *cluster* specialized in nanotechnology where companies and research centers are located, in addition to the incubator that has specialized pilot plants.
- Innovation promotion in a planned manner by i2t2.
- This state has the largest number of companies that manufacture and/or develop nanotechnology products.
- Existence of educational infrastructure for specialized development in different fields of nanotechnology.
- Existence of funds to support nanotechnology innovation and entrepreneurship.
- Adjacent to the largest consumer of nano-materials in the world, the United States.
- Binational cooperation programs in innovation and entrepreneurship, such as the Mexican-United States Council for Entrepreneurship and Innovation (museic).
- Operation of consortia and alliances for collaborative projects between companies, research centers, and institutions.
- Important academic and research base in this area, with scholarship and postgraduate programs available.
- Existence of important companies demanding nanotechnologies and suppliers of nanomaterials.
- Participation in networks and consortiums for the development of this area.

OPPORTUNITIES

- Demand for nanomaterials for the Metalmechanical Industry, Textiles, Plastics and Coatings, Ceramics and Paper, among others.
- Growth in federal resources for research and innovation.
- Demand from industries with potential for nanotechnology development.
- Possibilities for cooperative projects with U.S. institutions and companies.
- Growth of the nanomaterials market worldwide.
- The existence of other organized *clusters* that want inputs of knowledge and national technological materials.

WEAKNESSES

- Weak communication between companies and academia and a lack of linked projects between large companies and institutions.
- Nuevo León does not have enough equipment to supply the state's demand for new project development, since the *cluster* alone has more than 500 projects in the pipeline.
- Lack of coordination of efforts to achieve the consolidation of a more effective network.
- There is no clear and pertinent dissemination for the promotion of the programs that each center, university and institution has in this area of specialization.
- Scarce diffusion of nanoscience knowledge to society and industry.

THREATS

- International progress in this area is very rapid and if we do not make inroads in time, we run the risk of increasing the country's technological dependence.
- Weak medium- and long-term financing to ensure project continuity.
- The growth of companies in emerging countries with infrastructure and labor that competes with Mexico.
- Competition from other states for innovation resources.

Source: CamBioTec, A.C., with information provided by the Nanotechnology Cluster (2011).

9.1.3. Specialization niches

Based on the information provided by the *cluster*, the strategic components were defined to enable the articulation between institutions and the integration of the network's Development Plan. This plan considers concrete deliverables oriented to the generation and implementation of projects and new companies in the field of nanotechnology, based on the strengthening of key competencies, the current infrastructure, technological foresight, international collaboration and human resources training.

In this way, the *cluster* defined seven strategic areas in which it seeks to influence the development and strengthening of the sector:

- Development of functionalized nanoparticles of metal oxides, nanographenes, nwt, nanoclays, calcium carbonates, nitrides to improve mechanical properties in the industrial sectors of metalworking, plastics, paper, packaging, cement and glass.

- Development of functionalized metal oxide nanoparticles to improve hydrophobic properties in the industrial sectors of paper, cement, textiles, paints, coatings and glass.

- Development of functionalized metal oxide and metal oxide nanoparticles to improve microbial growth inhibition properties in the industrial sectors of paper, ceramics, textiles, paints and coatings, packaging, plastics and nanobiotechnology.

- Development of functionalized nanoparticles of metal oxides, nanoclays, calcium carbonate, graphenes and phosphates to improve flame retardant properties in the industrial sectors of paper, textiles, paints and coatings, plastics and cement.

- Development of functionalized nanoparticles of metal oxides, carbon blacks to improve properties such as resistance to UV radiation in the industrial sectors of plastics, textiles, paints and coatings, paper, glass and cement.

- Development of functionalized oxide nanoparticles metallics, carbides, nitrides for improvements in properties such as abrasion resistance in the industrial sectors of glass, ceramics, paints and coatings, cement, plastics and metal-mechanics.

- Development of metal oxide coatings to improve optical properties and corrosion resistance in the metalworking, glass, ceramics, plastics, cement and paper industries.

The above lines are oriented to the industry that is part of the *cluster* and that can be identified in the following branches of economic activity:

- Concrete
- Glass
- Ceramics
- Metalmechanics
- Plastics
- Food packaging
- Paper
- Paints and coatings
- Nano biotechnology
- Textiles

In addition, as a result of consultations with *cluster* leaders, two projects have been identified that seek to strengthen the work that this consortium carries out in the state for the benefit of nanotechnology.
The defined specialization niches are:

1. Development of nanotechnological processes on a commercial scale.

2. Specific funding for nanotechnology development projects.

9.1.4. Description of priority projects

9.1.4.1. Creation of a collaborative network to scale up nanocomposite production processes.

9.1.4.1.1. Target

Optimize the use of infrastructure for scaling up nanotechnology developments through cooperation with national institutions.

9.1.4.1.2. Justification

Nanotechnology is growing at an accelerated pace worldwide; Nuevo León is one of the most developed states in terms of infrastructure and linkages in this area at the national level. In 2011, the Mon- terrey Nano *cluster* Innovation Network (RED MNC-9) was created in the Nuevo León Nanotechnology *cluster* (cnnl), with the aim of establishing strategic alliances and innovation networks capable of promoting the development of this field and positioning Mexico among the main developers of this science, training specialized human capital, creating infrastructure, developing innovative products, with technology transfer and creating new companies. But there is still a long way to go to position Mexico competitively on the international scene. Greater capacity is needed to generate prototypes and scale up processes to levels compatible with the demands of industries that require greater complexity.

Considering the state's capabilities in human, infrastructure and industrial resources, the *cluster* has proposed the creation of a collaborative network for scaling up nanocomposite production processes that systematically brings together information from academia, productive capabilities and industrial demands, emerging niches with market opportunities and government support for the development of applied research projects (Nanotechnology *cluster*, 2011).

9.1.4.1.3. Brief Description

It is a project promoted by the state's Nanotechnology *cluster.* The proposed infrastructure is complementary to that of the nanotechnology incubator.

Within the framework of the consultations carried out, it has been proposed that the collaboration network for scaling up nanocomposite production processes be an extension of the Nanotechnology *cluster* and collaborate simultaneously with the MNC- 9-NANO NETWORK. The purpose will be to strengthen and promote the activities of both, in order to have an expanded capacity to scale processes at a commercial level, combining the talent, infrastructure and existing resources of the organizations that make up the network to generate distinctive, significant and permanent advantages derived from knowledge, and the adoption and industrial application of nanotechnology.

Another important aspect to be fulfilled by this network is to promote the education and interdisciplinary training of personnel dedicated to research and development in the area, in order to strengthen scientific knowledge, interdisciplinarity and competitiveness.

The network shall coordinate the efforts made in the academic, industrial and governmental sectors, through:



- To achieve the active and participatory involvement of the industry.
- To achieve the integration of a feasibility study for the project that incorporates a catalog of products, services and industry capabilities, among other elements.
- Access to specialized databases for the sector.
- Leverage the infrastructure of various institutions for the scaling up of nanotechnology developments.
- Locate and make members of the *cluster the* different nanotechnology networks existing in the country, which in turn will help to have an inventory of the spaces available for the development of nanotechnology and the equipment available, as well as the specialization niches of each infrastructure.
- Assist and inform stakeholders on national nanotechnology initiatives.
- Promote the interrelation of scientific communities and companies, thus complementing their capabilities and providing solutions to problems of advanced complexity.
- Promote the linkage (generate technological extension networks) of academia and industry through the creation of collaboration programs with leading international institutions in the field of nanotechnology.

9.1.4.1.4. Critical factors for project success

- Coordination of the Nanotechnology cluster.
- Generate a broad collaboration agreement between national institutions with the capacity to scale up nanotechnological processes.
- Initial government support for the establishment of the network.
- Encouragement through complementary funds for companies to finance specific network projects.
- Strengthen business capabilities to manage financial support.
- Existence of resources to promote the mobility of researchers and students.
- Cooperation program for the promotion of internships in centers, institutes and companies at the national level.
- Relevant dissemination of Nanotechnology.

9.1.4.2. Creation of a fund for the development of projects in Applied Nanotechnology.

9.1.4.2.1. Target

Create a special fund for applied research projects that will provide resources complementary to those contributed by the industry, in order to finance competitive technological developments with a long-term perspective.

9.1.4.2.2. Justification

In Mexico, Nanotechnology has no specific public policy instruments to promote its industrial development (Ortigoza, 2013), (De la Riva, 2013).

The development of nanotechnology has specificities that must be addressed, such as the following:

- It is an emerging area with a high demand for scientific knowledge, the application of which requires longer periods of time.

than those contemplated by the support instruments in force.

- Nanotechnology-based companies need the pro- vision of seed and venture capital to perform at industrial scales.

- Companies using nanotechnology require incentives to assume the risks inherent in the adoption of these innovations, given their uncertainty.

Therefore, during consultations, the *cluster*'s management has expressed the need to design a fund to address these special circumstances.

9.1.4.2.3. Description

In Nuevo León there is proven investment in research infrastructure, in addition to the wide variety of projects in the pipeline to be developed. However, in contrast to the above, there is a lack of funds for the completion of projects with medium and long term horizons, especially in terms of their scaling up to a commercial level. For this reason, the challenges identified are as follows:

- To ensure that scientific development has productive and direct applications.
- Ensure that professional qualifications are adequate for production requirements and avoid factors that limit technological development.
- Create the necessary economic conditions to favor the development of technological activity at the commercial level.
- Provide comprehensive support so that medium-term projects can be completed regardless of fiscal cycles and the limitations of existing funds.

In order to achieve the above objectives, it is proposed to create a specific fund for nanotechnology development, which will provide the necessary economic resources to fully finance research, development and innovation activities in nanotechnology.

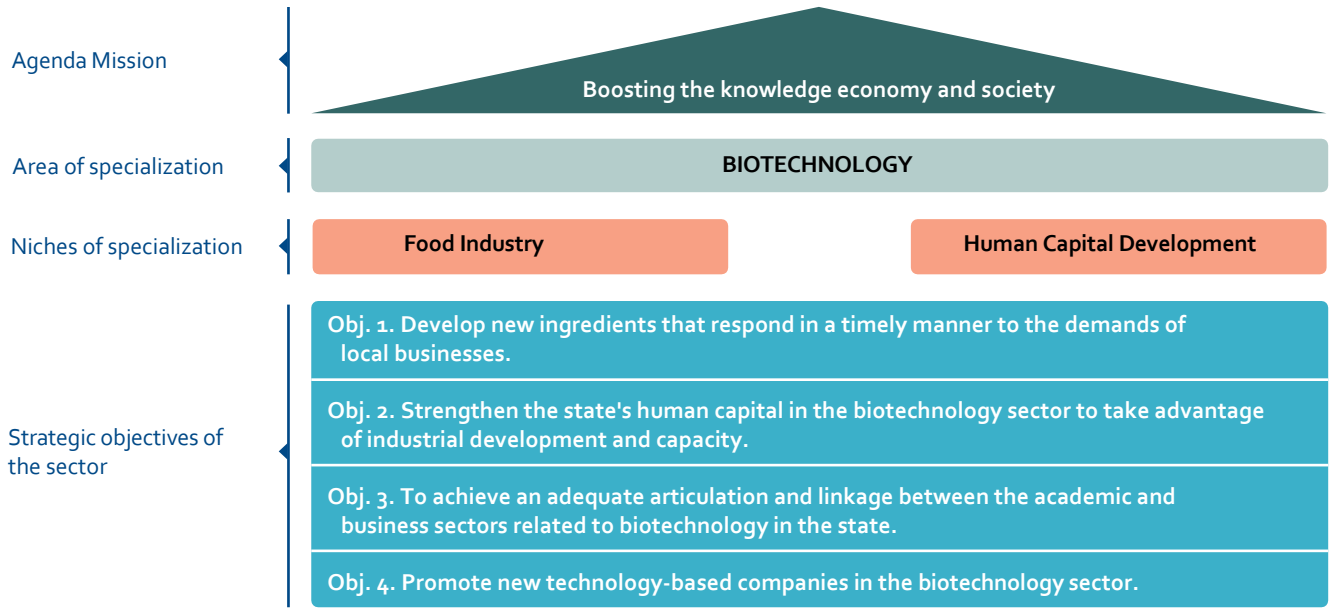
9.1.4.2.4. Critical factors for project success

- To count on the contributions of federal and state resources for the generation of the fund.
- Establish a fund management board composed of representatives of the triple helix.
- State support in the promotion of an adequate innovation management model, in which the conditions are in place to link the nanotechnology industry ecosystem.
- Establish rules of operation for the fund, requiring co-participation between public and private institutions, as well as support for applied nanotechnology projects with high socioeconomic impact.
- Transparency in the selection and approval procedure for projects that are candidates for support.

9.2. Biotechnology

As part of the Agenda work for this area of specialization, the state's Biotechnology cluster has defined four sectoral objectives.

Outline of the strategic framework for the biotechnology sector in Nuevo León.



Source: CamBioTec, A.C., with information provided by the Biotechnology cluster.

9.2.1. Brief description of the area of specialization

According to the definition of the National Polytechnic Institute (ipn), biotechnology is a set of knowledge and methods through which the use of viable organisms is used to generate new products, processes and services, applicable to the areas of agriculture, food, pharmacy, chemistry and environmental protection, through various systems, such as: the treatment of solid waste, the production of improved agricultural crops, or the development of new vaccines.

In recent years, biotechnology has been classified into four types (ipn, 2010), (Salomón, 2009):

- Red. It is related to biomedicine, to medical or clinical activity and to the study and application of biotechnology in human and animal health.
- Green. It focuses on agricultural, livestock and forestry activities, as well as on their productivity, on increasing resistance to harmful species or on the manufacture of pesticides that improve their performance.
- Blue. It deals with seafood and aquaculture products, one of its main objectives is the manufacture of vaccines that reduce fish mortality.
- White. Related to the industrial applications of biotechnology, through which new products are elaborated (production of microorganisms, fermentations, chemical specialties, bio-transformations, etc.).

Nuevo León has prioritized biotechnology as a transversal platform that enables various industries relevant to the state, such as food, agriculture, health products and environmental protection. In the case of biotechnology, the Bio *cluster* in the state was founded in January 2008.

9.2.2. SWOT analysis

SWOT analysis in the area of Biotechnology of Nuevo León

STRENGTHS

- There is a *cluster* specialized in biotechnology that includes companies, higher education institutions and research centers.
- This state has the highest number of linkages between business and academia.
- Nuevo León is developing an important academic and research base in this area and has scholarship and graduate programs available.
- It is the state with the most biotechnological developments in the food industry.
- There are consolidated companies that make use of biotechnological instru- ments and processes.

OPPORTUNITIES

- It is adjacent to the most developed country in biotechnology, the United States, with which it can develop alliances to promote student mobility and generate highly skilled human resources in the area.
- The state has a high biological and genetic diversity, the care and rational use of which represents a great potential for the development of biotechnology.
- It has a wide range of national companies with potential for the implementation of biotechnology. The use of biotechnology in these companies opens up opportunities to establish high-tech businesses.
- Of the various current high viability applications of biotechnology, the food market is the second most in demand worldwide.
- Federal resources for innovation are growing.
- Biotechnology has been prioritized in the peciti 2014- 2018 (Special Program for Science, Technology and In- novation).

WEAKNESSES

- There is little information available on the developments and alliances that the state has in this area of specialization.
- There is weak financing for medium- and long-term projects in this area. This needs to be strengthened to guarantee their continuity.
- There is insufficient dissemination for the promotion of the programs that each center, university and institution has in this area of specialization.
- There is little appropriation of this technology in the community; it is necessary to create funds and programs to increase the interest of society and encourage technological entrepreneurship in this area.
- Very few companies have biotechnology as a fundamental basis of their business. Only a few are consolidated and almost no information is available

THREATS

- The growth of companies from emerging countries with infrastructure and biotechnology developments that compete with those generated in Mexico.
- International progress in this area is much greater than in Mexico, and there is a risk of further backwardness and dependence on products, mainly drugs and food.
- Public perception is adverse, especially when it comes to genetic engineering.

Source: CamBioTec, A.C. with information provided by the Biotechnology cluster (2011).

9.2.3. Specialization niches

The Bio *cluster* has identified the main development areas considered for the state, which are as follows:

- Biopharmaceuticals
- Functional foods
- Scale-up and purification of secondary metabolites
- Genetically engineered crops
- Biofuels

It is important to note that this *cluster* currently serves projects mainly in the following areas:

1. Food: specifically in the development of functional foods and in projects on the utilization of industrial by-products of high economic value (e.g., for the generation of biofuels from agro-industrial wastes).
2. Clinical research (health): regulatory aspects with the Comisión Federal para la Protección contra Riesgos Sanitarios (cofepris) and clinical protocols in hospitals, universities and companies working in the field, such as the Organización de Investigación Clínica por Contrato (cro), the Biobank and training in good clinical practices.
3. Energy and environment: biotechnology consulting firms and laboratories (dedicated to pollutant measurement, water treatment, environmental remediation, etc.).

9.2.4. Description of priority projects

9.2.4.1. Food and Nutraceuticals as part of the Bio *cluster*

9.2.4.1.1. Objectives

To develop, through biotechnological processes, ingredients for the food industry, as well as functional ingredients.

9.2.4.1.2. Justification

Since 2010, the Bio *cluster* has identified as a relevant problem the rise in input prices for food manufacturing beyond what the cost structure can support, in addition to the lack of production at the national level. As part of the consultations with the members of the Bio *cluster*, this priority project was identified as one that could lead to the consolidation of its leadership and foster inter-institutional linkages and thus respond to a concrete need of the industry.

Biotechnology is one of the most powerful tools a society has to compete in different markets. Nuevo León is the state with the largest number of activities registered nationally in this area and one of its most important efforts is the creation of the Bio *cluster*; however, it is necessary to promote and improve its position in the market.

The aim of this entity is to promote more efficiently the linkage and transfer of technology between the public and private productive sector and research centers. In this way, it will be possible to achieve a solid base in the development and production of biotechnology for the food industry, taking advantage of the level of industrialization that the state possesses with the academic and research base that is currently being developed.

9.2.4.1.3. Description

The improvement of positioning consists of consolidating the *cluster*'s leadership for the generation and application of scientific and technological knowledge in the area, particularly in the niches of opportunity identified by the Bio *cluster* in the area of ingredients and nutraceuticals, as well as coordinating academic advances, industry demands, and economic and human resources in each specialization niche, in order to articulate viable projects.

The aim is to promote academia-industry linkages (generate technological extension networks) through the creation of collaboration programs with international institutions.

leading companies in the field of biotechnology for the production of special ingredients for the industry.

In addition, we will seek the support of funds and programs for technological development, the preparation of technological plans and the placement of teachers and doctors in Biotechnology in companies with activities related to this area. In addition, we intend to obtain integral financing to guarantee the conclusion of medium-term projects that have direct applications in the production of ingredients and nutraceuticals.

Another important aspect that should be addressed is the detection of new opportunities for the area as well as national and global advances, thus promoting the development of new technological projects in this field.

9.2.4.1.3. Critical Factors for Project Success

- Food companies should be involved in defining ingredients and their specifications, as well as in obtaining project financing.
- Attract the participation of research centers to generate an effective response to the demands of companies in an expeditious manner.
- The state should support the Bio *cluster* and promote an adequate innovation management model, where conditions are in place to link the biotechnology industry ecosystem.
- That the Bio *cluster* has the availability to gather information on programs and support for linkage and the power to promote them. It is also important to have access to data or indicators to identify areas of opportunity in the different biotechnology niches.
- The participation of the companies to provide information that will allow the Bio *cluster* to search for and implement appropriate linkages.
- That the *cluster* has specialized personnel to efficiently coordinate the activities established in the specific projects of the network.

9.2.4.2. Human capital in Food Biotechnology

9.2.4.2.1. Target

To train and strengthen the human capital that will contribute to the intelligent development of the area in question in Nuevo León, in order to take advantage of the level of industrialization of the state, as well as the diversity of its natural resources.

9.2.4.2.2. Justification

Nuevo León is developing an important academic and research base in the area of biotechnology, with various scholarship and postgraduate programs available. Furthermore, it is trying to promote the use of biotechnology in companies with the potential to implement it, with the aim of developing a culture of knowledge and innovation and boosting the state's economic growth.

Despite the fact that Nuevo León is one of the states where most innovation is generated at the national level, international progress in this area is much greater than in Mexico and there is a risk that the backwardness in this area will increase, as well as dependence on products such as pharmaceuticals and foodstuffs, among others.

It is important to consider that food production for the growing population is increasing, as well as the demand by consumers for safe food with additional nutritional benefits and free of contaminants. In addition, it is desired that such production be carried out in a sustainable and environmentally responsible manner, therefore, it is necessary to improve the level of knowledge in biotechnology through the specialization of the state's human resources.

9.2.4.2.3. Description

To achieve the proposed objective, it is necessary to promote and guide the training of biotechnologists and bioengineers, in accordance with the academic and industrial reality of the country. It is recommended that specialization be in the area of food, due to the state's industrial capacity in this sector. We will also seek to generate linkages between agronomists and biotechnologists to produce specialized capital.

The proximity to the United States, which is one of the countries with the most biotechnology activities, can also be used to generate linkage agreements with its schools and/or companies with expertise in the area. Likewise, student exchanges can be carried out to promote specialization, mainly in vegetables, cereals and citrus. In addition, relations with societies and associations of a similar nature in the country and abroad will be fostered.

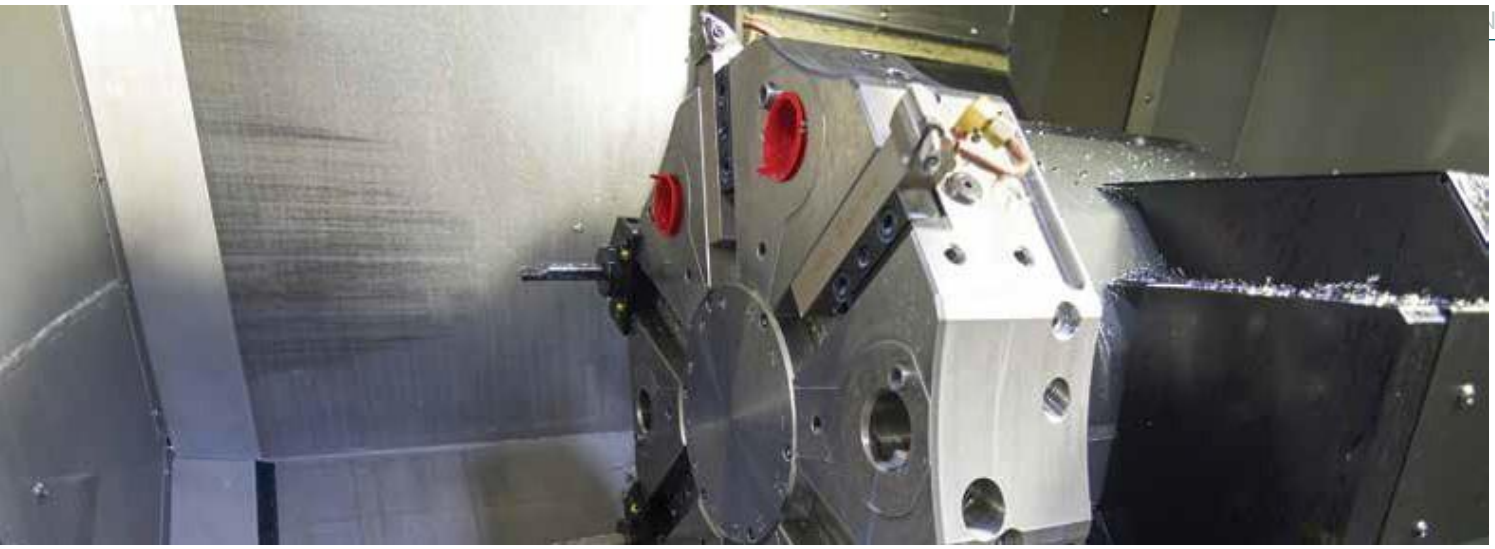
Specialization will be encouraged in the areas of plant development and reproduction, disease resistance genes, genes that control tolerance to abiotic stress, metabolic engineering, bioinformatics, functional genomics, development of plant transformation systems of social, economic or industrial interest, use of plants as bioreactors, and implementation and use of molecular markers in traditional breeding programs.

Another objective to be clear about is that this biotechnology development must be environmentally responsible.

The strategic areas to be supported will be: the systematization of agricultural diversity by means of molecular markers; conservation and use of the diversity of agricultural and forestry genetic resources through molecular markers; conservation and use of agricultural and forestry genetic resources by means of molecular markers. The strategic areas to be supported will be: systematization of agricultural diversity by means of molecular markers; conservation and use of the diversity of agricultural and forestry genetic resources through modern biotechnology; biosafety; monitoring of novel products and analysis of their impact on agro-ecology; ecology and molecular evolution.

9.2.4.2.4. Critical factors for project success

- The availability of human and economic resources for the formation of specialized human capital in the area of food biotechnology.
- That the programs generated for specialization in the branches of Biotechnology guarantee high-performance students the existence of internships and/or positions in research centers and companies of the entity.
- That agreements be formalized with institutions of excellence in the training of human resources.
- That a scholarship program be supported through a public-private arrangement.



9.2.5. Complementary projects

9.2.5.1. Intellectual Property and Technology Surveillance Unit

9.2.5.1.1. Target

Promote and facilitate the interaction between the generation of knowledge and its application, boosting the links between academia and industry, identifying technological needs in the socioeconomic sectors and seeking solutions in science and technology institutions, and strengthening the protection of technologies for transfer to companies and organizations.

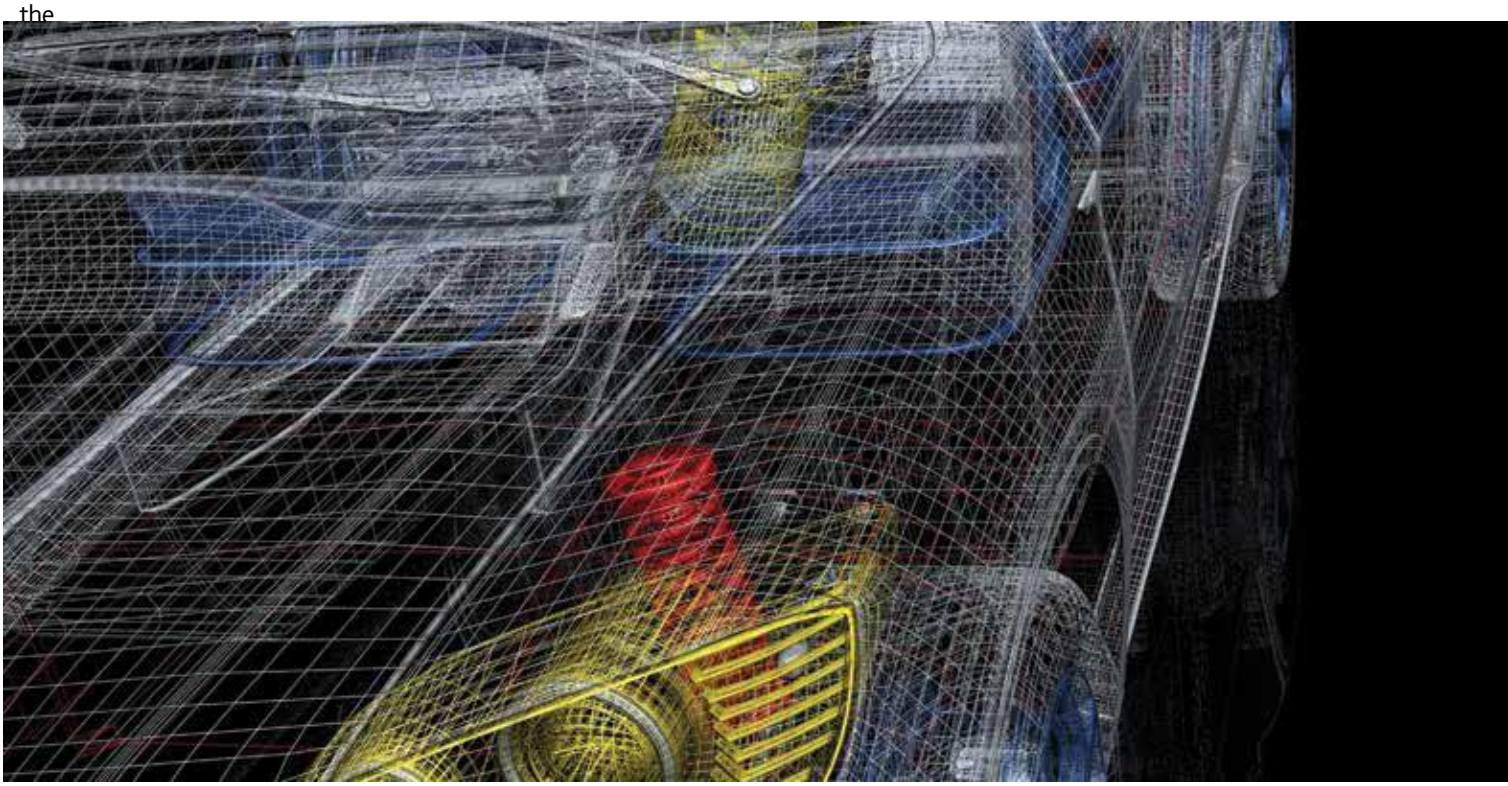
9.2.5.1.2. Justification

Among the problems that the Bio *cluster* has already identified is the poor linkage between companies and academia, mainly due to confidentiality issues. This causes the academy to work in developments that are not linked to the market or the industry and that in turn the industry has difficulties in developing new ingredients with the speed required to meet the demands in the necessary time.

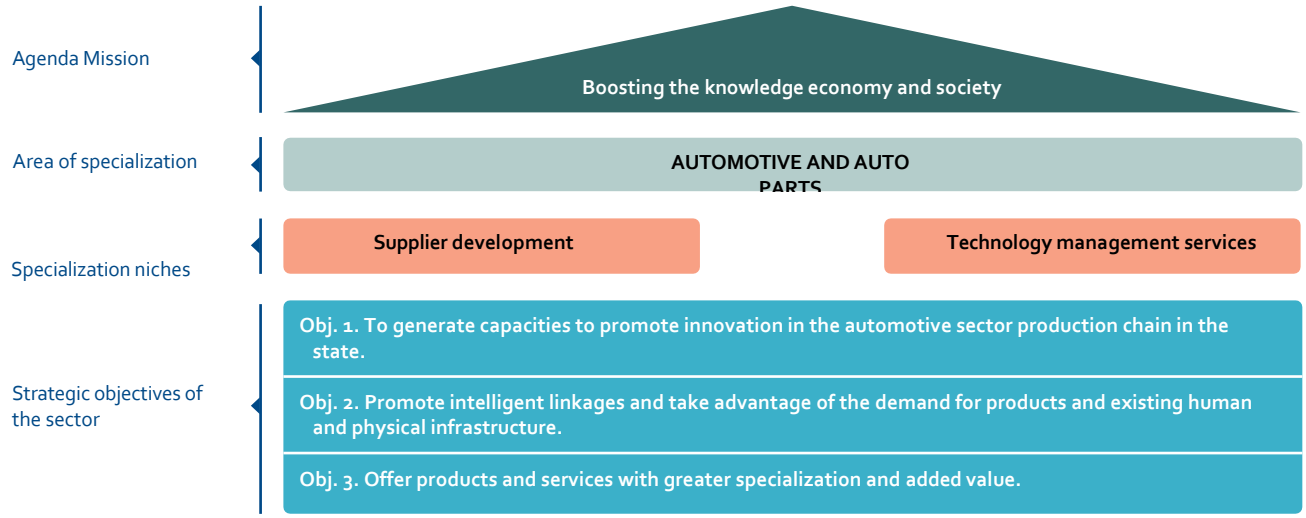
Therefore, we propose the creation of an agency in charge of managing the links between companies and academia, which will monitor and be in charge of issues related to intellectual property and technological surveillance, in order to create innovation and greater competitiveness in the state. This is important because if the results of research are not transformed into new products, there will be no innovation and companies will not be competitive.

9.3. Automotive and Auto Parts

Of the strategic economic sectors in the state of Nuevo León, the automotive sector is undoubtedly emblematic. This sector comprises the assembly plants or terminal industry and the auto parts sector, identifying in the value chain the assembly companies and the first, second and third tier suppliers, commonly known as Tier 1, 2 and 3.



Outline of the strategic framework for the automotive and auto parts sector in Nuevo León.



Source: CamBioTec, A.C., with information provided by the Automotive cluster.

9.3.1. Brief description of the area of specialization

The Automotive Industry encompasses final consumer goods assembled in the assembly industry, as well as replacement market products or spare parts for used automobiles. A significant proportion of the value of exports, employment generated and the Gross Domestic Product (GDP) of automobile-producing countries worldwide depends on this industry (Valdenebro, 2014).

The Automotive and Auto Parts Industry in Nuevo Leon stands out in the national context, with the presence of innovative companies in different links of the value chain, as well as research centers, testing and design laboratories and leading human resources training programs. The Nuevo Leon Automotive *Cluster* (CLAUT), founded in December 2005, is a consolidated *cluster* that boosts the competitiveness of this sector.

9.3.2. SWOT analysis

SWOT Analysis in the Automotive and Autoparts Area of Nuevo León

STRENGTHS

- The state has a large industrial infrastructure (assembly plants and *Tier* 1, 2 and 3), higher education institutions, research centers and automotive *cluster* associations.
- Unbeatable geographic location with respect to the North American market. Its participation in this market as a supplier continues to increase.
- The state has an extensive communications infrastructure that allows for efficient logistics and trade processes (ports, railroads, highways and means of distribution).
- Industrial *clusters* have been developed that make production more efficient and allow processes to be completed on time, reducing costs.
- The organization and recognition of CLAUT.
- Existence of a technology park (PIIT) with important capabilities for the automotive industry.
- Existence of human resources training and research programs relevant to the sector.
- Young human resources (technicians and engineers).

OPPORTUNITIES

- The educational platform that has been created for the Automotive sector.
- Increased federal resources for research and innovation.
- The installation of a new Mexican-owned assembly plant in Nuevo León.
- Existence of industrial relations networks that are highly relevant to the automotive industry.
- Tooling manufacturing cuts across several industries, so the capabilities of this industry can open up markets in other sectors.
- Increasing demand for services from value-added suppliers for *Tier* 1 in specialized maintenance services (e.g. electromechanical, mechanical press repairs, pneumatics, among others).
- Unbeatable geographic location with respect to the North American market.
- Growing domestic demand for automobiles.
- Significant enrollment of engineering students who can later specialize in some relevant areas in the short term (mechatronics, mechanics, electronics).
- Existence of funds that promote linkages between industries or between academia and industry for the development of technological projects.

WEAKNESSES

- Lack of capabilities for the design of production processes (with advanced manufacturing) of new products in *Tier* 1 and 2 companies.
- Lack of greater investment in research and development by companies in the sector.
- Insufficient and short-term incentives for innovation.
- For some equipment and processes, greater specialization is required, especially in areas where the supply of Mexican technicians is currently insufficient or does not exist in the local market (for example, auto parts design and design of production processes with advanced manufacturing).
- The decisions of the tractor companies are taken from outside the country, including investment decisions for technological development projects.
- A large number of the parts currently supplied to *Tier* 1 companies in the state contain a lot of material and little added value, which is why there is usually a price fight to the detriment of the companies in the sector.
- One limitation for the development of small and medium-sized companies to position themselves as suppliers in the sector is the lack of compliance with certifications.

THREATS

- Aggressiveness of Asian countries to win markets.
- Appearance of new foreign competitors.
- Competition from other states for resources for innovation and investment.
- Speed of technological change.
- There is a high dependence on imports (currently more than 60% of inputs and intermediate products for vehicle assembly are imported).
- Variations in international demand are a constant risk for the domestic automotive industry.

Source: CamBioTec, A.C., with information provided by the Automotive cluster.

9.3.3. Specialization niches

CLAUT is currently working on the identification of productive processes and core technologies of the companies in the *cluster*, as well as on the creation of an inventory of specialized equipment and machinery in the state, with the objective of identifying what equipment exists, which company or institution has it and which does not. This serves as a tool for identifying needs and promoting inter-company linkages (generating technological extension networks).

In addition, the state has worked on the development of strategic human capital with the creation of two postgraduate programs in local universities that offer a degree in automotive design engineering and a diploma in product design.
In spite of these advances, it has been identified that the most important challenges of the sector in the entity are:

- Consolidate human capital in automotive design engineering by means of projects in liaison.
- Develop *Tier* 2 suppliers that comply with quality standards and supply systems under a linked value chain approach.

In this context, the niche of specialization of the state of Nuevo León is the strengthening of intelligent linkages to take full advantage of active cooperation between companies, research centers, non-governmental organizations and public administration agencies at the state, national and, if possible, international levels.

9.3.4. Description of priority projects

9.3.4.1. Automotive Industry Intelligence, Training and Liaison Unit

9.3.4.1.1. Target

Create a unit to operate as a knowledge transfer office, to identify the needs and supply of services, and to manage the linkages between companies and providers of technological services and specialized technical training.

9.3.4.1.2. Justification

Nuevo Leon has a great academic infrastructure in different areas of the automotive sector; however, the main areas of opportunity show that the linkage between the organizations that make up the innovation ecosystem in the state could be further strengthened. In this sense, as a result of the consultations with *cluster* executives, it is proposed to create an Automotive Industry Intelligence, Training and Linkage Unit in the state.

The unit will promote a coordinated interrelation of industrial, academic and governmental support in the operational areas of the automotive sector, will permanently manage the requests for interrelation between the members of the automotive industry and the governmental support in the operational areas of the automotive sector.

innovation system, through the mastery of the strengths in technological infrastructure and technical human capital of the sector in the state.

The organization will seek to increase the productivity of the sector by facilitating national and international linkages to generate new innovation projects, making efficient use of the infrastructure and human capital of navies, suppliers (*Tier I*), schools and technology centers, as well as universities and governmental support.

9.3.4.1.3. Brief description

An organization supported by CLAUT is proposed, which will promote the linkage between industry specialists, students, professors and researchers that make up the academic community and the national science and technology system. In these projects, the Intelligence Unit will manage the most appropriate solutions for each case and will be characterized by its clear orientation to results.

A unique attraction of the Intelligence Unit is that it will be responsible for carrying out periodic studies to identify the most relevant technological trends for the development of the sector, an activity for which it will have to develop human and IT infrastructure capabilities to carry out foresight and technological surveillance studies, which will provide the basis for decision-making by the state's automotive sector.

In particular, for the identification of technological trends, it is advisable for the Intelligence Unit to link up with international organizations that already have extensive experience in this area and in the automotive sector, including, for example, the Observatory for Industrial Technology Foresight (opti), an institution that works in a network with different academic and business organizations.

In the context of linkage between state entities, the areas of greatest interest to be promoted by the Linkage Intelligence Unit are:

- Technological development projects that generate human capital in the following areas:
  - Design and development of precision tooling (geometric tolerances), analysis *software* (finite element and others), product quality planning and product developers.
  - Manufacturing in production cells, design of manufacturing processes for the manufacture of new products and scaling up of manufacturing processes for specialized mechanical parts.
  - Sheet metal forming in hard dies (stamping, deep drawing) with the analysis of friction between tools and sheet (punch-mine, sheet-matrix and presser-foil), wear due to contact surface with tooling, displacements and elasto-plastic deformations.
  - Design and manufacture of injection molds and tools.
  - Management of quality management systems such as *Ad- vanced Product Quality Planning* (apqp), Failure Mode and Effect Analysis (amef) and knowledge of ISO 16949, among others.

- Development of projects with shared infrastructure, experimental testing laboratories (static and dynamic)

  The company is also involved in the development of new products (e.g., chemical and chemical components), production lines, test cells and validation of different processes and components in the automotive industry.
- Development of virtual simulation projects, development of new components, modules and subsystems.
- Nano-coatings to prevent corrosion and extend the life of auto parts.

Thus, the mission of the Intelligence Unit should be to make its resources available for the promotion and consolidation of networks, establish transformational links, open shared institutional spaces and contribute to the formation of innovation projects as axes for leveraging the economic development of the sector.

Among the tasks of the Intelligence Unit will be to support technical schools, technological institutes, universities and companies with funds to reduce training costs, train specialized and high-level technical talent (postgraduate degrees), such as tool technicians, and promote research stays to apply and adapt technologies in *Tier* 2 and 3.

The Intelligence Unit shall also be the mechanism to generate a network of contacts between Chambers and business associations. In addition, it will promote consultants in technological transfer and knowledge management in the automotive industry. The Unit will be in charge of providing seminars on technological management to companies in the sector.

9.3.4.1.4. Critical success factors

The critical factors for the success of this project have to do with generating an adequate and strict policy regarding the handling of information (with the objective of protecting companies from undesired outflows of information). Another aspect to consider is the adequate training of specialists for the operation of funds, promotion of linkages and technological managers specialized in the automotive sector production chain. It will also be critical to manage an adequate promotion of a culture of linked work between industry and research centers and integration with the governmental sector.

In addition, CLAUT's success is due to the fact that
project leadership and that the project is executed in es

The company has a close collaboration with universities and research centers.

Nuevo León has a wide range of services with the capacity to assist other companies in specific areas.

The challenge is to link the knowledge developed The challenge is to link the knowledge developed by the state's universities and the private sector, in order to solve more efficiently the specific needs of other companies.

9.3.4.2. Program for the development of specialized suppliers in the automotive sector in Nuevo Leon.

9.3.4.2.1. Target

Identify and organize potential chains formed by a client company (OEM or *Tier* 1) and potential suppliers, under a value chain approach:

- Conduct an analysis of the potential market for products in various niches along the production chain.
- Develop an analysis of the critical points demanded by the products (quality, delivery and payment conditions, production size, etc.).
- Analyze the services developed by the companies that are candidates for integration into the chain.
- Carry out a prospective study of the chain and a comparison exercise between supply and demand.
- To train specialized human resources, specifically tool and die makers who can be integrated as labor force in the value chain of the automotive industry.

9.3.4.2.2. Justification

The productive chain of the sector in Nuevo Leon is interested in working with increasingly competitive suppliers (machinery and equipment), with low costs and high quality. There is interest mainly in Tier 1 companies in developing new national suppliers that meet these characteristics and the required certification procedures.

It can be considered that there is an adequate level of infrastructure, as the state has a wide variety of infrastructure, including of companies (micro, small, medium and transnational) that carry out economic activities relevant to this industry.

Among the challenges to be faced by companies interested in joining the sector are the following:

1. To ensure that SMEs (*Tier* 1 and *Tier* 3) have the strategic resources to compete in markets with growing demand and thus comply with standards and supply quality systems. A relevant factor is to have comprehensive support for compliance with technical specifications, standards and various norms.
2. The scarcity of innovation and technological specialization in the sector's processes and products, caused by the segregation of the market in which they participate and the lack of interest in assuming the risk of participating in new markets. Efforts to generate technology in the sector's companies are isolated cases that do not respond to a strategic conception or innovation system. In addition, there is a lack of coordination between educational institutions and companies.
3. To have human resources at a technical level such as toolmakers for the design and development of tools in areas such as forging, materials and surfaces.

9.3.4.2.3. Brief description

To encourage the entry of new companies into the automotive production chain, it is advisable to start in segments with well-defined needs, identifying where specialized suppliers capable of meeting specific expectations (market niches) are required. In this sense, it is

One area of opportunity is the *insourcing* of specialized maintenance services in areas such as electro-mechanics, mechanical press repairs, pneumatics, surface treatment, material hardening, among others.

The program for the development of specialized suppliers in the automotive sector in Nuevo Leon should identify and organize potential chains formed by a client company (OEM or *Tier* 1) and potential suppliers, under a value chain approach, for which it should:

- Conduct an analysis of the potential market for niche products along the production chain.
- Develop an analysis of the critical points demanded by the products (quality, delivery and payment conditions, production size, etc.).
- Analyze the services developed by the companies that are candidates for integration into the chain.
- Carry out a prospective study of the chain and a comparison of supply and demand, as well as a product promotion program.
- Integrate specialized educational schemes to create a workforce at the bachelor's degree level and in technical education, which will make it possible to provide adequate human resources for the automotive production chain.
- Support companies to achieve certification as reliable suppliers to the industry.
- To support technological institutes and schools at the technical level in the training of human resources in areas such as forging, materials and surfaces, as well as tooling and electronics technicians.
- Generate linkage and collaboration schemes, not only with universities but also with schools and technological institutes for the training of technical human resources needed in the sector's value chain.

In parallel with the programs to promote supplier integration, it is necessary to provide small and medium-sized companies with IT tools that generate greater returns in its operation and offer continuous training mainly focused on the following areas:

- Product quality
- Timeliness of delivery
- Assimilation and adaptation to customer operations
- Value chain integration
- Certification of personnel and processes

The program should provide SMEs with different support tools that will enable them to increase their productivity and compete under better conditions in the sector's global markets. The program should promote business contacts between large companies and SMEs in areas where they are competitive, as well as promote strategic alliances between them to consolidate the productive chain.

9.3.4.2.4. Critical factors for the success of the project are:

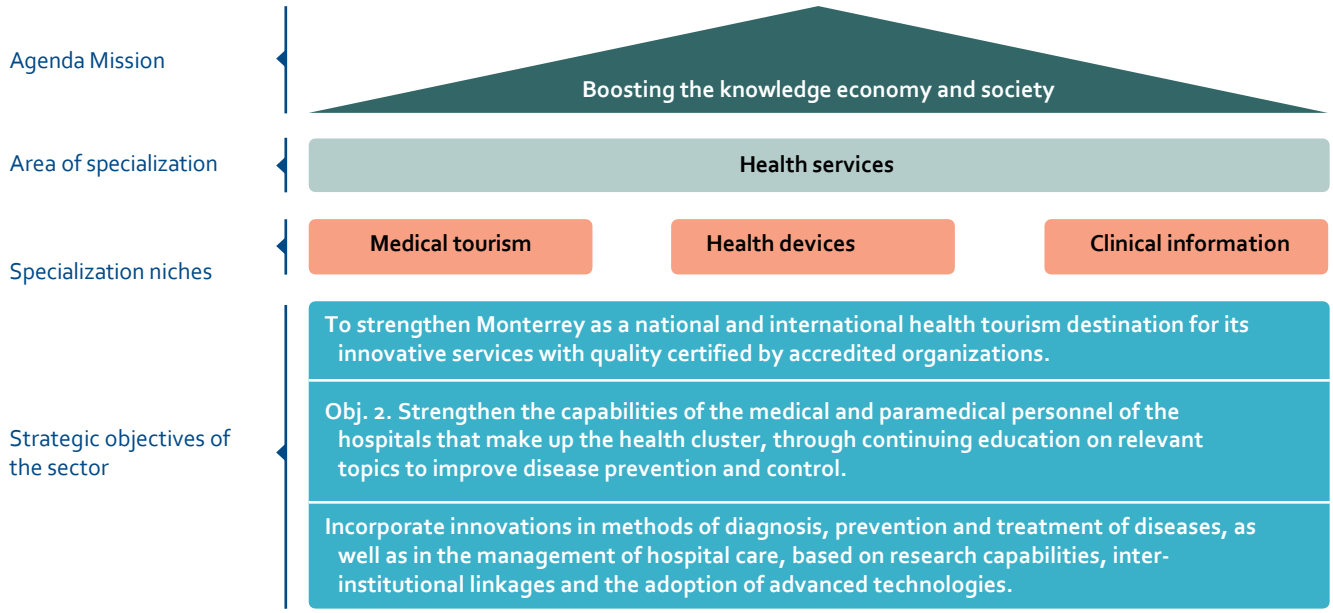
- Obtain support from the public and private sectors for company certification.
- Identification of priority technological areas within the sector.
- Simplify the granting of funds for the technological development of the industry.
- Promote the scientific and technological development of the manufacturing sector in secondary services such as electro-polishing, electrolytic processes, surface treatment, hardening of materials, molds, dies, tooling, among others.
- Promotion of a culture of work linked between industry and research centers and integration with the governmental sector.
- Involve schools at the technical level to create appropriate curricula and programs for the training of toolmakers, toolmakers and electronics technicians.

9.4. Health Services

The sector is framed within the area of life sciences and integrates the services offered by social security institutions and private institutions, dedicated to offering health services whose impact covers both citizens and the general public.

The Company's operations are aimed at Mexican nationals and residents of the U.S. border areas such as Texas, Arizona and California, as well as other countries such as Canada and Europe.

lustration 29 . Outline of the sectoral strategic framework of Servicios de Salud de Nuevo León.



Source: CamBioTec, A.C., with information provided by the Health Cluster.

9.4.1. Brief description of the area of specialization

Mexico's health care system is composed of two sectors: public and private. The public sector comprises social security institutions that provide services to workers in the formal sector of the economy and institutions that protect or provide services to the population without social security. The private sector provides services to the population with the capacity to pay.

Social security institutions are financed from three sources: government contributions, employer contributions, and employee contributions. These institutions provide their services in their own facilities and with their own personnel. Finally, the private sector is financed by user payments.

The company offers services in private offices, clinics and hospitals (Gómez Dantés, Sesma, Bece- rril, Knaul, Arriola and Frenk, 2011).

In Nuevo León, the necessary infrastructure and capabilities have been generated to offer specialized health services through private units. This area has achieved consolidation and currently attracts patients from different regions. In addition, it generates highly qualified jobs, both in the hospital units and in companies that provide high value-added goods and services. There is a *cluster* of Specialized Medical Services and Health Sciences in the state, which was founded in March 2005.

9.4.2. SWOT analysis

Table 8. SWOT Analysis in the Health Area of Nuevo León

STRENGTHS

- There is a specialized *cluster* that brings together recognized and certified hospitals, higher education institutions and research centers.
- Close links between companies and academic centers linked to the *cluster*.
- Strong training programs for general practitioners and specialists.
- Recognition of the quality of medical services.
- Identification as a medical tourism destination by the Ministry of Tourism and ProMéxico.
- Existence of innovative companies that develop technology relevant to health.
- Prestige of Monterrey as a center for quality medical services.

OPPORTUNITIES

- Its proximity to the United States represents an opportunity to attract medical tourism, as well as alliances to promote student mobility and generate highly trained human resources in the area and to carry out joint research projects.
- The expected growth of the national budget for research, development and innovation.
- The priority nature of health in the National Development Plan.
- Promotion by federal institutions to attract medical tourism.
- The demographic and epidemiological profile of Mexicans that defines important challenges for medical care.

WEAKNESSES

- Little attention and funding for research projects.
- Low coordination among hospitals to develop common care schemes and research programs.
- High turnover of nursing staff due to uncompetitive salaries and lack of recognition.
- Lack of a continuing education program to re-skill and update medical and paramedical personnel.
- Problems in the implementation of certification programs that cause additional costs.
- Lack of integration of information technologies in aspects such as the management of clinical records.
- Deficiencies in the promotion and dissemination of services.

THREATS

- Competition from other Mexican states and countries that actively promote medical tourism.
- The rate of innovation in the sector that determines the need for continuous change.
- Deficiencies in personnel training programs for the sector.

Source: CamBioTec, A.C., with information provided by the health cluster.

9.4.3. Specialization niches

The main development areas under consideration are:

- Generate information technology (IT) strategies to integrate and standardize IT processes, including the development of an electronic platform for clinical records management.
- Promote the certification of hospital units in the *cluster* as a mechanism for attracting national and international medical tourism.
- Strengthen continuing education programs in order to support the training of hospital care personnel and thus make Nuevo León a national benchmark for specialized training.
- Launch a research and innovation program to improve current services and incorporate new specialties such as the treatment of chronic patients, geriatric patients and those with pain conditions.

9.4.4. Description of priority projects

9.4.4.1. Definition of an electronic medical record in the state at the conceptual level and criteria for its operation

9.4.4.1.1. Target

Design a format with standardized elements and fields that will allow for the interoperability of the clinical records currently used by the institutions integrated into the health *cluster.*

9.4.4.1.2. Justification

At the consultation workshop for the preparation of this Agenda, there was consensus on the priority of developing and adopting an electronic clinical record to share information and knowledge for the coordinated delivery of integrated health services, as well as for appropriate decision-making for the benefit of patients.

Previous efforts have already been made in the state by the sector with the support of the United States-Mexico Foundation for Science (fumec) to achieve an integrated system. However, these efforts have been limited because the state's hospital companies already have different computerized tools for managing their clinical records, so it is necessary to focus on the design of a format and a scheme to support the interoperability of the existing solutions.

This project will have a transversal character with respect to the *software* cluster in the state of Nuevo León, in which we will work jointly in its development and implementation.

9.4.4.1.3. Description

According to nom-024-ssa3-2012, an electronic clinical record is the "Patient-centered set of information stored in electronic media that documents the medical care provided by health professionals in accordance with health provisions, within a health facility.

An electronic health record is an Electronic Health Record Information System which, in turn, is an "information system that makes it possible to capture, manage and exchange structured and integrated information from the clinical record, as well as geographic, social, financial, infrastructure and any other type of information that documents the medical care provided to a single individual and/or the installed capacity of health facilities. The information generated by these, together with the information contained in the National Health Information System, is integrated into the National Basic Health Information System.

The aim is to develop a standardized format and a system for the

This requires an information technology infrastructure and a specific administrator that could be assigned to the *cluster* or to a n institution nominated for this purpose.

It is proposed that the project be coordinated by the Tecnológico de Monterrey, in view of its IT development capabilities, with the support of the hospitals participating in the *cluster*.

It is essential to decide who will be in charge of the system's administration, as this is a critical function in ensuring coordination among hospitals.

The project should operate ideally among the health and *software clus- ters* in the state of Nuevo León and it is planned that in this first phase it will be possible to define the criteria for its implementation.

9.4.4.1.4. Critical success factors

- Integration of collaboration between the health clusters and the health state *software.*
- Conclusion of a *cluster* agreement for the execution of the project and the implementation of the result.
- Strict adherence to the relevant regulatory framework.
- Designation of the technology development project coordinator and system administrator.
- Design of public policies to adapt pre-existing systems, regulations and legislation, as well as security.
- Agree on the standardized clinical record format to be used.
- Monitor the compatibility of systems and infrastructure of participating hospitals.
- Financial support from the participating hospitals, with complementary resources that may come from the Innovation Stimulus Program (the project would have to be promoted by one of the companies in the *cluster*) with linkages.
- Contemplate an implementation monitoring and evaluation program.
- To achieve the integration of the public health sector into this project.

9.4.2.2. Program to support the certification of health tourism services

9.4.2.2.1. Target

To support hospital institutions in complying with the standards of the National Certification System for Health Care Establishments (sinaceam) in order to strengthen their competitiveness in attracting patients from other regions.

9.4.2.2.2. Justification

The objective of sinaceam is to contribute to the continuous improvement of the quality of health care services and the safety provided to patients, as well as to encourage participating institutions to maintain competitive advantages that will enable them to achieve, sustain and improve their position in their field.

In this context, the Certification of Health Care Establishments is the process through which the Health Care Council (Consejo de Salut

The General Hospital recognizes health care facilities that participate on a voluntary basis and meet the standards necessary to provide good quality health care and patient safety.

According to the Consejo de Salubridad General (2012), "the competitive advantages acquired by a facility upon certification" are the following:

- Demonstrates compliance with standards based on patient safety, quality of care, hospital safety, current regulations (except those related to finances) and priority national health policies.

- Evidences the commitment to continuous improvement with the patient, his/her family, the unit's personnel and society.

- It reinforces your institutional image, since certification, being an external evaluation, demonstrates to patients, family members, physicians and the public that your organization works with the highest quality standards.

- Proof that your hospital is internationally competitive.

- Preferably it will be considered for the assignment of trainees.

In the case of private hospitals, they can:

- To be part of a Specialized Health Insurance Institution (ises).

- To have the recognition and business with an insurance company.

- Participate in the bidding processes for health care services called by the Public Administration in any order of government.

- They may be incorporated into the national Medical Tourism strategy.

9.4.2.2.3. Description

This is a program that includes sensitization and training of managers and key personnel of *cluster* hospital institutions and other medical service providers, to induce their participation in voluntary sinaceam certification.

The Sinaceam hospital certification standards (2012 version) consist of three sections, the first of which covers the international goals for patient safety, the second of which covers the international goals for patient safety, the second of which covers the international goals for patient safety, the third of which covers the international goals for patient safety and the third of which covers the international goals for patient safety.

The second, patient-centered standards, and the third, standards focused on the management of the health care facility.

International patient safety goals identify high-risk areas in hospitals and describe solutions based on evidence and expert knowledge.

The international goals for patient safety are:

- Correctly identify patients
- Improve effective communication
- Improving the safety of high-risk drugs
- Ensuring surgeries in the right place, with the right procedure and on the right patient
- Reducing the risk of healthcare-associated infections
- To reduce the risk of harm to the patient from falls

The patient-centered standards cover the following sections:

- Access and continuity of care
- Patient and family rights
- Patient evaluation
- Ancillary diagnostic services
- Patient care
- Anesthesia and surgical care
- Handling and use of medications
- Patient and family education

The management-focused standards cover the following areas:

- Improving quality and patient safety
- Infection prevention and control
- Governance, leadership and management
- Facility management and safety
- Staff qualifications and education
- Communication and information management

Medical, nursing, logistics and administrative personnel should be involved in the training and development of best practices.

9.4.2.2.4. Critical success factors

In order for this program to function properly and meet its objectives, the following is required:

- Coordination of the project by the Health Cluster.
- Technical leadership of the project by the Autonomous University of Nuevo Leon through its School of Medicine.
- Technical supervision of the program by the Secretary of Health of the State of Nuevo Leon.
- Formalization of collaboration agreement with the Consejo de Salubridad General and the Comisión para la Certificación de Establecimientos de Atención Médica.
- Program funding from other federal, state and municipal programs.
- Inclusion of all types of personnel in the training process.
- Development of standardized documentation systems for medical procedures and patient care schemes.

9.4.4.3. Continuing education program for physicians and paramedics

9.4.4.3.1. Objectives

Establish Monterrey as a national benchmark for the education and training of medical and paramedical personnel, taking advantage of the capacity and experience of the institutions linked to the *cluster.*

9.4.4.3.2. Justification

The sectoral workshop identified the opportunity for the *cluster*'s academic and hospital institutions to develop a program to train physicians, nurses and support personnel from all over the country, in order to share methodologies, procedures and advanced techniques. This form of collaboration with institutions from other entities would consolidate the national leadership of the *cluster* and open up future avenues for inter-institutional cooperation.

9.4.4.3.3. Description

With the leadership of the *cluster* and the active participation of the Uni- versidad Autónoma de Nuevo León, the Tecnológico de Monterrey and the Universidad de Monterrey, a program will be designed for the development of the cluster.

The company has a continuing education program based on the competencies required by physicians, nurses and support staff to ensure the quality of services in other institutions.

The Program includes the possibility of visits by personnel from institutions of other entities to the facilities of the *cluster*'s member organizations so that relevant knowledge can be transferred and, subsequently, to exchange experiences with such personnel.

A mechanism should be created to disseminate the program and attract students from all over the country, taking advantage of the prestige achieved by the group of institutions that make up the *cluster*.

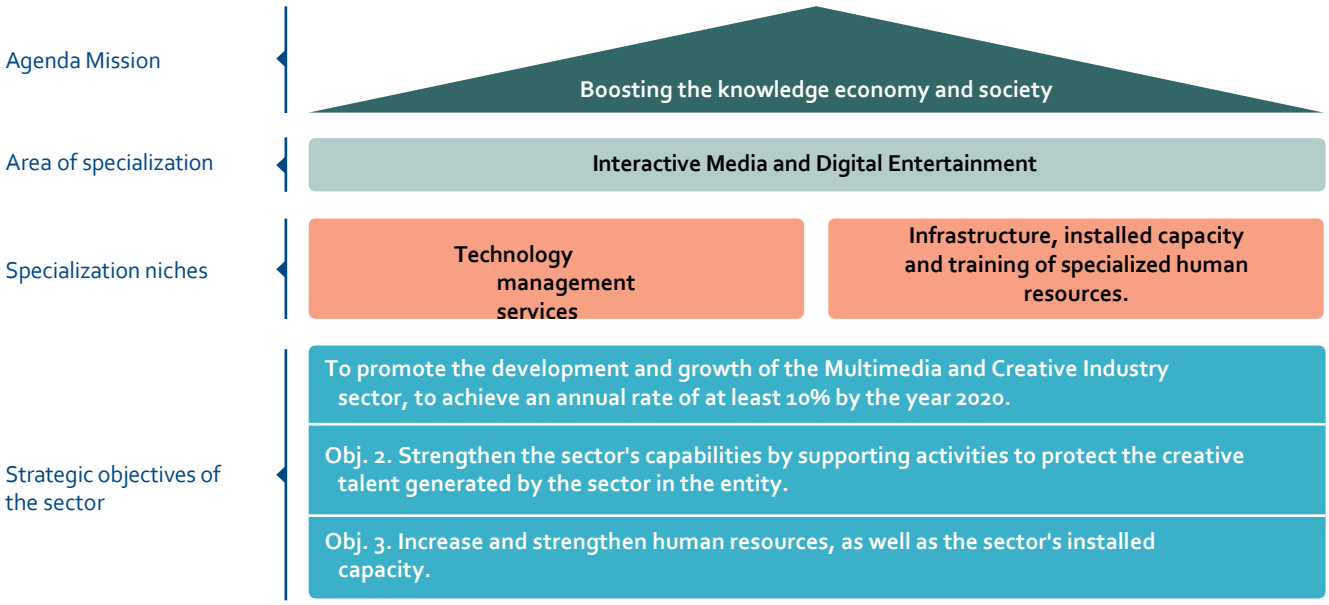
9.5. Interactive Media and Entertainment

Of the strategic economic sectors in the State of Nuevo León, the Interactive Media and Digital Entertainment Industry offers great potential. This sector includes the development of video games, 2D and 3D animations, Web 2.0 services, digital marketing, development of interactive applications for instructional purposes (*e-learning*), as well as the development of interactive media.

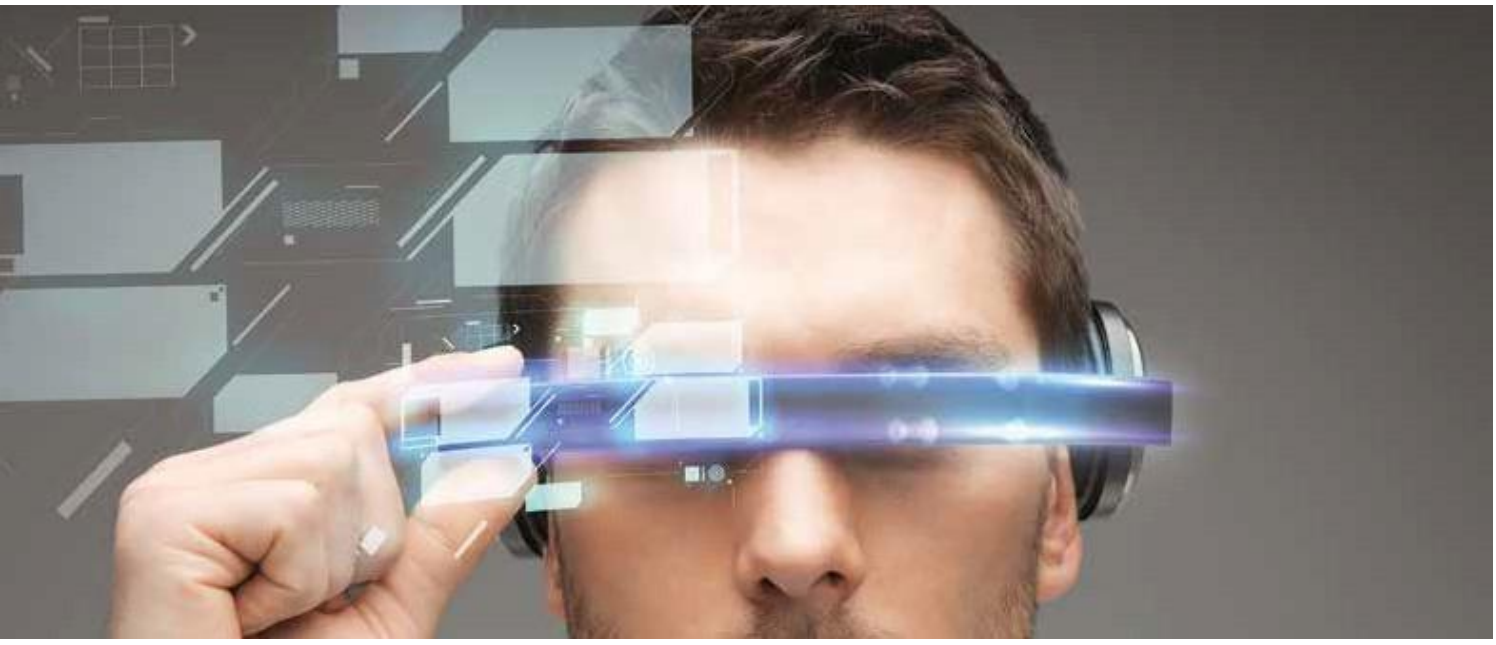
development of digital entertainment projects that involucran audio and video services.

It should be noted that, in Nuevo León, the Creative Industries sector has the *Monterrey Interactive Media Cluster* (mimec), which was founded in April 2013.

Illustration 30. Outline of the strategic sectorial framework for Interactive Media and Entertainment in Nuevo León.



Source: CamBioTec, A.C., based on Monterrey International Media & Entertainment Cluster, (2013).



9.5.1. Brief description of the area of specialization

The Interactive Media and Digital Entertainment industry has its origin in the Creative Industry, which produces, distributes and markets goods with a dual composition: tangible and intangible. The United Nations Educational, Scientific and Cultural Organization (unesco) defines Creative Industries as: "productive sectors where creation, production and commercialization of goods and services are combined". Since they make use of Information and Communication Technologies (ict), there is a demand for certain specialized skills to foster innovation and competitiveness.

From an economic perspective, the creative economy has been growing at an accelerated pace in most of the world's economies, contributing about 8% of the annual income of the world economy in 2010 (unctad, 2011).

The definition of Creative Industries varies geographically, in the United States creativity is market and consumer oriented, while in Europe it is more related to traditions of national culture and cultural citizenship (two extremes: consumer and culture). Depending on the approach, they can also be referred to as cultural industries, especially in Europe, or as creative economy (ProMéxico, 2013).

The Interactive Media and Digital Entertainment Industry extends to a large number of areas that are of political responsibility and government administration. It obviously influences economic development, regional growth, job creation, foreign investment, etc. However, the sectors with which it has the greatest in- teraction are:

- Trade: Creative goods and services comprise an important element in international trade, which is under the political supervision of the ministries of trade, foreign affairs and international relations.

- Technology and communication: Extensive links with new communication technologies, telephone services, Internet, broadband, satellite communications, among others.

- Tourism: In a considerable number of countries there is a close association between the Creative Industries.

- Education: Training for the Creative Industries workforce is a topic of growing interest, as is the expansion and evolution it develops.

9.5.2. SWOT analysis

Table 9. SWOT Analysis in the area of Interactive Media and Digital Entertainment of Nuevo León

STRENGTHS	OPPORTUNITIES
• There is human capital, physical infrastructure and oriented technology. • International agreements, as well as government incentives and support to obtain resources to boost the sector's competitiveness. • Existence of companies organized around the *cluster,* in which organizations responsible for the training of qualified personnel also participate.	• Increasing demand for products and applications in this industry. • Expansion of the telecommunications infrastructure, as well as the supply of advanced equipment and *software.* • Increasing availability of resources for innovation in the country. • Vocation of young people to create companies related to the sector.
WEAKNESSES	**THREATS**
• Lack of an industrial policy to promote and provide guidance for the development of the sector. • Lack of agile talent training schemes adapted to the needs of the creative industry. • Lack of an intellectual property protection strategy.	• Vertical structures within the sector that inhibit fair competition. • There are no specialized funds for the development of the Creative Industry. • High international competition.

Source: CamBioTec, A.C., based on Monterrey International Media & Entertainment Cluster (2013).

9.5.3. Specialization niches

As part of the consultation work with relevant stakeholders, it has been indicated that for the next five years, the technical and professional staff of the Creative Media Industry in the region should be channeled and developed according to elements such as strengthening self-learning, work and collaboration skills, global vision with local work capabilities, among others (Monterrey International Media & Entertainment Cluster, 2013).

Another of the main needs identified in the area of specialization is to have a unit to provide support, specialized advice and guidance on intellectual property matters, which will allow us to enhance the opportunities and creative talent generated in the state.

Therefore, the niches identified are:

- Technology management services
- Infrastructure, installed capacity and training of specialized human resources

9.5.4. Characterization of unique projects and project plan

9.5.4.1. Creation of the Intellectual Property Protection Unit for the Creative Industry

9.5.4.1.1. Target

Strengthen the use of the products and knowledge generated by the Creative and Multimedia Industry in the state, through the generation and protection of the intellectual property of this sector in the state.

9.5.4.1.2. Description

Integration of a center that provides support to the Creative Industry for the design of intellectual property protection strategies.

Nuevo León's creative industry requires an office that provides support and advice on the integration of intellectual property protection strategies that are The state generates in the state, not only from the perspective of copyright, but in an integral manner in schemes that involve the different figures.

9.5.4.1.3. Critical factors for project success

In order to carry out a project of this nature, it will be necessary to begin by promoting intellectual property among the companies in the sector, as well as to integrate a proposal that highlights the importance of the problems in the sector and defines the characteristics of the services, the unit's operating model and its financing scheme.

9.5.5. Creation of a multimedia development center with shared infrastructure

The project seeks to strengthen the sector's installed capacity and implement mechanisms to support the development of specialized human resources.

9.5.5.1. Target

To provide a collaborative space with a flexible training environment for young university graduates, oriented to the needs of the industry.

9.5.5.2. Description

Integration of a center that operates under the following four fundamental creative production lines:

- An inverse virtual reality system, with 3D vision systems.
- A motion capture area with *hardware* (cameras and equipment) and *software* for digital manipulation.
- Design and animation work center.
- Editing and post-production center.

This center should have and offer the industry, within a university, the infrastructure capabilities in creative production, but at the same time it should serve as a training space for specialized human resources.

Internationally, there are various models for operating this type of center, so a detailed analysis of these should be carried out in order to identify the best model and the most appropriate institution for their administration.

9.5.5.3. Critical factors for project success

It is necessary to count on the support of the *cluster*'s member companies, but above all, on the committed support of the state and federal governments.

It will be essential to have a business plan that integrates the needs, characteristics and operating mechanisms that establish clear rules as well as the impact it can have on the industry and the state's economy (feasibility analysis).

Identify appropriate space for implementation. Additional strategic projects identified.

9.6. Complementary strategic projects of the *clusters*

As part of the field work carried out with the Management Committee and the Advisory Group (*Cluster* Council), the following were identified additional projects were identified for each *cluster*, which are presented below.

9.6.1. *Cluster:* Aerospace. Strengthening of the supply chain for the Aerospace Industry through a program to of certified supplier development

9.6.1.1. Target

To develop certified suppliers for the Aerospace Industry through training and technical assistance for compliance with industry standards.

9.6.1.2. Justification

Most of the companies in the state are specialized suppliers of specific non-complex components (Tier 2); their activity has to do with the assembly of components and the manufacture of parts. They are large maquiladora companies, intensive in employment generation, however, they are not in the first level of supply, a situation that reflects the limited capabilities of the Aerospace Industry in the state.

The companies in the sector do not compete for national, regional or local market niches, but rather in global markets, where the products they manufacture must meet the following requirements with strict quality standards and product and process certification. In order to increase the integration of companies into the supply chain, it is necessary for them to achieve the certification of processes and competencies required by the sector's driving companies. This makes it imperative that there be a program to support supplier certification.

9.6.1.3. Brief Description

The program should provide SMEs with different support tools to enable them to compete under better conditions in the sector's markets. It should also provide ongoing training and promote economic facilities (public-private partnerships) for companies that are candidates for integration into the sector. Support should be in at least the following areas: iso 9001, iso/ts 16949, as9003 and as9110.

9.6.2. *Cluster:* Agroindustrial. Technological development network for integrated water management.

9.6.2.1. Target

Create an inter-institutional collaboration network to develop and transfer technologies for integrated water management in the agricultural sector.

9.6.2.2. Justification

The north of the country is one of the regions suffering from water scarcity, mainly due to factors such as lack of rainfall, inefficient use, pollution and overexploitation of water resources.

The cluster members identified the need to create a comprehensive program with the collaboration of experts in natural resource management, to develop a set of competencies for the sustainability and management of natural resources, in order to develop a set of competencies for the sustainability and management of natural resources. For these reasons, meetings with *cluster* members identified the need to create a comprehensive program with the collaboration of experts in natural resource management, to develop a set of competencies for the proper maintenance and use of water resources.

The program aims to create comprehensive strategies for the

management of the entity's water. The use, needs and quality of the resource will be analyzed in an interdisciplinary manner. Research, technological development and training of human resources in the optimal use of water will be carried out. This will promote the integrated and sustainable use of watersheds and aquifers, as well as the improvement of water productivity in the agricultural and livestock sectors. An important part of the program will be to promote the reconversion of crops based on water availability.

9.6.2.3. Brief Description

The aim is to identify the institutions with the required capacities and to generate a scheme and incentives for collaboration.

The company's mission is to create and disseminate methodologies, technologies, advisory services and training for the best use of water in agri-food production, highly efficient irrigation systems and integrated crop management programs that optimize water requirements.

The network will seek to develop an integrated technological program that will provide strategies in accordance with the characteristics of the state for integrated water management, promoting research and collaboration in irrigation, water harvesting, water saving, recycling, treatment and reuse.

9.6.3. *Cluster:* Agroindustrial. Safety in Nuevo León's agroindustry.

9.6.3.1. Target

Create a specialized program to develop research, technology transfer, training and innovation in food safety with the implementation of contamination risk reduction systems and good practices programs in agri-food production.

9.6.3.2. Justification

Agri-food products produced in the region require certification to ensure that they are safe and of high quality in order to have a better chance of entering international trade. Safety is a key element for this to happen because it is the most important attribute in agri-food production, and also represents a guarantee of safety for consumers. This generates the interest of the actors belonging to this area of specialization in creating a food safety center that offers them the opportunity and security to increase and improve the quality of agri-food products with an interest in expanding their markets.

9.6.3.3. Brief Description

This program seeks to create a technological support system for agricultural and agroindustrial producers through the strategic implementation of a model of continuous improvement and technical assistance aimed at improving processes, agricultural practices and methods for ensuring the quality and traceability of these products, in order to comply with national and international market regulations regarding safety, quality and innocuousness.

The following critical factors must be considered for the success and smooth operation of the program:

- The adoption of good practices in the agricultural and livestock production process.
- Develop and disseminate integral technological packages to certify the quality and safety of relevant agroindustrial products.
- Optimization of production processes.
- Programs and regulations for the improvement and management of quality, traceability and safety.

9.6.4. *Cluster:* Household appliances. Energy efficient equipment development program

9.6.4.1. Target

Develop technologies and components that lead to overall energy savings in household appliances.

9.6.4.2. Justification

The requirements of consumers of household appliances are closely associated with the following aspects:

- Cost savings in operation, which has a lot to do with energy savings.
- Concern for environmental sustainability, so greater efficiency is demanded.

According to data from the Federal Electricity Commission (Comisión Federal cfe), as of June 2014, the State of Nuevo León was the entity with the second highest consumption of electricity, only behind the State of Mexico, and in 2011 and 2012, it ranked first in the country in consumption of this resource (cfe, 2014).

This is due to its extensive industrial and manufacturing development, where the branches of this sector (steel, cement, chemicals, glass, among others) use electricity intensively, but also because of the intensive use of refrigeration and air conditioning.

All of the above has led the *cluster* to identify the development of highly energy-efficient equipment as a priority, which requires research into better insulating materials, energy conversion systems and industrial design.

9.6.4.3. Brief description

This is a program to promote cooperative research between companies and research institutions in the areas of new materials, electrical and electronic systems, instrumentation, control and industrial design that will lead to the reduction of energy consumption in air conditioning, refrigeration, stoves and washing machines.

9.6.5. *Cluster:* Energy. Program for the development and dissemination of technology for the use of renewable energies.

9.6.5.1. Target

Develop a program for research and implementation of technologies for the use of renewable energies, both in the public and private sectors.

9.6.5.2. Justification

Due to Nuevo Leon's high energy consumption, as mentioned in section 9.6.4.2 of this document, the importance of having sustainable energy generation systems that allow the state's industrial activity to improve its efficiency levels and increase its sustainability in economic development is evident.

9.6.5.3. Brief description

According to the Energy Sector Plan of the State of Nuevo León 2014-2015, the aim is to generate and promote synergies between academic and research institutions and local companies for the development and implementation of technologies for the evaluation of potential, energy generation, interconnection with the electricity grid and use of renewable sources.

The Program can capitalize on the opportunity represented by the federal initiative to create the Mexican Energy Innovation Centers (cemies), which form collaborative networks for the development, transfer and implementation of solar, wind, geothermal and biomass energy technologies.

9.6.6. *Cluster:* Logistics and transportation. Vehicle and cargo monitoring system

9.6.6.1. Target

To have a statewide cargo monitoring system to take advantage of the state's installed capacity, as well as to strengthen security schemes.

9.6.5.2. Rationale

In order to support logistics platforms, innovations are needed in at least the following areas, which are directly dependent on the development of ICTs:

- Optimization of transport operations: transport optimization, planning and control (tms).
- Electronic data interchange system - goods handling (edi).
- Material picking optimization system, extracting packaged assemblies from a superior unit (*picking* optimization).
- Radio Frequency *Identification* (rfid or *Radio Frequency Identification*).
- Global Satellite Positioning or satellite tracking of shipments (gps).
- Sending remote information from cargo vehicles.
- Optimization of distribution center operations and structuring of the distribution network: management of distribution centers (*Warehouse Management System* or wms); identification of merchandise via bar codes; warehouse automation; packaging of finished products; merchandise organization systems, etc.

9.6.5.3. Brief Description

This involves the development and/or assimilation of advanced cargo geopositioning technology, as well as the development of specific applications that can be disseminated among the companies in the *cluster*, generating positive impacts on costs, safety and reliability.

The aim is to start from internationally proven systems, using technology transfer mechanisms and, based on the technology acquired, to develop specific applications for the different users of the freight transportation network that are integrated into the *cluster.*

9.6.7. *Cluster: Software* (Information Technology). E-government technology development program

9.6.7.1. Target

Promote the adoption of better government practices through the use of ICTs to facilitate interoperability among the different government agencies, provide better service to citizens and adequately manage files and information.

9.6.7.2. Justification

The economic development of regions and countries is nowadays linked to the efficiency of administrative procedures at all levels and in all organizations, including governments. Thus, the ease of carrying out governmental procedures and processes and having easy access to public information depends to a large extent on the use of electronic means of communication.

technological tools that strengthen the state's operability, not only for operational efficiency but also for the reduction in the use of economic resources.

Therefore, there is a need for a strategy and an operating program that will allow the government of Nuevo León to streamline its operation, to the benefit of the population and the industrial sector.

9.6.7.3. Brief description

The aim is to promote an application development and training program to strengthen governmental capabilities in the use of ICTs to improve relations with citizens and governmental efficiency, thus generating more business opportunities for the companies in the *cluster.*

9.6.8. *Cluster:* Sustainable housing. Research network for the construction of popular eco-housing with sustainable materials and energy.

9.6.8.1. Target

Establish a network of public and private institutions in order to design affordable, sustainable housing adapted to the climatic conditions of the state.

9.6.8.2. Justification

According to the study entitled "La necesidad de vivienda nueva urbana" (nvnu), conducted by the Instituto del Fondo Nacional de la Vivienda para los Trabajadores (infonavit) and the Centro de Estudios Económicos del Sector Privado (ceesp), Mexico needs to build approximately 650 thousand new homes each year, of which infonavit should finance a maximum of 300 thousand homes. For this reason, in its 2012-2016 Financial Plan, this institution plans to grant approximately 300 thousand loans for new housing per year. According to figures issued by infonavit, as of August 2012, Nuevo León was the leading provider of new housing loans in the country; despite being the state with the least amount of housing subsidies proportionally received by its population, as it is a state with the least amount of housing subsidies, it is also the state with the least amount of new housing loans in the country.

(Cámara Mexicana de la Industria de la Construcción, 2012).

The *cluster* has identified that in order to respond comprehensively to this opportunity, the development of more sustainable technology that also offers economic solutions is required.

9.6.8.3. Brief description

The aim is to consolidate existing capacities in the state's institutions, encouraging research and collaboration between universities, research centers and companies to design affordable and decent low-income housing, using innovative materials, energy-saving strategies and renewable sources.

This will promote a research and technology transfer program that includes the development and testing of materials, bioclimatic architectural designs, as well as energy and water saving systems. Projects included in the program will be eligible for public and private financing.

9.6.9. Multi-cluster. Integration of a medical device design, incubation and testing center.

9.6.9.1. Target

Integrate a center for the design and testing of medical devices, with a technological platform capable of taking advantage of business opportunities by assisting both new and existing companies participating in this market.

9.6.9.2. Justification

According to data from ProMéxico (2011), during the last decade, the country has become one of the leaders in the manufacture and assembly of medical devices worldwide. In 2012, global production in the sector reached a value of 635 billion dollars (mmd) and it is estimated that between 2012 and 2020 the Average Annual Growth Rate (mcaGR) will be 7.6%.

In this sense, the medical device market has been growing in recent years, and Nuevo León has a base of companies and health services of great interest, since it has the Health, Nanotechnology and Biotechnology *clusters*, which could be the leaders of a project that would boost this market in the state.

However, to achieve this objective, a technological platform is needed to design and test the prototypes for their market launch.

9.6.9.3. Description

To have a space where prototypes of medical devices can be designed and tested, and to make it a training center for specialized human resources. The space should have services such as:[5]

- Monitoring reports: to identify economic, social and technological trends.
- Innovation projects: with companies in the region, in order to capitalize on knowledge in areas such as nanotechnology, biotechnology and biomems, to translate it into new and/or better products.
- Generation of protocols: for *in vivo* validation with animal models.
- Training of masters and doctors: oriented to the development of medical devices, through an alignment of existing graduate programs focused on the use of enabling technologies, such as nanotechnology, micromanufacturing and biotechnology, in the participating institutions.
- Design and prototyping laboratory: oriented to the development of medical devices, using nanostructured materials, as well as technologies such as biomems and microfabrication.

In order for this program to function properly and meet its objectives, the following is required:

- Coordination of the project by the *cluster of* Health, Nanotechnology, Biotechnology and *software*.
- Technical leadership of the project by the Instituto Tecnológico de Estudios Superiores de Monterrey (itesm).
- Follow-up of the project by the Nuevo Leon Institute of Innovation and Technology Transfer.
- Design of a strategic plan for the sector.
- Project financing from federal, state and municipal programs.

[5] Based on "Pre-proposal for the fordecyt Project: Regional Development of the Medical Device Industry based on Nano and Micro-technologies". Formulated by the State Government in collaboration with Dr. Alex Elías and Dr. Ciro A. Rodríguez, from itesm (2014).

9.6.10. Transversal. Platform for sharing best practices and collective knowledge among *clusters*.

9.6.10.1. Target

Strengthen linkages between *clusters* of strategic industry sectors in Nuevo León, through an innovation network in the Monterrey-Saltillo-Texas corridor. Also, exchange best practices with other states and participate in a bi-national re- ference framework (Nuevo León Software Council, 2014).

9.6.10.2. Justification

On May 2, 2013, Presidents Enrique Peña Nieto and Barack Obama agreed to establish a high-level U.S.-Mexico economic dialogue to forge a more competitive and dynamic economic relationship, with joint strategic actions in four areas:

1. Promoting competitiveness and connectivity
2. Promoting economic growth
3. Productivity and innovation
4. Building alliances for regional and global leadership

The members of the body created will meet every year to strengthen existing coordination schemes. Within the framework of the high-level economic dialogue between Mexico and the United States, the coUnited States, on May 20, 2013, the Mexican-American Council for Entrepreneurship and Innovation (museic) was created with seven integrated committees to follow up on specific activities aimed at the following (Nuevo León Software Council, 2014):

- Legal framework that stimulates innovative entrepreneurship
- Promote female entrepreneurship.
- Participation and collaboration of the Latino diaspora in the United States.
- Promote infrastructure that supports entrepreneurs and SMEs.
- Share experiences and best practices in the development of regional innovation *clusters.*
- Best practices and joint projects for technology commercialization.
- Share tools and best practices on financing and promotion of innovative and high-impact entrepreneurship.

Within the museic framework, one of the actions consists of sharing experiences and best practices in the development of regional innovation *clusters*, and in this sense, the state of Nuevo León plays a relevant role due to its experience in clustering.

9.6.10.3. Description

The creation of a platform for sharing experiences, information and knowledge among *clusters* and their affiliates is the next step in the consolidation of the state's strategic objectives.

In the first phase, during 2014 the platform was integrated and some of the *clusters* joined the effort. However, the second stage requires the creation of an instrument to support the innovative projects generated by the platform, as well as a linkage unit or knowledge transfer office that can provide support to the projects that emanate from it.

This platform seeks to function in a manner similar to a social network among the members of the *clusters*, to facilitate information on the products and services that each one offers and, as a result, strengthen the collaborative work and the articulation of the sectors of the economy.

In addition, companies will have a register of innovation projects, which will enable them to find companies that will support them or sell them products or services needed in their production or innovation processes.

In order for this program to function properly and meet its objectives, the following is required:

- Technical leadership of the project by the *cluster* of *software*.
- Follow-up of the project by the Nuevo Leon Institute of Innovation and Technology Transfer.
- Train companies and *clusters* in the use of silver.
- To achieve the involvement and use of the platform by companies and *clusters*.
- Project financing from federal, state and municipal programs.

10. Roadmap of the State Agenda of Innovation

The Agenda concept from which the project has been approached, establishes that the definition of a series of instruments that constitute the road map for the coming years is at the same level of importance as its content:

- A framework of priority projects, which places the launching of priority projects in the different areas of specialization considered within a time horizon and as a whole.
- A scorecard, which includes the indicators selected to monitor the evolution and achievement of the proposed strategy.

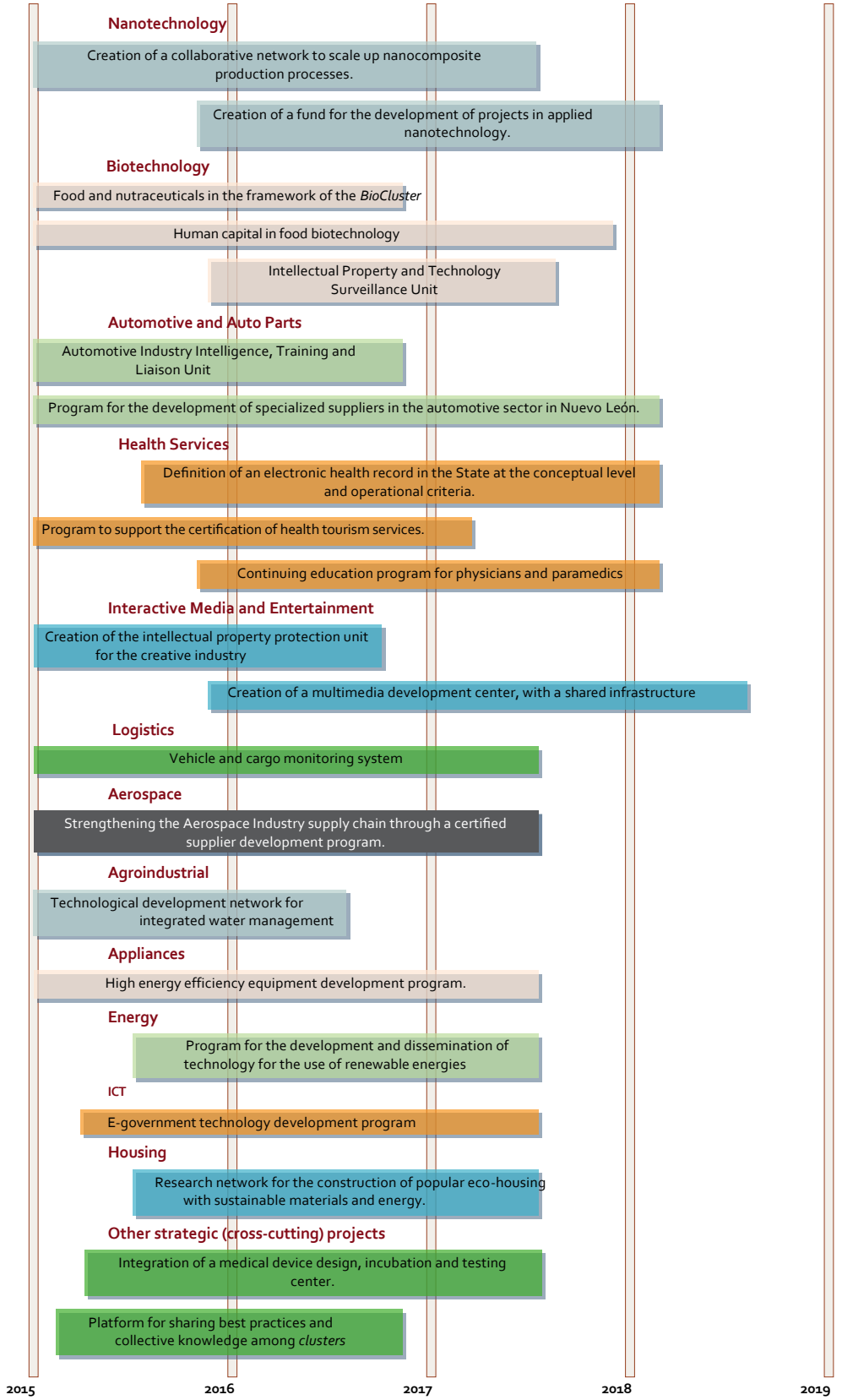
The following is a detailed description of how each of these elements of the roadmap were addressed in the Nuevo León Innovation Agenda.

10.1. Priority projects network

This section presents an overview of the projects that have been prioritized from the different areas of specialization. It should be emphasized that, although all the projects evaluated throughout the implementation of the Agenda have been considered to be of high importance in the state, it has been necessary to prioritize them based on existing capacities, as well as on the development of a plan for the effective use of resources for the identification of development times, not only within each area, but also across the state as a whole.

The result of this exercise is the temporary planning shown, which is of an indicative nature. Its final execution, as well as that of the projects identified, is subject to their correct definition and will depend on other factors such as the availability of funds, budgetary feasibility, the interest of private agents or the deadlines and technical and administrative conditions, both of budgets and of the financing programs to which they are submitted.

Illustration 31. Priority projects network



Source: CamBioTec, A.C., with information provided by the Nuevo León clusters and I² T authorities.²

10.2. Scorecard

The Agenda's scorecard is one of the key instruments for constantly monitoring the progress of the proposed roadmap. In this regard, the proposed monitoring system consists of indicators that will allow annual monitoring of progress in three areas:

- Areas of specialization, in order to identify whether the state's R&D&I activity is really oriented to these areas.
- Projects, in order to ascertain the Agenda's level of progress in the implementation of the initiatives identified in terms of quantity and nature.
- Governance model, to highlight whether the progress of the Agenda is being monitored in collaboration with the triple helix.

Indicators of success of the Agenda

Main indicators of success		
Areas of specialization	**Projects**	**Governance Model**
1. Total amounts mobilized by projects, broken down by EA • Weight of private financing • Weight of public financing 2. Weight of the funds attracted from each area of specialization	Priority projects: 1. Number of priority projects launched 2. Budget mobilized in new priority projects 3. No. of participants in ongoing priority projects • Number of companies participating in the projects All projects: 4. No. of applications submitted (within EAs, for any program and any type of project) 5. Success in proposal approval (%)	1. Follow-up meetings of the Board of Directors 2. Working meetings of Sectoral Committees

Source: Indra Business Consulting

In the case of Nuevo León, the follow-up of the activities described in the Agenda, as well as the fulfillment of the state's goals and actions in terms of innovation, will be monitored by the state's *Cluster* Council, which is made up of the members of the state's triple helix.

11. Linking the Innovation Agenda with ProMéxico's Global Business Agenda

The following is a strategy for Pro-Mexico support in the state, generated through the Export Promotion Unit. The proposal has a direct connection with the projects to be promoted within the Innovation Agenda. The first section shows in more detail the

In the second section, the most relevant indicators of the entity in terms of internationalization are presented in a schematic manner, while in the second section, the strategic projects that ProMéxico intends to carry out in 2015 are detailed.

11.1. Main internationalization indicators of the state

Nuevo León is one of the most dynamic states with the greatest diversity of productive sectors in terms of exports in Mexico, which has shown the following evolution:

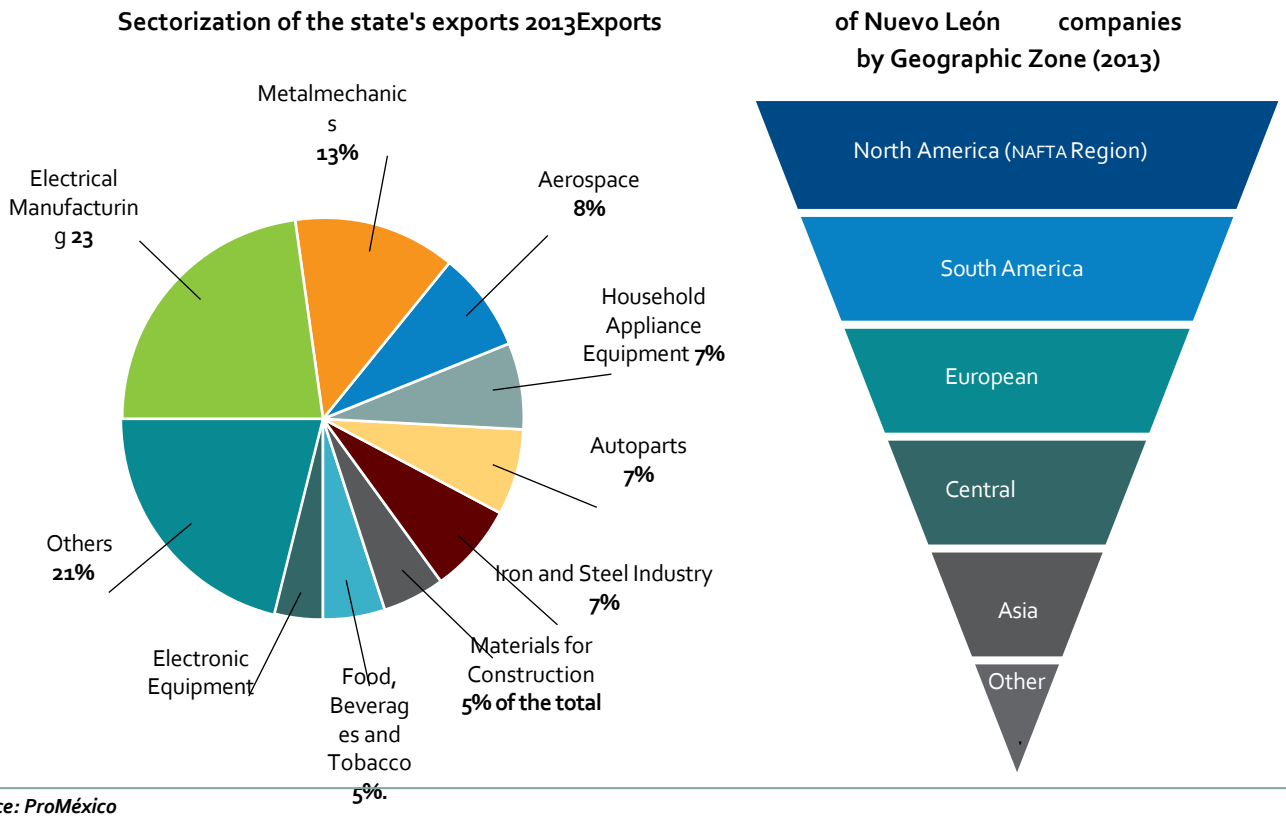
Table 10 . State export values (2010-2012)

Period	Thousands of dollars
2012	25,821,504
2011	24,654,015
2010	21,025,012
2009	17,184,481

Source: Information provided by ProMéxico with data from INEGI.

It is worth mentioning the Electrical Manufacturing and Metalworking sectors as those with the greatest weight in terms of total exports, and the United States as the main destination.

Sectoral distribution of the state's exports (left) (%, 2010-2013) and main geographic export areas of the state (right) (2010-2013)



Source: ProMéxico

In terms of Foreign Direct Investment (FDI), Nuevo León has had a positive evolution over time, and its rapid recovery after the low numbers reported in 2009, as a result of the global crisis, is noteworthy.

Table 11. Main indicators of Foreign Direct Investment in the state (2009-2014)

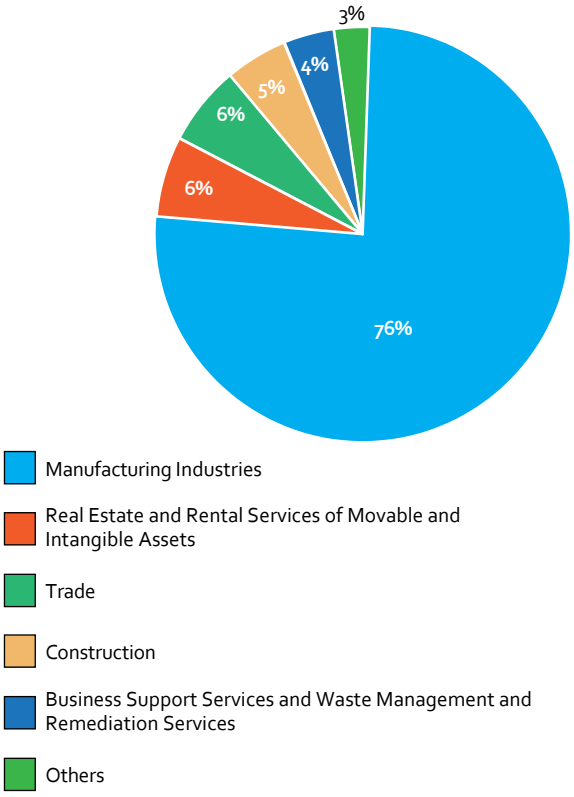
FDI in Nuevo León	
Year	**Amount (mdd)**
2009	1,275
2010	5,382
2011	1,413
2012	1,002
2013	420
2014	5,700
Total	15,192

Source: ProMéxico and Excélsior (2014).

In the case of FDI, manufacturing industries have been the most representative in the state, with an important diversity of countries of origin.

Main countries by contribution to FDI in the state (left) (%, 2009-2014) and sectoral distribution of FDI in the state (left) (%, 2009-2014) and sectoral distribution of FDI in the state (right) (%, 2009-2014).
FDI in the state (right)

Cou ntry	Total (mdd)	Percentage
Netherlands	$6,488.23	60.98
United States of America	$2,202.41	20.70
Spain	$489.20	4.60
Denmark	$460.71	4.33
Sweden	$369.42	3.47
Japan	$364.25	3.42
Belgium	$339.57	3.19
United Kingdom of Great Britain and Northern Ireland and Northern Ireland	$233.63	2.20
France	$182.73	1.72
Others	∃490.33	4.61
Total	$10,269.82	**100.00**



Source: ProMéxico

Finally, it is worth mentioning that Nuevo León, due to its export potential, has developed 17 twinning agreements at the international level and 20 at the national level, including those with the cities of San Antonio, Houston, Dallas, Orlando and Edinburgh in the Healthcare, Transportation and Heavy Manufacturing, Energy and Environmental Technologies, ICT, Creative and Knowledge Industries, Consumer, Agri-Food and Design Industry sectors.

11.1.1. ProMéxico's strategic projects for the state of Mexico

To boost the state's development, ProMéxico plans to promote the following strategic projects in 2015:

Table 12. ProMéxico's strategic projects for the state of Mexico

No.	Sector of focus ProMéxico	Title	Description	Institutions involved	Expected results
1	**Health**	High-value functional ingredients	Technology development program for the production of high-value functional ingredients	ProMéxico, INADEM, SE, Conacyt/ State Institutions: SEDEC, PIIT, Biotechnology *cluster*, Agro cluster/ Universidad Autónoma de Nuevo León, Tec de Mty, UDEM	At least 50% of the projects in the participating companies should be about generating new technologies
2	**Transportation and Heavy Manufacturing**	Automotive Training	Intelligence, training and liaison unit	ProMéxico, INADEM, SE/ State institutions: SEDEC, CLAUT/ Universidad Autónoma de Nuevo León, Tec de Mty, UDEM	To achieve an impact on 50% of companies
3	**Energy and Environmental Technologies**	*Cluster* Energetic	Development of the Nuevo León Energy Cluster: Strategy 1.6 of the state's energy program.	ProMéxico, INADEM, SE, SENER, PEMEX, CNH/ State Institutions: SEDEC/ Universidad Autónoma de Nuevo León, Tec de Mty, UDEM	Cluster integration
4	**Transportation and Heavy Manufacturing**	Certification TS	Supplier Development for the automotive sector	ProMéxico, INADEM, SE/ State Institutions: SEDEC, CLAUT / Universidad Autónoma de Nuevo León, Tec de Mty, UDEM	To achieve an impact on 50% of companies
5	**Transportation and Heavy Manufacturing**	Certification AS	Supplier Development for the Aerospace sector	ProMéxico, INADEM, SE/ State Institutions: SEDEC, Aerocluster/ Universidad Autónoma de Nuevo León, Tec de Mty, UDEM	To achieve an impact on 50% of companies
6	**ICT, Creative Industries and Knowledge**	Export Consortium	Formation of a Consortium of exports for Business Intelligent	ProMéxico, INADEM, SE/ State Institutions: SEDEC, CSOFT, PHT/ Universidad Autónoma de Nuevo León, Tec de Mty, UDEM	Integration of the Export Consortium

No.	Sector of focus ProMéxico	Title	Description	Institutions involved	Expected results
7	**Consumption**	Development of productive capacities	Implementation of production processes within the supplier companies of the Household Appliances sector	ProMéxico, INADEM, SE/ State Institutions: SEDEC, CLELAC, PIIT/ Universidad Autónoma de Nuevo León, Tec de Mty, UDEM	To achieve an impact on 50% of companies
8	**Agri-food**	Export impulse Made in Nuevo León	Development of Made in Nuevo León companies to penetrate new markets	ProMéxico, INADEM, SE/ State institutions: SEDEC, Hecho en Nuevo León, Agro cluster/ Universidad Autónoma de Nuevo León, Tec de Mty, UDEM	Achieve an impact on 50% of companies
9	**Design Industries**	Export impulse Made in Nuevo León	Development of companies in the Hecho en Nuevo León program	ProMéxico, INADEM, SE / State Institutions: SEDEC, Hecho en Nuevo León,/ Universidad Autónoma de Nuevo León, Tec de Mty, UDEM	Achieve an impact on 50% of companies

Source: ProMéxico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