Supporting the Contribution of Higher Education Institutions to Regional Development

The OECD Program on Institutional Management in Higher Education (IMHE) with the support of the Higher Education Funding Council for England (HEFCE)

CASE STUDY REPORT ON THE STATE OF NUEVO LEÓN, MEXICO

Prepared by the Regional Integration Program of Northeastern Mexican States and Linkage with the State of Texas (INVITE Program) coordinated by Dr. Romeo Flores Caballero and with the collaboration of members of *Instituto Tecnológico y de Estudios Superiores de Monterrey, Universidad Autónoma de Nuevo León and Universidad de Monterrey* universities, and Nuevo Leon's regional partners.

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The self assessment report was chaired by Dr. Romeo Flores Caballero, Executive Coordinator of the Regional Integration Program of Northeastern Mexican States and Linkage with the State of Texas (INVITE Program) and coordinated simultaneously at the universities by the following managing partners: Dr. Magda García-Quintanilla, Academic Innovation Coordinator at the *Universidad Autónoma de Nuevo León*; Ing. José Alfredo Galván-Galván, Dean of the Architecture, Design and Engineering Division at the *Universidad de Monterrey*; and Dr. Eugenio García-Gardea, Associate Vice-President for Research and Technologies at the *Instituto Tecnológico y de Estudios Superiores de Monterrey*. These managing partners provided enthusiastic and skillful leadership in the steering group, and acted as hosts on several occasions for meetings associated with the project.

A working group representing the universities in the region and including regional partners such as the State Minister of Education and State Minister of Economic Development, contributed to the report with information and comments on the text. Additionally, with the support of the steering group, several consultation meetings and events were held to capture the views of a wider business and policy community.

The present document, it is not a review of regional development in the region or an evaluation of those regional agencies and programs that do not involve the universities, and it is also not a study of other parts of the education system except where they interact with the universities. This is a self evaluation of the higher education provision in the region that also includes information only from the three higher education institutes with major impact on the regional development; the study does not include some other small and medium size colleges and institutions of the region that also perform some activities in the delivery of higher education.

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I. CHAPTER ONE: OVERVIEW OF THE REGION

A. The Geographical Situation

The state of Nuevo León, and its capital city, Monterrey, are located in the northeastern region of Mexico. Monterrey is considered the region's most important financial and industrial center. It is also the primary point of entry for the commercial exchange between the northeastern region of Mexico and the United States.

The state is comprised of 51 municipalities (counties), and the city of Monterrey is located 200 km. from the border with Texas, USA.

It has a total area of 64,555 km^2 (3.3% of national territory) and is strategically located at the 100th meridian—the same distance from the east and west coasts of the USA, and close to the ports of the Gulf of Mexico and Pacific Ocean. Nuevo León is situated in the most important logistic corridor of North America, which provides an excellent trade position to export to the USA. This location also allows the state to attend the local market; having direct access to the trade border bridges of Colombia (Nuevo León) and Nuevo Laredo, Tamaulipas.

B. Geopolitical and Economic Structure

Nuevo León has the third largest economy of all the states in Mexico, and Monterrey is considered the most important financial, commercial and industrial center of the north region. Also it is known as the industrial capital of Mexico. In 2004, the national population economically active (PEA) was 43,398,755, and the state's total economically active population adds up to 1.81 million, 43% of the state's total population and 41% of national.

The state's GDP in 2004 was USD56.5B (7.4% of the national); the historical record is shown in the following table[1]:

Table I.1. Gross Domestic Product in Million of Pesos into Current Price in Basic Value; Nuevo León / 1993–2003

Sector	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total	**74075**	**85560**	**111676**	**151831**	**193251**	**240613**	**286750**	**352924**	**368602**	**409144**	**455054**
Agricultural, forestry and fishing	1068	1454	1904	2828	3054	4620	4429	5256	5275	6335	6397
Mining	245	320	364	443	481	695	811	960	1152	1101	1638
Manufacturing industry	19027	21410	30729	43261	53960	65583	74115	89147	88774	94834	100408
Construction	2393	2951	3031	4548	6231	7676	10300	12386	13165	13827	17836
Electricity, gas and water	903	983	1144	1607	2045	2689	3446	3199	3407	4724	4732
Commerce, restaurants and hotels	15726	17642	22427	31373	38979	45149	53035	72696	71352	78959	91039
Transport, storage and communications	7513	9192	12285	16860	22768	29518	36457	45818	47459	49482	53151
Financial services, insurances and real estate	12123	13805	20765	22108	23878	30970	36487	39424	43308	51836	57987
Social and personal communal services	17651	20797	26054	32708	43980	55779	71275	87831	100305	113505	127271
Attributable banking services	-2574	-2994	-7026	-3906	-2124	-2066	-3606	-3792	-5595	-5458	-5405

[1] Source: http://www.data.nl.gob.mx/Estadistica/PorDependencia/Producto%20Interno%20Bruto/PIB%20nominal

State General Economic Indicators:

- Per capita income is USD11,149 per annum, which exceeds 84% of the national average (USD6,042).
- Exports of USD8,842M, 5.3% of the national.
- Direct Foreign Investment USD1,058M, 9.08% of the national.

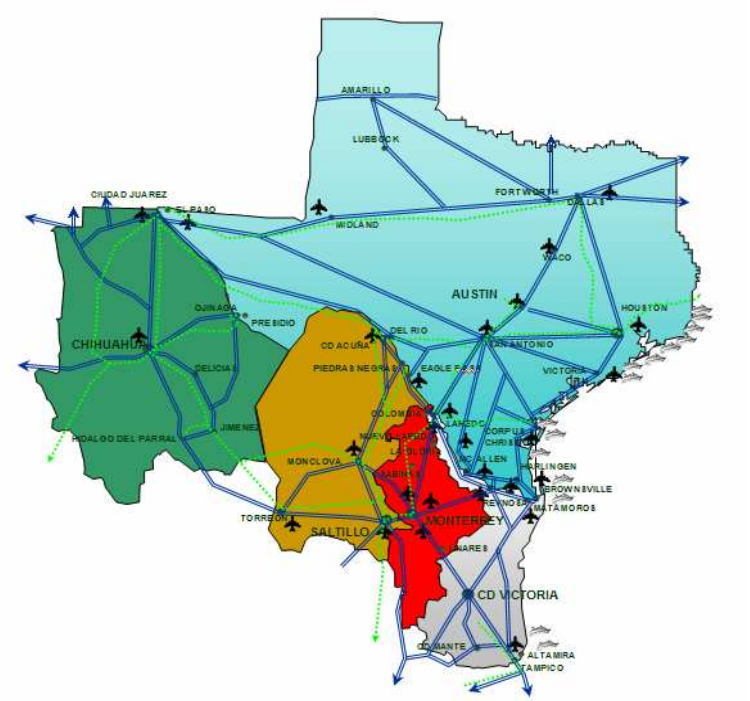
Nuevo León's accessibility to national capital and other major centers of economic and cultural activity

Due to its geographic position, Nuevo León is the main logistic corridor in North America for export to the United States of America. It is also able to support the local market, as a result of its access through border crossing points located at Colombia, Nuevo León and Nuevo Laredo, Tamaulipas.

Altogether, the "Northeast Mexico-Texas Region" combines a cutting-edge communication infrastructure with 70k kilometers of highways, 23k kilometers of railroads, 15 seaports, and 26 airports; 69% of all commercial truck crossings and 52% of all private vehicle crossings in the Mexico-US border is done through this region. Also, 70% of the total trade between Mexico and the US is done through this region.

As a strategic state within this region, Nuevo León's infrastructure is considered solid in terms of communications, transportation, energy, gas and coal deposits, and sufficiency in power generation plants. Also, the state has efficient highways and railroad networks, access to seaports, four high-traffic international bridges, and more than 180 weekly direct flights connecting to major US cities. At present, the state is equipped with the following:

Figure I.1. *Nuevo León's Infrastructure*



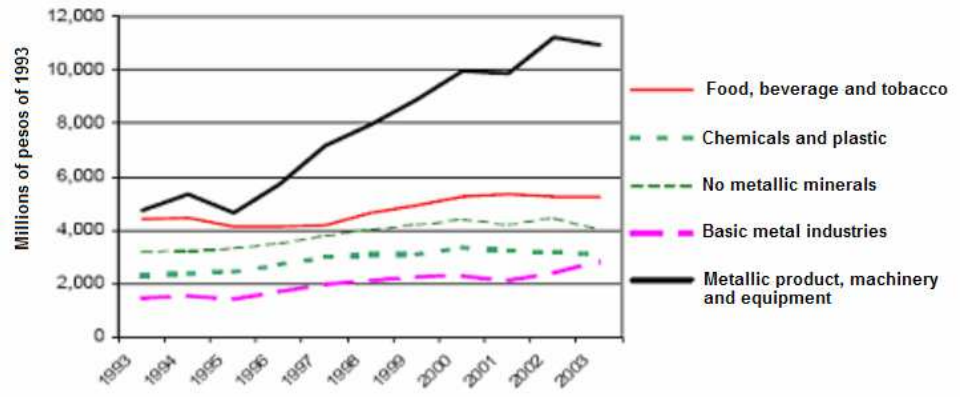
- 4,226 km. of highways
- 1,091 km. of railroads
- 2 international airports
  - A world-class airport located in Apodaca, N.L., with 190 direct flights to ten cities in the US on a weekly basis (Atlanta, 28; Chicago, 14; Dallas, 28; Houston, 61; Las Vegas, 12; Los Angeles, 14; Miami, 7; New York, 4; San Antonio, 13; Phoenix, 7; and Madrid, 1 on a weekly basis).
  - A new cargo terminal (4k m^2) with an approximate capacity of 20,000 tons per year, with a potential to expand and duplicate its total capacity.

- 1 international Mexico-US border bridge, "Colombia," considered the fourth most important in Mexico.
- State-of-the-art telecommunication services. Wide network of fiber optic T1 and DSL, and services provided by private companies such as Telmex, Alestra (AT&T) and Avantel (MCI Worldcomm).

Economic Sectors and Technological Clusters

The most important sector is manufacturing, with main industries being food, beverages (with an international presence in the beer industry), cement (CEMEX-the world's second largest corporate supplier of cement.), chemicals, automotive, steel, glass, gas (the Burgos basin, is the main reservoir of not associated gas in Mexico). At present, the state is highly supportive of strengthening industrial clusters of the new economy, such as aerospace, software, mechatronics, automotive, nanotechnology, biotechnology, and specialized medical services. See figure I.2.

Figure I.2. *Nuevo León's Manufacturing Production, 2003*



In mid-2002, Mexico launched an initiative to develop regional software clusters across the country. The initiative represents a cooperative effort by the federal and state governments, the private sector, and universities to reduce software imports to Mexico, increase exports, and produce new highly qualified employees. Nearly three years from their creation, these clusters compete with other national and international projects within this sector. The first 12 regional software cluster groups in the country achieved international sales for developments and services in the amount of USD104M. Today, 225 companies in the country are participating in these projects, located in Aguascalientes, Baja California, Coahuila, Guanajuato, Jalisco, Morelos, Nuevo León, Puebla, Sinaloa, Sonora, Tabasco, and Yucatán. More than 85% of software companies in Mexico are small to medium-sized companies; 5% employed 300 employees, and barely 3% initiated operations five years ago or more.

In Nuevo León, the state's areas of specialization of software and technology regional development will be focused on developing local and remote applications for the US, e.g., solutions in biotechnology, mechatronics and telecommunications.

C. Demographic Situation

Mexico is a relatively young country. 50% of its more than 100 million inhabitants are between 5 and 29 years old. The state of Nuevo León has a total population of 4.2 million (3.9 % of the country) and has the same demographic structure. 85% of the state's population is located in Monterrey and its metropolitan area, which is ranked the third largest city in Mexico. Its population has a life expectancy above the average (75 years for men, 79 years for women).

The city of Monterrey is known by the federal judicial authority as one of the safest cities in Mexico. Approximately 70% of the population has social security services, and more than 90% of its residences have utility services, such as water, electricity, and sewage.

During the last 35 years in Mexico, there has been an increase in the total number of women vs. men. In 2005, there were **3 million** more women than men in the population. See following tables[2].

[2] Source: INEGI. Population and Housing Census, 2005.

Table I.2. Nuevo León's historic population growth / 1970–2005

Year	1970	1980	1990	2000	2005
Total Population	48 million	67 million	81 million	98 million	103 million
Women	24 million	34 million	41 million	50 million	53 million
Men	24 million	33 million	40 million	48 million	50 million

State	Total Population		
	Total	Men	Women
Mexico	103,088,021	50,124,361	52,963,660
Nuevo León	4,164,268	2,072,921	2,091,347

According to the latest figures obtained from the population count performed by INEGI in 2005, the total population of Nuevo León is 2,091,347, which makes Nuevo León the eighth most populated state in Mexico, equal to 4% of the total national population. 4% of Mexico's men and 3.8% of its women live in Nuevo León.

Key demographic indicators of the region

Age structure of the population

Table I.3. Nuevo León's Population by Quinquennial Groups of Age and Gender[3]

1990

Age	Population		Men	Women
	Total	%		
Total	**3,098,736**	**100**	**1,524,664**	**1,556,072**
0 - 4	331,519	10.7	168,597	162,922
5 - 9	350,558	11.3	178,254	172,304
10 - 14	369,459	11.9	168,328	183,131
15 - 19	388,480	12.5	195,037	193,443
20 - 24	337,524	10.9	168,514	169,010
25 - 29	267,335	8.6	131,768	135,567
30 - 34	226,879	7.3	110,900	115,979
35 - 39	180,402	5.8	88,772	91,630
40 - 44	145,262	4.7	71,411	73,851
45 - 49	121,838	3.9	60,748	61,090
50 - 54	100,263	3.2	49,598	50,665
55 - 59	75,104	2.4	36,957	38,147
60 - 64	62,398	2	29,546	32,852
65 - 69	46,095	1.5	22,190	23,905
70 - 74	29,882	1	13,885	15,997
75 - 79	23,068	0.7	10,578	12,490
80 - 84	14,384	0.5	6,381	8,003
85 - 89	7,963	0.3	3,447	4,516
90 - 94	2,486	0.1	1,061	1,425
95 - 99	910	0	382	528
100 and older	334	0	108	226
Not Specified	16,593	0.5	8,202	8,391

2000

Age	Population		Men	Women
	Total	%		
Total	**3,834,141**	**100**	**1,907,939**	**1,926,202**
0 - 4	396,563	10.3	201,948	194,615
5 - 9	385,771	10.1	196,456	189,315
10 - 14	355,194	9.3	180,250	174,944
15 - 19	373,807	9.7	187,079	186,728
20 - 24	391,235	10.2	195,585	195,650
25 - 29	369,135	9.6	183,270	185,865
30 - 34	322,572	8.4	158,942	163,630
35 - 39	272,200	7.1	134,659	137,541
40 - 44	224,330	5.9	110,097	114,233
45 - 49	168,680	4.4	82,616	86,064
50 - 54	144,499	3.8	70,886	73,613
55 - 59	109,729	2.9	53,878	55,851
60 - 64	92,626	2.4	44,938	47,688
65 - 69	65,875	1.7	31,411	34,464
70 - 74	48,611	1.3	22,607	26,004
75 - 79	33,324	0.9	15,550	17,774
80 - 84	17,528	0.5	7,667	9,861
85 - 89	10,634	0.3	4,424	6,210
90 - 94	4,154	0.1	1,677	2,477
95 - 99	1,741	0	664	1,077
100 and older	380	0	164	216
Not specified	45,553	1.2	23,171	22,382

[3] Source: INEGI, Population Census of 1990 and 2000.

Emigration and immigration

Table I.4. Nuevo León's population movement, 2000

Immigrant population	827,453
Emigrant population	228,453
Net balance	599,000
Immigrant persons in year 2000	128,902
Emigrant persons in year 2000	66,925
Net balance	61,977

Table I.5. Nuevo León's other indicators of emigration and immigration[4]

Indicator	1990	1995	2000	2005
Interstate immigrants	28 486	29 418	30486	31752
Interstate emigrants	16 037	15 507	15648	16598
Net balance	12 449	13 911	14838	15154
International emigration	- 3 665	- 9 260	-7583	-7863
Interstate rate of immigrants*	8.86	8.26	7.8	7.48
Interstate rate of emigrants*	4.99	4.35	4	3.91
Net balance **	0.39	0.39	0.38	0.36
International rate of emigration**	-0.11	-0.26	-0.19	-0.19

* Rate for every 1000 people

** Rate for every 100 people

Health and well-being[5]

Table I.6. Nuevo León's material resources for health

	2002		2003		2004	
	National	State	National	State	National	State
Census of beds	76	78	70	77	74	74
Consulting rooms	51	49	46	47	51	48
Operating rooms	3	2	3	2	2	2

Note: The indicators are estimated for every 100,000 people.

Table I.7. Nuevo León's human resources for health

	2002		2003		2004	
	National	State	National	State	National	State
Physicians	113098	4026	116480	4103	124906	4445
Dentists	9108	343	7042	221	7165	219
Pediatricians	6728	260	6916	264	6790	259
OBGYNs	6516	240	6558	244	6864	254
Nurses	192828	8175	189747	8277	199835	8221
Staff with Assistant Services	36575	1503	34075	1345	20065	328

Note: Indicators are estimated for every 100,000 people.

[4] CONAPO: National Population Council

[5] Mnistry of Health, Government of the State of Nuevo León

Table I.8. Mexico and Nuevo León's mortality rate by age groups*/ 1997–2001[6]

	1997		1998		1999		2000		2001	
	National	State	National	State	National	State	National	State	National	State
General	4.7	4.4	4.6	4.3	4.5	4.2	4.5	4.2	4.4	4.1
Infant–1/	16.3	13	15.8	13.1	14.6	11.2	14.6	11.6	16.9	11.3
1-4 years	1.1	0.6	1	0.6	0.9	0.5	0.9	0.5	0.8	0.5
5-14 years–2/	3.7	2.7	3.5	2.9	3.4	2.2	3.4	2.5	3.2	2.4
15-64 years	2.9	2.3	2.9	2.4	2.8	2.3	2.8	2.3	2.6	2.2
64 and more	51	53.9	48.5	48.7	47.6	48.1	47.6	46.8	45.2	46.8
Maternity–3/	4.7	2.4	5.3	2.8	5.3	2.8	5.1	3.5	5.9	1.9

* Rate for every 1,000 inhabitants.
_1/ Rate for every 1,000 born alive.
_2/ Rate for every 10,000 inhabitants.
_3/ Rate for every 10,000 born alive registered babies.

According to the last INEGI figures, during 2004 the national mortality rate was 4.5% and in the state was 4.2%.

Table I.9. Nuevo León's Well-being Indicators 2004

Indicators	*National*	*Nuevo León*
Percentage of families with refrigerator	67.84	92.97
Percentage of families with telephone	35.13	58.47
Percentage of families with automobile	32.74	47.01
Percentage of families with health services	39.16	64.79
Percentage of families with more than elementary school	52.23	66.38
Percentage of families with an income of more of 2.5 minimum wages	34.24	48.55

Source: INEGI, Socioeconomic regions in Mexico.

Participation of the local population in higher education

Mexico's school enrollment exceeds 29 million students and has 3,812 higher education institutes (or HEI) that serve 2,239,100 students. 2,032, 53.31% of the HEI are public and assist 67% of the student population. 1,780, or 46.69%, are private and assist to 33% of the student population.

In general terms, the educational average of Nuevo León's population is 9.2 years, which is higher that the national average (7.9 years). The state has 43 HEI, representing 1.13% of the national total. The four public universities serve more than 61% of the total enrollments in HEI. The largest public university is the *Universidad Autónoma de Nuevo León* (UANL), which concentrates 60,916 undergraduate students. In total, Nuevo Leon's student enrollment exceeds 1.19 million, which are divided in 5,561 institutions.

8.6% (9,602) of Nuevo León's undergraduate students enroll in a graduate program, representing 5.8 % of the total population of graduate students in Mexico, adding up to 129,867. There are more than 500 scientists recognized as members of the National Researchers System (SNI for its acronym in Spanish), representing 4.9% of the national total (10,189).

The budget for education in Mexico is USD3B (6.2% of the GDP), while for Nuevo León the budget adds up to USD2.6B (6% of the state's GDP). The total budget consists of the state's contribution of USD1.3B (3% of the state's GDP) and a similar amount from federal government sources.

[6] Ministry of Health, Government of the State of Nuevo León

Although Mexico's budget dedicated to education exceeds the average of the members of the OECD, our country is ranked 34th (of 41 countries) in educational efficiency. In accordance with the OECD's Economic Survey of Mexico in 2005, our country is delivering inefficient and inequitable educational services. At the same time, Mexico has the lowest average in mathematics and reading skills.

D. A Brief History of the Higher Education Institutions Engagement in Regional Development

The state of education in Mexico reflects the inefficiency of the educational system, which does not contribute to the elimination of poverty, it does not solve inequalities and it does not increase competitiveness. In accordance to the World Economic Forum, Mexico is ranked 55th in competitiveness.

Nevertheless, it is important to focus on Nuevo León and recognize the individual efforts that its universities, especially the three most important universities, *Universidad Autónoma de Nuevo León (UANL), Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM)* and *Universidad de Monterrey (UDEM),* have made to contribute to the development of the region. Besides the natural incorporation of computers and information systems as part of their teaching-learning process, most universities have also incorporated social and community programs, technical and practical internships with businesses and industries, and training and continuing education programs into students' curricula in order to respond to the needs of the business and industrial sectors.

However, despite all the federal and states efforts made to the higher education system, such as increasing the investment in education and increasing student enrollment, it is important to consider the existence of some irregularities in the whole system. The most critical is that the educational system that is still "invertebrate." The absence of articulation between all different education levels, as well as the lack of links between the educational and economic systems could explain the limited research and scientific development, and the high rate of professional unemployment and underemployment.

As a consequence of this, the increasing investment in education does not reflect in the quality of the teaching and learning process, and the increasing enrollment of students dissolves the efforts to increase the educational budget. At the same time, the teachers union does not contribute to the improvement of educational policy. The budget shortage and the nonsupportive influence of the teachers union are limiting the training of qualified professors and also limiting the selection of pedagogical materials, aids and equipment available to increase the quality of education.

E. The Scope and Level of Involvement of Regional Stakeholders in the Project

In order to promote scientific and technological research, the state government created in November, 2003, the Corporation of Strategic Projects of Nuevo León, which is responsible for five strategic projects. The two most important projects are as follows:

- The Regional Integration Program of Northeastern Mexican States and Linkage with the State of Texas.
- The Monterrey International Knowledge City (MIKC).

These projects have implemented a diversity of collaborative projects and programs involving academic and state government institutions, as well as the private sector of Nuevo León, the northeastern region, and Texas. They promote a new culture based on science and technology development for wealth creation.

Recently the government of Nuevo Leon created a very important initiative. An agreement, established through the creation of the program "Monterrey International Knowledge City" (March, 2004), and the Technological Park (June, 2005) with the National Board of Science and Technology (or CONACYT for its acronym in Spanish) will promote innovation and technology development in the most strategic areas of the region, involving the three most important universities of the state.

As a result of this commitment, **16 new research centers** will be created in the state under the governance of the following participating institutions:

- **CONACYT (5):** Feeding and development, advanced materials, engineering and industrial development, scientific research and higher education.
- **UANL (2):** Actually it is strongly contributing for innovation, research, science and technological development through 38 laboratories and 18 research centers, and will create two new research centers for health sciences and innovation, and engineering and technology; focusing on nanotechnology, mechatronics, development of new materials, information technologies and software.
- **ITESM (6):** While promoting different programs for nanotechnology, medicine, biotechnology, mechatronics, robotics, and aerospace industry through its 33 research centers, it will create six new research centers in advanced and alternate materials for construction, cyber-security, utility data center, informatics, software developmenta and MEMS technology.
- **UDEM (3):** Innovation and development for small and medium-sized business, research and innovation of products, packages and packing, legal studies for industrial property.

Nuevo León's state government strategic programs

The Regional Integration Program of Northeastern Mexican States and Linkage with the State of Texas (INVITE Program)

From the government of Nuevo León's perspective, the links between Mexico and the US should be viewed with optimism, trust, and certainty. We are neighbors, friends, and partners, and share the world's most dynamic and complex border, with 360 million annual crossings. This interdependency compels us to abide by our bilateral agreements and to conceive new strategies for cooperation and regional integration.

NAFTA is the central axis of our economic and social link. In just 10 years, our bilateral trade increased from USD106B to USD250B. In 2004, there was (except for corn, bean, sugar, and some agricultural products) trade opening and free movement of goods and most services. Through NAFTA, we have been able to achieve a "bilateral metamorphosis" and initiate a "regional metamorphosis" to consolidate an equalitarian and complementary partnership. Both countries may be different but not distant. They may share a common future, and progress in science, technology, and communications makes them interdependent. This is an appropriate time to accelerate our regional economic integration, in which the northeastern states of Mexico and Texas shall lead the next step of NAFTA.

The INVITE Program was created in March, 2004, by the governor of the state of Nuevo León, Dr. José Natividad González-Parás. It was created with the vision of achieving economic integration and cooperation in the social, ecological, and cultural matters of the northeastern Mexican states of Nuevo León, Chihuahua, Coahuila, and Tamaulipas, with the state of Texas, USA, within the constitutional framework.

The mission of the INVITE program is to promote the second stage of the North American Free Trade Agreement. The program has become one of the most important structures of Nuevo León's government for the creation and establishment of collaborative partnerships between academic, industrial and governmental institutions from the northeastern region of Mexico and the state of Texas.

Purposes of the INVITE Program

- To consolidate the regional economic integration between northeastern Mexico and its correlation with Texas.
- To design and establish long-standing public policies on economic, environmental, and social matters.
- To promote the development of strategic economic zones.
- To encourage the participation of the domestic and international public and private sectors in the development of the region.
- To promote and strengthen research and investment for the development of state-of-the-art technology and engineering in the region.
- To generate a new northeast border culture of integration and economic, academic, and social cooperation.

Goals of the Program

- Increase competitiveness
- Strengthen comparative advantages
- Standardize public policies
- Promote economic growth
- Improve social welfare levels
- Exploit scale economies
- Use productive recourses efficiently

Monterrey International Knowledge City Program[7] *(See Exhibit I)*

It is clear that the economic development and growth of societies and nations in the framework of globalization is increasingly based on the generation of values through knowledge, associated with a constant increase in competitiveness. Nuevo León has all favorable conditions to achieve this, distinguishing it as the center of a region, which economic strength translates into the creation of wealth and social welfare, benefiting the people of Nuevo León.

In addition to being distinguished for its industrial, entrepreneurial and business culture, Nuevo León stands out in the higher education environment in Mexico and Latin America. The *Instituto Tecnológico y de Estudios Superiores de Monterrey* or ITESM has worked to create technological institutes in a national network. The *Universidad Autónoma de Nuevo León* or UANL has achieved academic excellence in multiple areas. The *Universidad de Monterrey* or UDEM has done exhaustive social work together with the business sector and prestigious private universities. Together, these institutions have formed the higher education system in Monterrey and its metropolitan area, which, besides supporting the increasing local demand, has brought students from other states and countries, especially from Latin America.

Graduate education represents an active sector with a growing demand. If it is effectively linked with the productive sector based on knowledge and technological development, it will undoubtedly create a virtual circle in productive investment, foreign currency revenue, employment generation, and economic dynamism in the region.

To that end, the project of Monterrey as an International Knowledge City (MIKC) was established with the following four objectives: to promote technological development and establish knowledge corporations, to internationally project an image that reflects the quality education available in the region, to develop the required urban infrastructure, and also to assure high competitiveness in the governmental and private sectors as the main axis of the economic development.

[7] Proyectos estratégicos para transformar Nuevo León (*Strategic projects to change Nuevo León*), Plan Estatal de Desarrollo (*State Development Plan)* 2004-2009, Chapter 7, Gobierno del Estado de Nuevo León (*Government of the State of Nuevo León*).

F. The Economic and Social Base

Nuevo León's economic and social base

Industrial structure by sector

Table I.10. Nuevo León's Real GDP by Industry in Millions of Chained (1993 Pesos and as a Percentage of Total GDP (1993–2005)

Real GDP by industry in Millions of Chained 1993 Pesos and as a Percentage of Total GDP (1993 - 2005)
NUEVO LEÓN

Period / Industry	2000		2001		2002		2003		2004 1/		2005 1/	
	Millions of 1993 pesos	(%)	Millions of 1993 pesos	(%)	Millions of 1993 pesos	(%)	Millions of 1993 pesos	(%)	Millions of 1993 pesos	(%)	Millions of 1993 pesos	(%)
Total	**101,900**	**100.0**	**101,750**	**100.0**	**105,008**	**100.0**	**108,628**	**100.0**	**113,967**	**100.0**	**118,995**	**100.0**
Agriculture, forestry and fishing	1,277	1.3	1,474	1.4	1,558	1.5	1,563	1.4	1,610	1.4	1,663	1.4
Mining	432	0.4	424	0.4	460	0.4	527	0.5	559	0.5	607	0.5
Manufacturing	28,919	28.4	28,294	27.8	29,175	27.8	29,187	26.9	30,584	26.8	31,854	26.8
Construction	3,028	3.0	2,935	2.9	2,875	2.7	3,494	3.2	3,672	3.2	3,852	3.2
Electricity, gas and water	1,416	1.4	1,385	1.4	1,435	1.4	1,523	1.4	1,561	1.4	1,594	1.3
Commerce, restaurants and hotels	21,607	21.2	21,223	20.9	22,315	21.3	23,621	21.7	24,613	21.6	25,573	21.5
Transport, storage and communications	12,709	12.5	12,820	12.6	13,166	12.5	13,990	12.9	15,067	13.2	16,061	13.5
Financial services, insurance and real estate goods	14,430	14.2	15,246	15.0	15,925	15.2	17,308	15.9	18,087	15.9	18,811	15.8
Communal services and personal services	20,682	20.3	20,699	20.3	21,189	20.2	21,119	19.4	21,922	19.2	22,732	19.1
Imputed banking services	-2,600	-2.6	-2,749	-2.7	-3,091	-2.9	-3,704	-3.4	-3,708	-3.3	-3,752	-3.2

Source: INEGI, Sistemas de Cuentas Nacionales de México, Producto Interno Bruto por Entidad Federativa.
_1/ Estimated by Secretariado Técnica de Planeación, Dirección de Estudios Económicos, Secretaría de Desarrollo Económico.

Table I.11. Nuevo León's economic activity rates

Real GDP by Industry in Millions of Chained 1993 Pesos and Annual Growth Rate (1993 - 2005)
NUEVO LEÓN

Period / Industry	2000		2001		2002		2003		2004 1/		2005 1/	
	Millions of 1993 pesos	(%)	Millions of 1993 pesos	(%)	Millions of 1993 pesos	(%)	Millions of 1993 pesos	(%)	Millions of 1993 pesos	(%)	Millions of 1993 pesos	(%)
Total	**101,900**	**7.6**	**101,750**	**-0.1**	**105,008**	**3.2**	**108,628**	**3.4**	**113,967**	**4.9**	**118,995**	**4.4**
Agriculture, forestry and fishing	1,277	-8.3	1,474	15.4	1,558	5.7	1,563	0.3	1,610	3.0	1,663	3.3
Mining	432	14.5	424	-1.9	460	8.7	527	14.4	559	6.1	607	8.6
Manufacturing	28,919	7.1	28,294	-2.2	29,175	3.1	29,187	0.0	30,584	4.8	31,854	4.2
Construction	3,028	0.9	2,935	-3.1	2,875	-2.0	3,494	21.5	3,672	5.1	3,852	4.9
Electricity, gas and water	1,416	2.5	1,385	-2.2	1,435	3.6	1,523	6.2	1,561	2.5	1,594	2.1
Commerce, restaurants and hotels	21,607	15.6	21,223	-1.8	22,315	5.1	23,621	5.9	24,613	4.2	25,573	3.9
Transport, storage and communications	12,709	11.4	12,820	0.9	13,166	2.7	13,990	6.3	15,067	7.7	16,061	6.6
Financial services, insurance and real estate goods	14,430	3.7	15,246	5.7	15,925	4.5	17,308	8.7	18,087	4.5	18,811	4.0
Communal services and personal services	20,682	3.3	20,699	0.1	21,189	2.4	21,119	-0.3	21,922	3.8	22,732	3.7
Imputed banking services	-2,600	4.8	-2,749	5.7	-3,091	12.4	-3,704	19.9	-3,708	0.1	-3,752	1.2

Source: INEGI, Sistemas de C
_1/ Estimated by Secretaría Técnica de Planeación, Dirección de Estudios Económicos, Secretaría de Desarrollo Económico
Note: GR, is growth rate.

The leading export sectors

Table I.12. Nuevo León's exports in millions of USD by sector

Category	2003	2004	2005
NUEVO LEÓN TOTAL EXPORTS	**10,421.4**	**11,477.6**	**13,110.9**
Electrical machinery and equipment, incl. lamps, automotive applications, transformers, batteries	3,327.6	3,467.3	**3,820.2**
Vehicles and related components, incl. spares and accessories for automobiles, trailers and buses	1,344.5	1,593.8	**1,952**
Mechanical machinery and equipment, incl. air pumps, gas turbines, refrigerator components	1,319.2	1,515.4	**1,878.9**
Lighting equipment and furniture, incl. fluorescent lamps, fixtures and pre-fabricated furniture	711.7	666.9	**657.5**
Metal parts and fabrication, incl. tubes, cables, extrusions and their accessories	498.6	660.4	**706.7**

USD Million

The importance of knowledge-intensive sectors within the regional economy

Table I.13. Mexico and Nuevo León's Technological Advance Index (TAI) 2004[8]

Country / Region	TAI
USA (GLOBAL)	0.733
NUEVO LEÓN	**0.476**
MEXICO (GLOBAL)	0.389
COAHUILA	0.326
JALISCO	0.257

The Technology Achievement Index (TAI) report aims to capture how well a country is creating and disseminating technology and building a human skill base, reflecting capacity to participate in the technological innovations of the network age. This composite index measures achievements, not potential effort or inputs. It is not a measure of which country is leading in global technology development, but focuses on how well the country as a whole is participating in creating and using technology[9].

The occupational structure of employment (manual, technical, clerical, professional etc)

Table I.14. Nuevo León's structure of employment by occupation

Sector	%
Professional & technical	9.6
Education	3.5
Art	1.0
Management	7.5
Clerical & administrative support	12.8
Agriculture	0.4
Production, maintenance & material handing	36.3
Service occupations	11.5
Sales & related occupations	14.1
Others	3.3
Total	**100.0**

[8] United Nations, 2004
[9] TAI: http://hdr.undp.org/reports/global/2001/en/pdf/techindex.pdf

Public and Private R&D

Nuevo León's R&D centers are private since they are located within private industries and universities, except those that belong to the UANL, the most important public university in the state. The main areas of the centers are:

- Integrated Systems for Manufacturing
- Industrial Automation
- Product Innovation
- Artificial Intelligence
- Ceramic Materials
- Food Processing
- Environmental Quality
- Biotechnology
- Energy Studies
- Applied Chemistry
- Furniture Design and Testing

Social and cultural characteristics of the region

Basically, Nuevo León's culture is not very different from other cultures in Mexico. Families play a dominant role in the society and are a major influence on individual behavior. Families can be large, and blood relationships are often augmented by extended family including college friends, business associates and others.

The official and first language of the state is Spanish, and English has become the second language in terms of importance and use. The more common cultural activities are related to spending time with family and religion plays a central role in the culture of Mexico and Nuevo León. The most prevalent religion is Roman Catholic (89%), and there is a very small (but increasing) percentage of other religions that are also practiced in Mexico, such as Protestantism (6%) and Judaism.

In terms of the business culture, Nuevo León is known as the State of Progress, a place where vision and an entrepreneurial culture that spans generations have helped consolidate a dynamic society and a position of economic leadership in Mexico and Latin America. The challenges in today's global economy, such as increased competition, continuous innovation, and knowledge development demand that society and the government work together to fortify and enhance existing strengths and build toward a shared vision of the future.

Mexicans in general prefer to do business with people whom they "know." However, knowing a person in Mexico can be a long process[10]. Nuevo León's business culture has a warm, friendly atmosphere with a slower pace, and businessmen may be willing to embrace new ideas and take risks.

According to *América Economía* magazine (May, 2003), Monterrey, Nuevo León, is ranked the easiest city in Latin America to start a business, due to the cooperation between the economic and political sectors, as well as its attitude towards people and entrepreneurial companies.

Table I.15. Best cities for doing business in Latin America

Place	City	Population Millions	GDP per Capita Adjusted by Violence
1	Miami	2.3	27,045
2	São Paulo	18.5	7,553
3	Santiago	6.3	8,283
4	Monterrey	3.3	5,845
19	Ciudad Juárez	1.3	4,046

Source: América Economía (May 25th to May 8th, 2003)

[10] http://www.executiveplanet.com/business-culture-in/132435767175.html

Table I.16. Ease in starting a business

City	Rate	Disposition	Cultural Barriers
Monterrey	5.34	5.45	5.64
São Paulo	4.56	4.98	4.47
Santiago	4.45	4.60	4.41
Bogotá	4.40	4.28	4.68

Source: América Economía (May 25 th to May 8th, 2003)

Note: Scale from 1 (lowest) to 7 (best evaluation)

Table I.17. Top cities for doing business around the world

	Asia/Australia	Europe	Latin America
1	Singapore	London	**Monterrey**
2	Sydney	Amsterdam	Mexico City
3	Melbourne	Budapest	Buenos Aires
4	Hong Kong	Munich	Santiago
5	Taipei	Stockholm	San José

Source: Fortune December 20, 1999

Labor market indicators

Unemployment

Table I.18. Unemployment rate-1/, metropolitan area of Monterrey / 1990–2004[11]

Period	Metropolitan Area of Monterrey
1990	3.5
1991	3.6
1992	3.2
1993	4.9
1994	5.1
1995	8.0
1996	6.2
1997	3.9
1998	3.1
1999	2.2
2000	2.1
2001	2.6
2002	3.4
2003	3.8
2004	4.0

_1/ Percentage of the labor force. Labor force includes the population 12 years old and older

[11] Source: INEGI, National Census Urban Employment

Table I.19. Unemployment by sector in Nuevo León / 1993–2004

EMPLOYMENT BY SECTOR (IMSS) [1/]
NUEVO LEÓN / 1993 - 2004

Sector	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Total	**647,207**	**646,401**	**622,349**	**656,077**	**741,271**	**828,390**	**891,828**	**938,182**	**930,133**	**929,683**	**933,616**	**950,078**
Primary	**14,505**	**15,326**	**15,222**	**15,546**	**15,993**	**15,048**	**11,969**	**11,425**	**11,240**	**10,889**	**10,255**	**10,169**
Agriculture, Cattle, Forestry, and Fishing	14,505	15,326	15,222	15,546	15,993	15,048	11,969	11,425	11,240	10,889	10,255	10,169
Secondary	**319,354**	**309,317**	**290,086**	**311,029**	**360,228**	**413,867**	**457,114**	**477,239**	**451,936**	**437,402**	**430,498**	**432,024**
Mining	4,562	3,954	3,253	3,451	3,932	3,844	3,563	3,645	3,594	3,360	3,481	3,689
Manufacturing	260,198	249,900	241,495	263,058	297,921	331,788	358,908	380,437	360,196	344,841	335,167	336,020
Construction	49,262	49,911	39,211	37,833	51,255	70,859	87,344	85,749	80,576	81,303	83,774	84,283
Electricity	5,332	5,553	6,126	6,688	7,120	7,376	7,299	7,407	7,570	7,898	8,075	8,033
Tertiary	**313,348**	**321,758**	**317,041**	**329,503**	**365,050**	**399,476**	**422,746**	**449,518**	**466,957**	**481,392**	**492,864**	**507,885**
Commerce	114,945	117,682	116,836	120,860	131,251	146,568	156,285	167,091	173,360	177,059	177,702	179,779
Transport and Comunications	40,117	40,845	39,231	40,179	43,664	47,430	52,180	56,231	57,950	60,470	61,085	62,581
Services	158,286	163,232	160,974	168,463	190,135	205,478	214,281	226,196	235,647	243,863	254,077	265,524

Levels of education, including qualifications

Table I.20. Average level of education of EAP[12], 2004

	Total Years	Men	Women
National	8.2	8.1	8.5
State	9.5	9.5	9.6

Source: INEGI (Third trimester of 2004)

Table I.21. Technical and higher education (2002–2003)

	Number of Students per 100,000 Inhabitants		Number of Institutions per 100,000 Inhabitants	
	Technicians	Professionals	Technicians	Professionals
National	0.37	1.91	1.70	3.89
State	0.83	2.91	3.73	3.91

Source: Ministry of Public Education (SEP for its acronym in Spanish)

Table I.22. Technical education[13] (2004)

	Students	Schools
National	359,171	1,659
State	46,734	211

Source: Ministry of Public Education (SEP)

Table I.23. Higher education professional technicians[14]

	Students	Schools	Graduated
National	65,815	4,486	15,737
State	1,565	183	466

Source: Ministry of Public Education (SEP)

[12] EAP: Economically Active Population
[13] Technical Education trains employees for industrial or commercial activities after 9th grade.
[14] Professional Technicians have studies for 2 or 3 years after high school.

Table I.24. Technical education[15] (2004)

	Students	Schools	Graduated
National	1,865,816	3,793	243,095
State	111,662	150	16,102

Source: Ministry of Public Education (SEP)

G. Governance Structure

Structure of central and regional government in the region

At the present time, different sectors are being benefited from the federal and state resources. Areas such as education, small corporations, housing, the health sector, public security, science and technology, and agricultural industry, amongst others, have budgets designated by the state and additional federal resources.

The main source of revenue is from tax collection; only 11% of the state total revenue are state taxes; the remaining state resources are transferred from the federal government.

In regards to regional development, it could be mentioned that the state government has limited responsibility for developing the region. However, depending on the region, the federal government may or may not offer autonomy and economic resources for development. Currently, Nuevo León is implementing the Regional Integration Program of Northeastern Mexican States and Linkage with the State of Texas. For the same purpose, and as previously mentioned in Section E above, the state government created the *INVITE* program in mid-2003. Its most important initiative was the execution of the "ASSOCIATED REGIONAL PROGRESS AGREEMENT" entered into by the states of Chihuahua, Coahuila, Nuevo León, Tamaulipas, and Texas.

Education

As to education, there are two government agencies in charge of educational development in the state: the Ministry of Public Education and the Ministry of Education.

- **Ministry of Public Education (SEP)[16]**
  This is the highest level in the national education system. Its essential purpose is to create the conditions necessary to ensure that all Mexican students have quality education, at the required level and modality, and at the location where they demand it. Every six years this agency is responsible of the elaboration and publication of the National Education Program. The Higher Education Undersecretary is responsible for providing information about the higher education system to students, parents, directors, members of academic communities, institutional planning coordinators, analysts, the Mexican higher education subsystem members, and any other members interested in knowing the main progress of the government administration on higher education.

- **Ministry of Education (SE for its acronym in Spanish)**
  By means of the Undersecretary of Middle/High Education, the state's Ministry of Education coordinates all efforts to attain fair and high-quality middle and high education for students in Nuevo León. This includes educating citizens for a knowledge society to reach a level of fairness and equity especially for the more vulnerable groups. This Undersecretary represents the Ministry in the State Commission for Higher Education Planning (or COEPES for its acronym in Spanish), which, in addition to proposing trend measures with the best rationality and uniformity in educational services, among other duties it is in charge of: (a) promoting a linkage between

[15] Technical education trains employees for industrial or commercial activities after 9th grade.
[16] Ministry of Public Education (*Secretaría de Educación Pública)*: http://www.sep.gob.mx/wb2

universities, middle-high education schools, and the production sector and the society, in order to develop study plans in accordance with their needs; (b) supporting a strengthening and consolidation of COEPES, as the responsible agency of the middle-high and higher education planning in the state, encouraging research, as well as human, scientific, and technological development, and promoting cultural programs in higher education institutions.

The Ministry of Education centralizes all procedures made in the state, and is particularly responsible for educational development and improvement at the elementary, middle, and middle-high levels.

Health and welfare

The health sector shows encouraging signs. The state of Nuevo León, specifically the city of Monterrey, is distinguished for its quality, vanguard, and specialized medical services, as well as its hospital infrastructure. Life expectancy is 77 years, while the national average is 73.1. This state indicator is similar to that of some European nations. Likewise, the state has the lowest child mortality rate in the country, and vaccination coverage reaches 95 percent in urban areas.

In accordance with the 2004 figures, the state has a network of 569 institutions, which include both general and specialized hospital units, as well as outpatient service units. This locates Nuevo León in 14th place nationwide with a total participation of 2.9 compared to the rest of the country[17]. The private institutions (13) are particularly well known throughout the nation for their prestige and specialization in certain areas. However, no public hospitals have been built in the last 8 years. There is concern about the insufficiency of nurses in the state, and in spite of the significant modernization made by the Distance Specialized Medicine Program, rural areas and other suburban migration groups have a limited health services coverage.

As to the administration of public health services, there are four state agencies responsible for assuring medical service for state habitants.

- **Ministry of Health - (SS for its acronym in Spanish)[18]**
  It is the federal public agency responsible of elaborating the National Health Program, with a mission of contributing to fair, involved, and sustainable human development through the promotion of health as a shared social purpose. Other goals include universal access to integral and high quality services, satisfying needs and responding to population expectations, and offering professional progress opportunities to service providers in an equal financing framework, with honest, clear, and efficient use of the resources with the broadest citizen participation.

  The National Health Program foresees the formation of an equal, solitary, plural, efficient, high-quality and decentralized universal health system with participation linked to development. Likewise, the program is looking for better health conditions for Mexicans, and preferentially supporting the needs of the most vulnerable groups, with the expressed purpose of reducing to a large extent any health gaps that may arise among the different population subgroups.

  The action programs of the SS are to:
  1. Link health with economic and social development.
  2. Reduce health setbacks affecting poor people.
  3. Face emerging problems through explicit definition of priorities.
  4. Spread a crusade for quality health service.
  5. Offer financial support to population for health issues.
  6. Build a cooperative federalism on health issues.

[17] http://www.inegi.gob.mx/est/contenidos/espanol/rutinas/ept.asp?t=msal16&c=3893&e=19
[18] Ministry of Health: http://www.salud.gob.mx/

7. Strengthen the main role of the Ministry of Health (performance assessment, sanitary risk protection, national health information system and national epidemiology surveillance system).
8. Move forward to an integral model of health service.
9. Strength human resources investment, health research and infrastructure (managerial training, education, formation and training of health personnel, health research, physical infrastructure, optimization program, and civil service in the careers of health professionals).

- **Mexican Social Security Institute - (*Instituto Mexicano del Seguro Social* or IMSS)**[19]
  The Social Security Law establishes that "Social Security has the purpose of guaranteeing the human rights of health, medical assistance, means of subsistence, and required social services for individual and collective welfare." The Social Security Mexican Institute has the mission of offering Mexican workers and their families' sufficient and timely protection for any contingency, such as illness, disability, old age or death. The organization and administration of Social Security is entrusted to the IMSS.

  Such protection is given not only to health but to subsistence means, as well as whenever illness prevents a worker from continuing to perform his or her productive activity, whether temporarily or permanently. The purpose of the social service for collective and essential benefit is oriented towards increasing family income, learning methods to improve welfare level, developing artistic and cultural fondness, and even making a better use of free time.

  Its mission implies a decided position in favor of workers and their families; a supporting mission that goes beyond ordinary public assistance, with a trend toward realizing the solidarity principle between society and the state towards its most vulnerable members.

  Simultaneously, due to its nature, the Institute acts as one of the most efficient mechanisms for redistributing social wealth, contributing to social justice in the country. Among other roles, institutional labor helps to lessen social and political pressures. Mexican workers consider the IMSS to be one of the lasting accomplishments that resulted from long social fights, and it is a legacy that they are not willing to give up.

  With 60 years of continuous service, the IMSS is considered the largest Social Security institution in Latin America. It is a fundamental anchor of individual and collective welfare in the Mexican society and a major factor in the reallocation of wealth in Mexico. In spite of some weaknesses, the IMSS continues to be an invaluable resource for Mexican workers' health and welfare, and it faces the challenge of building the Mexican social security of the next century. Recently, the population receiving benefits rose to 46,813,307 individuals. The total number of permanently insured people reached 12,419,533, and the total number of retired people became 2,220,472.

- **Ministry of Health in Nuevo León**
  It is a centralized public agency with the mission of increasing the quality of life for habitants in the state of Nuevo León, seeking health in its entire environment as the main engine for the physical, psychological, and social development of individuals, with the joint efforts of public and private institutions.

  The primary objective of this agency is to care for and improve the population's health in Nuevo León, with prevention as the main principle, and to increase the quality of life and feeling of hope. Its main attributions are as follows:

  1. To exercise all roles established by the General Law of Health for federal entities, the State Law of Health, and related local health statutes, as well as those established in any

[19] Social Security Mexican Institute: http://www.imss.gob.mx/imss

decentralization agreement between the state and the Ministry of Health of the federal government;
2. To propose any policies and coordination programs with federal and municipal authorities on health issues, specifically prevention and social medical services;
3. To organize and control any centers or other public health institutions of the state;
4. To plan and implement sanitary campaigns to prevent and eradicate all illness and epidemics in the state territory, in coordination with the appropriate federal and municipal authorities;
5. To plan, develop, direct, and survey all health services provided in the state in terms of the corresponding legislation;
6. To encourage decentralization of health services to all municipalities by means of agreements executed in the State Law of Health framework;
7. To promote, coordinate, and perform program assessments and health services required by the governor of the state;
8. To coordinate the schedule of any health activity in the state, according to applicable law;
9. To motivate scientific and technological activities regarding health issues;
10. According to its attributions, to assist any other competent federal agencies, in the technology transfer process within the health area;
11. To promote the establishment of a basic information system for health matters in the state;
12. To support any coordination between health and school institutions to create and train human resources for health;
13. To assist in the formation and training of human resources to provide health services in the state;
14. To promote and motivate the participation of the community to elaborate health care programs;
15. To monitor, in accordance with its attributions, the application of Mexican official standards issued by competent authorities in health matter;
16. To ensure that all professional, technical, auxiliary and other health service providers are compliant to the law, and in accordance with its attributions as the local authority, also support training and updates;
17. In coordination with other agencies and competent entities, to perform prevention and control actions for care of the environment whenever it affects the population's health;
18. To establish, in terms of any applicable legal provision, required sanitary security measures to protect the population's health;
19. To impose and apply sanctions in terms of any law, regulation, and other legal provisions in this matter, to health service providers which are non-compliant with such observations;
20. To know and solve, if applicable, any administrative resource filed by individuals against any act made by this Ministry.

Health Services in Nuevo León[20]
It is a decentralized public agency formed on December 18, 1996, which responsibility is to assist the "entire population" that is not part of the Social Security Institute and has no access to private medical care.

The health services model for the entire population (with no kind of distinction) offers a basic package for providing health services to the unprotected populations of eight sanitary jurisdictions within the state.

- Security and Social Services for Workers in the State of Nuevo Leon Institute - *Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado de Nuevo León* or ISSSTELEON for its acronym in Spanish)[21]
  ISSSTELEON is a decentralized public agency of the state of Nuevo León's government. Its function is to administrate all insurance and benefits granted to active government employees, senior government workers, retired workers and their families. The agency was formed in 1983 by a law that years later disappeared to make way for a new one in 1993. At the present time, there are

[20] Health Services in Nuevo León: http://www.nl.gob.mx/?P=serv_salud
[21] ISSSTELEON: http://www.issteleon.gob.mx/

32 agencies and public entities of the three powers incorporated in the state of Nuevo León, in addition to an administrative building and an outpatient clinic.

Its mission is to protect the health and economic welfare and life quality of government employees, as well as senior citizens and retired employees of the state of Nuevo León's government and their beneficiaries. Its main functions are to administer medical services to the union and to provide insurance and benefits to the same.

Cultural Provision

In addition to the corresponding functions of the Ministry of Public Education, the state government established for the public the Art and Culture Board for Nuevo León (*Consejo para la Cultura y las Artes de Nuevo León* or CONARTE for its acronym in Spanish). This is a public agency responsible of supporting cultural development through a plural, democratic, and participative program, which encourages and promotes artistic expression, increases cultural values, and protects, keeps, and promotes the cultural heritage. This agency is also responsible of the promotion and coordination of federal, state, and municipal relationships, as well as relationships with public and private institutions. Its commitment is to offer cultural options and alternatives for the entire society.

Also, the state government, through its Ministry of Tourism, is currently engaging in a series of activities to promote "Cultural Tourism" in the region, through the publication of artistic events, exhibitions, and shows, organized by culture institutions, such as museums (34[22]), art galleries (6), theaters (14), and libraries (293[23]) in the state, among others.

On the other hand, Monterrey in particular has a deep cultural activity, as a result of the work made by the main universities located in the metropolitan area. Likewise, a number of cultural activities are sponsored by the private sector, such as concerts, dance performances, exhibitions, and plays, among others.

Influence of regional authorities over the provision of tertiary level education, research, teaching and cultural development

As shown in the following chapters, the role of the government of the state of Nuevo León is to encourage and promote education, culture, and above all, science and technology, which are catalysts in the integral development of the region.

To continue with the guidelines established by the State Development Plan 2003–2009, the state government, through its several agencies, such as the Ministry of Education, Ministry of Economic Development, Ministry of Tourism, INVITE Program, and Monterrey as International City of Knowledge Project, amongst others, has achieved satisfying and substantial progress for the coordination of efforts and resource optimization. These agencies have strategically adhered to the participation of several universities in the region, as well as other federal governmental agencies, such as CONACYT and SE.

This synergy has created the required basis to establish collaboration agreements and create main institutions to accomplish tangible efforts towards achieving the regional development goals established by the government to benefit the regional development. Today, more than ever, the regional players - universities, the private sector, and government - are aware of the importance of their commitment and participation as key elements of the economic, educational, and cultural development in the region.

[22] INEGI: http://www.inegi.gob.mx/est/contenidos/espanol/rutinas/ept.asp?t=mcul08&c=3135
[23] INEGI: http://www.inegi.gob.mx/est/contenidos/espanol/rutinas/ept.asp?t=mcul02&c=3129

II. CHAPTER TWO: CHARACTERISTICS OF THE HIGHER EDUCATION SYSTEM

A. Overview of the National System of Higher Education

Characteristics of the national higher education system

As previously described, the highest institution in the nation for education matters is the Ministry of Public Education (SEP). It is the highest level in the national education system. Its essential purpose is to create the conditions necessary to allow all Mexican students to have the assurance of a quality education, at the required level and modality, and at the place where demanded. Every six years, this agency is responsible for the elaboration and publication of the National Education Program. The Higher Education Undersecretary is responsible of providing information about the higher education system to students, parents, directors, members of academic communities, institutional planning coordinators, analysts, higher education subsystem members, and any other members of the public interested in knowing the main progress of the government administration on this issue.

Undergraduate population in higher and graduate degrees

According to the latest figures from the ANUIES[24], during 1992–2003, the undergraduate population increased 40%, from 79,772 to 111,662 students. By 2003, the state of Nuevo León was in 4th place in undergraduate population, representing 6% of the national total. See Table II.1.

Table II.1. Undergraduate population by federal entity, ANUIES for 1992–2003

Federal Entity	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Nuevo León	79,772	77,190	78,296	81,082	83,127	85,926	87,872	90,228	93,051	96,932	107,748	111,662
National Total	1,126,805	1,141,568	1,183,151	1,217,431	1,286,633	1,310,229	1,392,048	1,481,999	1,585,408	1,660,973	1,771,969	1,865,475
%	7%	7%	7%	7%	6%	7%	6%	6%	6%	6%	6%	6%

From 1970 to 2003, the study plan degree structure in Mexico was distinguished for its concentration in social-administrative and technology-engineering fields, representing 70% and 80% of the enrollment at the professional level. By 2003, this concentration was also present in the state of Nuevo León, and the undergraduate concentration in these fields was 51% and 36%, respectively. See Table II.2.

Table II.2. Undergraduate population in study plan areas and regions from ANUIES, 2003

Region	Total	Farming Sciences	Health Sciences	Natural and Basic Sciences	Social and Admin. Sciences	Education and Humanities	Engineering and Technology
1. Northwest	236,408	4,766	14,207	3,829	124,462	6,843	82,301
2. Northeast	308,711	6,894	26,442	1,994	142,746	10,106	120,529
Nuevo León	111,662	752	9,332	543	56,816	3,546	40,673
3. Central west	281,502	7,045	30,118	3,600	140,997	14,174	85,568
4. Central south	275,158	5,850	24,808	6,280	136,666	14,535	87,019
5. South -southeast	286,972	8,846	24,589	5,459	121,616	28,119	98,343
6. Metropolitan Mexico City	476,724	8,689	44,289	14,589	234,726	20,003	154,428
Total National	1,865,475	42,090	164,453	35,751	901,213	93,780	628,188

In accordance with the latest education statistics published by the SEP[25], the undergraduate and graduate population is as follows:

[24] ANUIES: National Association of Higher Education Institutions (*Asociación Nacional de Universidades e Instituciones de Educación Superior)*: http://www.anuies.mx/
[25] Education Statistics, 2005: http://www.sep.gob.mx/wb2/sep/sep_1413_estadisticas_educati

Table II.3. Undergraduates in bachelor's degree, SEP 2005

Total National

Support and Service	2004-2005
Total University Degree	2,087,698
Total National	333,985
Total State	197,290
Total Independent	894,205
Total Private	662,218

Total Nuevo León

Support and Service	2004-2005
Total University Degree	112,887
Total National	3,751
Total State	1,172
Total Independent	57,362
Total Private	50,602
Public University Degree	62,285

Table II.4. Graduates in graduate degree, SEP 2005

Total National

Support and Service	2004-2005
Total Masters Degree	150,852
Total National	18,773
Total State	6,251
Total Independent	61,597
Total Private	64,231

Total Nuevo León

Support and Service	2004-2005
Total Masters Degree	10,627
Total National	193
Total State	913
Total Independent	3,853
Total Private	5,668
Public Masters Degree	4,959

Statistics, Teaching Staff in Bachelor's Degree and Graduate Degree

Table II.5. Teaching staff in bachelor's degree, SEP 2005

Total National

Support and Service	2004-2005
Total University Degree	206,903
Total National	26,331
Total State	14,804
Total Independent	85,414
Total Private	80,354

Total Nuevo León

Support and Service	2004-2005
Total University Degree	8,013
Total National	392
Total State	118
Total Independent	3,910
Total Private	3,593
Public University Degree	4,420

Table II.6. Teaching staff in graduate degree, SEP 2005

Total National

Support and Service	2004 - 2005
Total Masters Degree	28,016
Total National	5,427
Total State	1,000
Total Independent	11,868
Total Private	9,721

Total Nuevo León

Support and Service	2004-2005
Total Masters Degree	1,947
Total National	15
Total State	81
Total Independent	1,224
Total Private	627
Public Masters Degree	1,320

Table II.7. Schools for bachelor's degree, SEP 2005

Total National

Support and Service	2004-2005
Total University Degree	2,847
Total National	239
Total State	275
Total Independent	729
Total Private	1,604

Total Nuevo León

Support and Service	2004-2005
Total University Degree	120
Total National	5
Total State	3
Total Independent	31
Total Private	81
Public University Degree	39

Table II.8. Schools for graduate degree, SEP 2005

Total National

Support and Service	2004-2005
Total Masters Degree	1,361
Total National	188
Total State	61
Total Independent	512
Total Private	600
Public Master Degree	761

Total Nuevo León

Support and Service	2004-2005
Total Masters Degree	71
Total National	1
Total State	3
Total Independent	26
Total Private	41
Public Master Degree	30

Higher education provided in relation to the settlement structure

Currently, universities offer 163 Bachelor's degree programs, 130 Masters Programs, 35 Doctorate programs and, specifically in the UANL there are currently about 53 specialization programs.

Table II.9. Education offered for bachelor's degree, masters, and doctorate programs.

University	UDEM	UANL	ITESM	Total
Number of bachelor's degrees	31	67	65	**163**
Number of masters programs	10	70	50	**130**
Number of doctorate programs	0	25	10	**35**

In terms of campus locations, UDEM has only one campus located in the municipality of Santa Catarina, one of the 7 municipalities that comprise the metropolitan area of Monterrey. On the other hand, ITESM has its main campus in the city of Monterrey and also has a campus network throughout the country, including one in Coahuila and one in Tamaulipas, contiguous states of Nuevo León. *Tecnológico de Monterrey* also has access to other locations in the state, region, and country by means of its different academic programs, which are offered online and via satellite through its virtual university as continuing education and community service programs.

UANL has 26 facilities and offers 215 bachelor's degree and graduate degree programs. In addition, the university educates specialized technicians and associated professionals satisfying the high school education requirements and sub-professional studies of 50,000 students. Of the 51 municipalities that make up the state of Nuevo León, UANL is located in number 8; its campuses comprise 6,763 hectares, more than 100,000 m^2 built in several locations of Nuevo León. The larger campuses are *Ciudad Universitaria*, *Mederos*, *Área Médica*, *Loma Larga*, and *Linares*. See Exhibit II.

In addition to the university system, the state of Nuevo León has a network of five universities and technological institutes, with four of them located in the metropolitan area of Monterrey and a fifth in the city of Linares, Nuevo León.

1. *Universidad Tecnológica de Santa Catarina* (Sta. Catarina)
2. *Universidad Tecnológica Gral. Mariano Escobedo* (Escobedo)
3. *Universidad Tecnológica de Linares* (Linares)
4. *Instituto Tecnológico y de Estudios Superiores de Monterrey* (Monterrey)
5. *Instituto Tecnológico de Nuevo León* (Guadalupe)

Data analysis at a national level to establish the demand and supply of different types of higher education

The criteria for opening of an institution and education programs are basically regulated by the Federal Law of Education, State Law of Education, Regulation of the Ministry of Education, and the criteria established by the COEPESNL. Likewise, each state defines its programs and education projects based on two official documents: the National Plan of Education of the Federal Government and the National Plan of Education.

National Plan of Education
Traditionally, Nuevo León has had education as a priority. A quality education system is the most viable alternative for reaching social, economic, and productive development in the state and in the country. Nuevo León's population of 15 years or more has an average school grade of 9.2, and the national average is 7.9; only 2.9 percent is illiterate, in contrast with 8.5 percent in the country overall. However, several challenges still exist in the matter of education in the state.

As a reference, the State Development Plan includes the following as its main objectives within the scope of education:

- To broaden its education services coverage, specially to disadvantaged groups.
- To improve education opportunities for the population in poverty and excluding conditions.
- To offer a quality education that allows Nuevo León's students to make progress and compete with human, ethical, and civic values.

To follow up these objectives of the state plan, the state government introduced an Education Sector Program 2004–2009. Chapter I includes a diagnosis showing the need to undertake actions aimed at quality education improvement for any kind and modality, stronger pre-school and middle instruction, training and professional development for teaching personnel, as well as internship programs. The sector diagnosis foresees the existence of conditions for growth in Nuevo León's education in terms of expanding services, increasing quality, and integrating the requirements of present economic politics.

Chapter II makes reference to the ideal addressed in the education system's efforts, which is to achieve an integral, equal, and quality education system that educates citizens and is committed to creating a society of knowledge and sustainable community development.

Chapter III details all strategies and courses of action that lead to this purpose. Amongst others, the following are highlighted:

- To motivate an integral education reform in the state.
- To strengthen elementary education by broadening its coverage, as well as improving its quality to recover national leadership.
- A better education and social integration of students with special needs.
- To secure and extend the middle-high education supply.

Chapter IV includes a performance indicator relationship, where a control and assessment of educational results system will be built. Amongst other indicators, we need to increase the average school grades in the state and improve the elementary and middle education completion rate.

Basic governance of and regulatory framework for the higher education system: funding mechanism and institutional autonomy

As mentioned in the previous chapter, there are two governmental agencies, axis of the state education development: the Ministry of Public Education (SEP[26]) and de Ministry of Education (SE).

- **Ministry of Public Education (SEP)[27]**
  This is the highest level in the national education system. Its essential purpose is to create the conditions necessary to ensure that all Mexican students have quality education, at the required level and modality, and at the location where they demand it. Every six years this agency is responsible of the elaboration and publication of the National Education Program. The Higher Education Undersecretary is responsible for providing information about the higher education system to students, parents, directors, members of academic communities, institutional planning coordinators, analysts, the Mexican higher education subsystem members, and any other members interested in knowing the main progress of the government administration on higher education.

- **Ministry of Education (SE)**
  By means of the Undersecretary of Middle/High Education, the state's Ministry of Education coordinates all efforts to attain fair and high-quality middle and high education for students in Nuevo León. This includes educating citizens for a knowledge society to reach a level of fairness and equity especially for the more vulnerable groups. This Undersecretary represents the Ministry in the State Commission for Higher Education Planning, in addition to proposing trend measures with the best rationality and uniformity in educational services, among other duties. The Ministry of Education centralizes all procedures made in the state, and is particularly responsible for educational development and improvement at the elementary, middle, and middle-high levels.

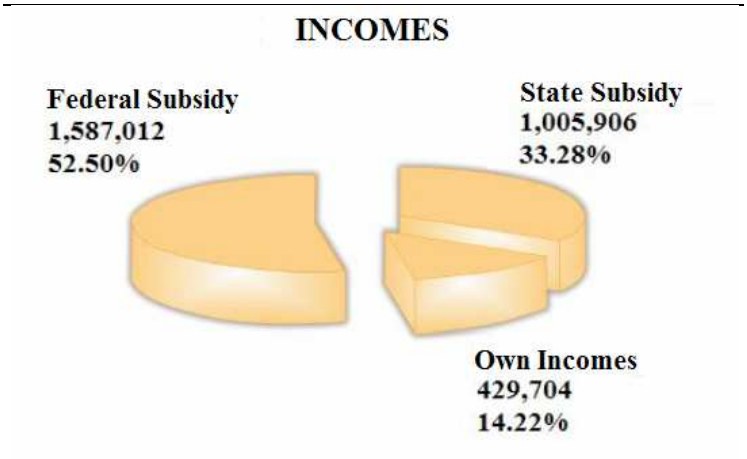
- **State Commission for Higher Education Planning of Nuevo León (COEPESNL)**
  One of the most important coordinating instruments in higher education areas is the State Commission for Higher Education Planning of Nuevo León[28]). It is a state agency that is coordinated with the National Higher Education Planning System. The agency's main goal is to permanently plan the higher-level development of the Mexican state of Nuevo León, according to the National and State Development Plans and simultaneously related to the National Coordination for Higher Education Planning (*Coordinación Nacional para la Planeación de la Educación Superior* or CONPES for its acronym in Spanish) and regional and state agencies which purpose is higher education.

  The COEPES in Nuevo León is a social consultation agency of the state government in issues related to the higher-level education sector. Its agreements, results and determinations are made on a consensual and proposal basis. Its goal is to contribute to the improvement of a higher education quality through participation and exchange of experiences.

  In regard to its financing, depending on whether it is public or private, a higher education institution's budget is comprised of funds assigned by the federal and state governments, as well as income generated by each one through its own mechanisms from financial campaigns, such as funds received from their directors, lotteries, among others. For private universities, no public funds are assigned as part of their budgets. However, the federal and state governments contribute with financial funds from specific programs, like scholarships or science and research projects. In contrast, public universities, specifically the UANL, do receive public funds annually, which represent a substantial percentage of their budgets. *See next figure.*

[26] Ministry of Public Education: http://www.sep.gob.mx/wb2
[27] Ministry of Public Education (*Secretaría de Educación Pública)*: http://www.sep.gob.mx/wb2
[28] National Coordination for Higher Education Planning or *Comisión Estatal para la Planeación de la Educación Superior* (COEPES): www.coepes-nl.edu.mx

Figure: II.1 *University Budget 2005*[29]



**** Numbers in thousands MXN***

B. Regional Dimension "Inside" the National Higher Education Policy

Regional dimension of the national higher education policy

The National Development Plan prepared by the federal government, particularly for 2001–2006, has a direct impact on higher education for each state through the State Development Plan, keeping ties through strategies designed to abolish inequality of opportunities when accessing education at all levels.

The National Development Plan for 2001–2006[30] establishes an education focus for the XXI century, summarized as follows:

> By 2025, the National Educational System, organized on equity and quality values, will offer the population throughout the country a relevant, inclusive, and integrally forming education, to constitute a fundamental axis in cultural, scientific, technological, economic, and social development for Mexico.
>
> Due to its pedagogic conception and a creative use of technology, Mexican education shall be effective, innovative, and productive. Its results will be known nationally and internationally for their fine quality, resulting from teaching personnel professionalism, from resources provided to their responsibilities, from the use of information to feed any planning and decision making, and from strict and reliable assessment mechanisms.
>
> The education system shall be an organization that will learn from its environment, and will promptly adapt to changes with a flexible and diversified structure, corresponding to an original federalism. It shall include formal teaching and life and work education, framing kinds, levels and modalities, and the schools and institutions of the system amongst them and outwards. It shall have effective consulting agencies, with a functional legal framework and participation and support from society.

In accordance to the aforementioned, the National Development Plan for 2001–2006 includes strategic objectives derived from the National Educational Plan, which shall also be included in the education plans for each state, and which also shall be consistent with strategies and priorities proposed nationally. Its objectives are as follows:

- Proceed towards equity in education.
- Provide quality education appropriate for Mexican needs.
- Promote education federalism, institutional management, and social participation in education.

[29] Second Annual Report from Mr. Jose Antonio González Treviño, Chapter 5.
[30] National Education Plan: http://redescolar.ilce.edu.mx/redescolar/servicios/plan/plan_sep.pdf

Each state, however, has the autonomy to incorporate in its education strategy those academic priorities that, due to its own region's economic and social characteristics are relevant for regional development and social welfare.

Particularly for the state of Nuevo León, the education plan is considering the value of reaching a profile of education coverage similar to that of the most developed countries, assuming an increase in the number of secondary school graduates. It also considers that the expansion of middle-high and higher education services may not be accomplished if a greater number of young students do not complete middle school. Middle school coverage is 87% in the country; Nuevo León reaches 91%. Still, there are many population groups in which there is great inequality of access to education services: marginal rural communities, migrant agriculture laborer, and, in urban areas, children in the streets. Furthermore, if compared to elementary education, desertion and failure rates in middle school are still high, resulting in low completion efficiency; which is considered one of the reasons why the present demand for middle-high and higher education services remains sluggish.

Moreover, the challenge to broaden middle-high and higher education services coverage establishes an additional challenge to apply even more resources to the state education system. On average, the cost of assisting young students obtaining higher education is greater than the expenditure for each one of the middle-higher education pupils, and this expenditure is even greater than the cost per pupil in elementary school. Still, education expenses represent a fourth of the scheduled expenditure of the federal government (compared to a 13% average in the OECD) and half of the total expenditure in Nuevo León. The amount in absolute terms should increase in order to assist more students in education levels that require greater investment. Population growth will vary in different regions of the state. It is likely to increase investment in the education infrastructure, bringing education services to places where population growth will be concentrated.

Finally, the education plan proposes, as one of its strategic objectives, to offer integrated higher education services that are committed to the state development process. The goal would be to strengthen areas of excellence in universities and to develop niche opportunities in new knowledge fields, such as biotechnology, mechatronics, nanotechnology, microelectronics, and information technology and communication. Therefore, it has been proposed that inter-institutional agreements be established between universities in the state of Nuevo León and the best universities in the country and abroad. It has also been proposed that the exchange of high-level teaching and scientific personnel (national and abroad) should be promoted among local, national, and international higher education institutions.

The education plan emphasizes the strategic link of universities with companies to promote research and development schemes and continuous training programs. It also emphasizes the value of encouraging human, scientific, and technological development in higher education institutions, in order to educate professionals with an entrepreneurial and competitive spirit internationally.

As a consequence of the aforementioned, the present state budget includes a large investment in state higher education, particularly concerning the development of science and technology. One example is the budget assigned to the Innovative and Technology Transfer Institute of Nuevo León (I^2T^2), in collaboration with the three most important universities in the state (ITESM, UANL & UDEM), as well as CONACYT, to carry out the construction of the Technological Research and Innovation Park (*Parque de Investigación e Innovación Tecnológica* or PIIT). When completed, the Technological Research and Innovation Park will provide 16 new research centers to the region, as well as the resources to perform the Universal Forum of Culture 2007, which undoubtedly will have a strong impact in education and cultural aspects to the State.

C. Regional Higher Education System and Governance

Basic profile and character of higher education institutions in the region

Nuevo León has traditionally regarded education as a priority; the government and the society recognize the role of people's upbringing in the state's social and economic growth. However, the contrasts in the educational sector are evident when comparing the coverage and level of schoolwork between the metropolitan area of Monterrey and the rural areas with larger marginalization. It is important to recognize, however, that on average, the relative situation of the state's educational sector is solid in the national context.

As stated earlier, Nuevo León's population over 15 years old achieves an average of 9.2 years of schoolwork, while the national average is 7.9 years; only 2.9% of the population is illiterate, compared to 8.5% of the whole country. In the middle and high education, the state is still one of the best in the nation.

The state has 43 HEI, or 1.13% of the country's HEI. Four public universities serve to more than 61% of the total enrollments in HEI. The largest public university is the *Universidad Autónoma de Nuevo León* (UANL), which currently concentrates 60,916 students.

There are large and very old universities, such as the *Universidad Autonóma de Nuevo León* and the *Instituto Tecnológico de Estudios Superiores de Monterrey* (ITESM), which have been considered pillars of the economic development in the state since 1933 and 1945 respectively. Also, the UDEM, after only 37 years, is currently considered one of the universities with the strongest impact in the state.

Figure II.20. *General information on the most important HEI in the region*

	UDEM	UANL	ITESM
Total number of students (undergraduate and graduate)	8,774	65,086	18,487
Number of freshmen per year	1,914	10,701	-
Number of graduates per year	1,031	7,959	3,459
Number of majors	31	67	65
Number of masters programs	10	70	50
Number of Ph.D. programs	0	25	10
Number of professors	855	5,671	2,800
Cost of tuition per semester and course:			
• *Per undergraduate course*	$1,210	-	$8,936
• *Per undergraduate semester*	-	$2,170	$53,616
• *Per Masters course*	$2,761	-	$20,100
• *Per Masters semester*	-	$3,585	$58,625
Number of scholarships offered per semester	Undergraduate: 3,245 Masters: 317	Total: 22,210	Undergraduate: 34.4% Master's: 48.8%
Number of research centers in the state	10	38	35
Number of researchers in the SNI[31]	46 [-1]	133[-2]	44[-3]
% of budget destined for research projects (expressed in Mexican pesos)	Scientific Research: $233,989 Technological Development: $2,898,395 HR for research: $276,200	$178,673,000	$191,000,000

[-1] Only 4 belong to the SNI

[-2] There are currently 50 researchers with candidacy status in the UANL.

[-3] Currently in the Monterrey Campus there are 39 researchers with candidacy status. The ITESM has 100 researchers who are members of the System (SNI) and 90 with candidacy status.

[31] SNI: National Researches System (*Sistema Nacional de Investigadores)*

In general, all the institutions have grown at a higher rate than the average growth rate of the state's population; the indicators demonstrate that the universities have attracted an out-of-state population, or a population from other states and from abroad.

At the administrative level, each institution has the autonomy to administrate its facilities and human resources, and to develop and update its study plans. However, it is important to mention that the ITESM is a system comprised of several campuses in different states of Mexico, and its corporate facility or main campus is in Monterrey. This systematic structure offers the institute an extraordinary advantage in terms of optimization of resources, economies of scale, and standardization of process.

There are other universities in the region, which at first might be considered rather small. Nevertheless, they have become more and more important in the state. For example, the *Universidad Regiomontana* (UR for its acronym in Spanish[32]), which is now considered the fourth most important in the state due to its size. According to the latest numbers reported by the UR, the university has 3 colleges: Economic and Administrative Sciences, Engineering and Architecture, and Humanities and Social Sciences. It consists of 5 units (campuses) located in different parts of the metropolitan area of Monterrey. It has a student body of 3,174 undergraduates and 599 graduates. Its faculty is made up of 58 professors in the departments of Humanities, Engineering, Baccalaureate, and Economic Sciences.

Lastly, there are some recently created universities, such as *Tec Milenio*[33] and the *Universidad Tecnológica de México* or UNITEC (which depends on a corporate institution located in Mexico City) that have been constantly growing in recent years, since they offer new educational models and more flexible three-month plans. These constitute very accessible educational choices and offer students the possibility of studying and working at the same time.

Tec Milenio
This is a university created by the ITESM which goal is to establish certain conditions so that its students may learn skills that will enable them to respond to the requirements of the job market, which demands more and more from professionals. The *Universidad Tec Milenio* currently has 22 campuses in Mexico, three of which are located in the city of Monterrey.

In the extracurricular environment, the university aims to establish consistency with the productive sector to offer the student job opportunities by promoting a link between the university content and the significant learning required in the job environment. Knowledge and skills recommended by internationally recognized certifying organizations are integrated into university programs. This offers students a great advantage in becoming competitive in the job environment. Specific requirements of knowledge and skills from internationally recognized organizations that provide certifications are also considered in the students' training. This way, students may decide to obtain them and have advantages that will make them competitive in their job lives. The curriculum design is as follows:

- Each major is divided into 6 basic modules and 3 of specialization; this is a poly-modular plan.
- It is designed in modules; that is, each major is divided into 6 basic modules and 3 of specialization; this is why it is called a poly-modular plan.
- The contents of each module are designed based on specific indications from certifying organizations.
- It is designed based on competencies; each module reflects the integration of contents that allow the students to learn specific requirements from the certifying organizations.

Historically, the coordination among universities in order to develop plans together, the homologation of academic programs, or the making of projects in collaboration has been almost null. The only liaison established so far is the direct relationship that each university has with government entities, both state and federal. They are responsible of establishing strategic courses of action derived from the national plan that will be applied in each state. However, a new era in the history of relationships among

[32] Universidad Regiomontana: http://www.ur.mx/
[33] Tec Milenio: http://www.tecmilenio.edu.mx/

universities has emerged as a consequence of strong support by the state government for the establishment of relationships among universities, businesses and the government. As has been described before, the Monterrey International City of Knowledge Project has become the setting for the establishment of collaborative conventions and the commitment of educational and governmental institutions for the benefit of regional development.

III. CHAPTER THREE: CONTRIBUTION OF RESEARCH TO REGIONAL INNOVATION

A. Responding to Regional Needs and Demands

Traditionally, the CONACYT has been in charge of research efforts and initiatives at national level. The federal public institution's goal is to consolidate a National Science and Technology System that will meet the country's priorities, solves problems, responds to specific needs, and contributes to the improvement of living standards and the well-being of the country's population. Today this institution has 27 public research centers in several Mexican states[34]. Please refer to the following tables.

Table III.1. Research centers according to their generic study area

Exact Sciences and Natural Sciences (10)

Research Center	Location (State)
1. Food and Development Research Center - *Centro de Investigación en Alimentación y Desarrollo, A.C.* or CIAD	Sonora
2. Scientific and Higher Education Research Center of Ensenada, B.C. - *Centro de Investigación Científica y de Educación Superior de Ensenada, B.C* or CICESE	Baja California
3. Northeaster Biological Research Center - *Centro de Investigaciones Biológicas del Noreste, S.C.* or CIBNOR	Baja California Sur
4. Scientific Research Center of Yucatan - *Centro de Investigación Científica de Yucatán, A.C.* or CICY	Yucatán
5. Mathematics Research Center - *Centro de Investigación en Matemáticas, A.C.* or CIMAT 6. Optics Research Center - *Centro de Investigaciones en Óptica, A.C* or CIO	Guanajuato
7. Advanced Materials Research Center - *Centro de Investigación en Materiales Avanzados, S.C.* or CIMAV	Chihuahua
8. National Astrophysics, Optics and Electronics Institute - *Instituto Nacional de Astrofísica, Óptica y Electrónica* or INAOE	Puebla
9. Institute of Ecology - *Instituto de Ecológica, A.C.* or INECOL	Veracruz
10. San Luis Potosí Scientific Research Institute - *Instituto Potosino de Investigación Científica* or IPICYT	San Luis Potosí

Social Sciences and Humanities (8)

Research Center	Location (State)
1. The Northern Boarder College - *El Colegio de la Frontera Norte, A.C.* or COLEF	Baja California
2. The Southern Boarder College - *El Colegio de la Frontera Sur* or ECOSUR	Chiapas
3. Economic Research and Teaching Center - *Centro de Investigación y Docencia Económicas, A.C.* or CIDE 4. Social Anthropology Research and Higher Education Center - *Centro de Investigaciones y Estudios Superiores en Antropología Social* or CIESAS 5. Geographic and Geomatics Research Center - *Centro de investigación en Geografía y Geomatica* or CIGGET 6. "Dr. José María Luis Mora" Research Institute - *Instituto de Investigaciones "Dr. José María Luis Mora"* or MORA	Mexico City
7. The College of Michoacán - *El Colegio de Michoacán, A.C.* or COLMICH	Michoacán
8. The College of San Luis - *El Colegio de San Luis, A.C.* or COLSAN	San Luis Potosí

Technological Development (9)

Research Center	Location (State)
1. Applied Chemistry Research Center - *Centro de investigación en Química Aplicada* or CIQA 2. Mexican Corporation of Materials Research - *Corporación Mexicana de investigación en Materiales, S.A. de C.V.* or COMIMSA	Coahuila
3. Human Resources Development Fund - *Fondo para el Desarrollo de Recursos Humanos* or FIDERH	Mexico City

[34] CONACYT: www.conacyt.mx

4. Industry Information and Documentation Fund - *Fondo de Información y Documentación para la Industria* or INFOTEC	
5. Applied Innovation in Competitive Technologies Center - *Centro de Innovación Aplicada en Tecnologías Competitivas* or CIATEC	Guanajuato
6. Technology and Design Research and Assistance Center of Jalisco - *Centro de Investigación y Asistencia en Tecnología y Diseño el Estado de Jalisco, A.C.* or CIATEJ	Jalisco
7. Advanced Technology Center - *Centro de Tecnología Avanzada, A.C.* or CIATEQ 8. Engineering and Industrial Development Center - *Centro de Ingeniería y Desarrollo Industrial* or CIDESI 9. Electrochemistry Research and Technological Development Center - *Centro de Investigación y Desarrollo Tecnológico en Electroquímica, S.C.* or CIDETEQ	Querétaro

Although the state of Nuevo León does not have any CONACYT research centers, research is a source of great scientific activity in the region – it is mostly basic research for academic purposes – and it has traditionally been carried out by higher education research centers and important government institutions.

As far as college research is concerned, there are two types we should consider: ***reactive research***, based on project demands and needs put forward by the community, carried out through various connections such as extra-curricular programs, continuing education, work placement and educational extension; and ***proactive research***, internal and innovative research proposals based on each institution's own priorities as well as other federal and international priorities that have been previously defined by strategic planning initiatives such as the Special Science and Technology Program (PECyT for its acronym in Spanish, 2001–2006) created by the CONACYT[35].

During the last few years, research and development have become more important in this region. Proof of this is the fact that the state's best universities and colleges have incorporated research and scientific development into their philosophy, their goals and their overall strategy. In the same way, the state government is increasingly aware of how important scientific research has become, and is therefore playing a decisive role and taking initiatives in creating and promoting new research centers that tend to concentrate on important areas of specific knowledge which might adapt to the needs of the international market in the near future. Real examples of these efforts are the creation of the Monterrey International Knowledge City Project (*Monterrey Ciudad Internacional del Conocimiento*) or MIKC, the creation of the Nuevo León Innovation and Technology Transfer Institute, the new PIIT being built, and the Monterrey Research and Advanced Studies Center or CINVESTAV Unit[36], which was recently inaugurated in the city of Monterrey at the end of 2005.

Inter-institutional Convention for developing the Monterrey International Knowledge City Program

By creating the "Monterrey International Knowledge City" Program (in March 2004) and the Science and Technological Park (in June 2005), the state government has engaged itself with the CONACYT and the state's three most important universities to promote innovation and technology development in the region's most strategic areas. As a result of this commitment, **16 new research** centers will be created in the state of Nuevo León.

- **CONACYT (5):** Food and development; advanced material; engineering and industrial development; scientific research and higher education.
- **UANL (2):** Which actually is strongly contributing innovation, research, science and technological development through 38 laboratories and 18 research centers, will create 2 new research centers: research and development in health sciences and innovation, research and development in engineering and technology, focusing on nanotechnology, mechatronics, information technologies and software.

[35] CONACYT: National Council for Science and Technology
[36] CINVESTAV: Research and Advanced Studies Center, *Instituto Politécnico Nacional* (www.cinvestav.mx)

- **ITESM (6):** This institution is developing different programs for nanotechnology, medicine, biotechnology, mechatronics, robotics and airspace industry in its 33 research centers and it will be creating 6 new research centers for the following fields: advanced and alternative construction material, cyber-security, utility data center, computers, software development, and MEMS technology.
- **UDEM (3):** Innovation and development for small and medium-sized businesses, product research and innovation, packages and packing, and legal studies for industrial property.

Regional research policy

In spite of the intense efforts made by the government, companies and universities in Nuevo León, one of the most important obstacles for research development is the nonexistence of a proper legal framework and of proper policies that would help to regulate, promote and connect research activities to regional development.

However, the strategic planning of university research activities, including the outlining of scientific priority areas, feeds back on the needs and demands of society through a set of detection mechanisms that each individual institution has established, enabling each of them to promote basic and applied research. Some examples of these initiatives are university programs aiming to promote the institutions' educational and research missions, university connections with local companies, and universities fostering entrepreneurial creations and creating new research centers (laboratories and workshops).

Table III.2. University research centers

Universidad Autónoma de Nuevo León (UANL[37])	**38** innovation laboratories, scientific and technological research and development in the following colleges: Medicine, biological Sciences, Chemical Sciences, Mechanical and Electrical Engineering, Civil Engineering, Architecture, Law, Economics, Arts and Philosophy, Geological Sciences, Forestry Sciences, Agronomy, Psychology, Veterinary Medicine and Zootechny.
Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM[38])	**62** throughout the country, 35 are in Nuevo León, and they concentrate on the following subjects: Industrial Automation, Biotechnology, Quality and Environmental Quality, Data Systems, Product Design and Innovation, Design and Construction, Electronics and Telecommunications, Energy Studies (solar energy and water energy), Intelligent Systems, Computer Research, Optics, Knowledge Systems, Integrated Manufacturing and Industrial Security Systems.
Universidad de Monterrey (UDEM[39])	The university currently does not have any research center. However, it does have a research committee which goal is to define research orientations and submit proposals for the creation of new research centers.

These initiatives are brought forward by the state government and by the region's three most important universities: UANL, ITESM y UDEM (with which there was a collaboration agreement signed on November 19, 2004). If we take all of them into consideration, we may mention that:

- Universities with the most impact clearly identify research and technological development as key elements for economic, educational, political and social development in the region. Therefore, their mission is changing from being exclusively educational to becoming involved in both education and research.

37 *Universidad Autónoma de Nuevo León*

38 *Instituto Tecnológico y de Estudios Superiores de Monterrey*

39 *Universidad de Monterrey*

- The Monterrey International Knowledge City project has given the state government and the universities more opportunities to appoint human, material and financial resources to priority areas. The project has also developed competition between companies and it has stimulated regional development as well as the development of new technologically-based businesses. Priority areas have been clearly defined. They are (a) biotechnology, (b) nanotechnology, (c) information technology and software development, (d) mechatronics, and (e) health.

All of these efforts combined require, however, that a series of policies be clearly defined in order to allow consistent management and operation of regional programs, funds, publications, recognitions, and incentives, aiming to promote public and private research, as well as scientific and technological development.

Regional partners

The main organizations that promote research and development at the national level are federal government services, as follows:

- the Mexican National Board of Science and Technology (CONACYT)
- the Ministry of Economy (SE)
- the Ministry of Public Education (SEP)
- the Mexican Institute for Industrial Property (IMPI)
- the Ministry of Environment and Natural Resources (SEMARNAT)
- the Ministry of Public Health and Assistance (SSA)

In Nuevo León, those who promote research may be divided into four areas, according to the following table:

Table III.3. Areas Promoting Regional Research and Technological Development

Government	Employers and Industry
- Nuevo León Science and Technology Board (CONACYT) - Ministry of Economic Development (SEDEC) - Monterrey: City of Knowledge project (MIKC) - Innovation and Technology Transfer Institute (I^2T^2) - The Regional Integration Program of Northeastern Mexican States and Linkage with the State of Texas (INVITE) - Mexican Industrial Property Institute (IMPI)	Companies such as: ALESTRA, GE, CARRIER, Conductores Monterrey, FRISA, GALVAK, GAMESA, HYLSA, IMSA, LAMOSA, METALSA, NEMAK, PROLEC, SIGMA, VITRO, YORK, among others.
Non-profit Private Institutions	**Higher Education Institutions**
Centro de Ciencias y Artes, A.C., Centro Integral de Desarrollo Tecnológico del Mueble, Desarrollo de la Cultura Ecológica, A.C., I.S.S. Mexico, 1ª. Sección, A.C., Naturaleza sin Fronteras, A.C., Organización Vida Silvestre, A.C., PRONATURA, Sociedad de Científicos Juveniles, A.C., among others.	- *Instituto Tecnológico y de Estudios Superiores de Monterrey* (ITESM) - *Universidad Autónoma de Nuevo León* (UANL) - *Universidad de Monterrey* (UDEM) - *Universidad Regiomontana, A.C.* (UR)

Technology Transfer Process

The importance of the technology transfer process is made perfectly clear in universities. However, most of the Technology Transfer Centers (CTT for its acronym in Spanish) owned by educational institutions limit their functions to protecting technology, offering legal assistance, or registering technology as intellectual property both nationally and internationally. (This is done by use of patents, utility models, industrial design, brands, trade notices, labels of origin, trade denominations, industrial secrets, diagrams of integrated circuit plans, user and working licenses, void, expired or cancelled rights, legal defense action and copyright.)

National organizations responsible for registering and protecting intellectual property are the National Copyright Institute (INDAUTOR) and the Mexican Institute for Industrial Property (IMPI). The latter has regional offices throughout the country, contributing to the establishment of a new way of approaching intellectual property (IP). It also aims to develop knowledge and general awareness concerning this type of protection, which would promote creativity and increase protection for new inventions, creating benefits for industrial activity and trade.

The Institute's Direction for Technology Information Promotion and Services organizes IP seminars and workshops, participates in technological, trade and art fairs, and also provides specialized counseling particularly targeted for the private, research and educational sectors. As far as connections between institutions are concerned, the IMPI and its Northern Department have strengthened their ties with several public and private organizations. They have done so in order to promote innovation and technological development activities that support modernization and promote national investments by establishing Technical Cooperation Conventions with several universities, research institutes and state governments. The goal is to develop a strong new philosophy for industrial property issues in the medium term.

As we may observe in the following tables, there was a global decrease in the number of patent applications, as well as in the number of patents granted between 2004 and 2005. According to data from the IMPI[40] gathered in 2005, there were 7,266 total license applications submitted worldwide. Only 3.6% (263) of them came from Mexico and 49.7% (3,611) of them were granted. Nationally, 55 of the total license applications were granted. This means the patent application system in Mexico is 21% efficient. *Please refer to the following tables:*

Table III.4. Patent applications by nationality - main countries 1993–2005

Year	*Total*	*Mexico*	*Germany*	*United States*	*France*	*Italy*	*Japan*	*UK*	*Spain*	*Switz.*	*Other*
1993	8,212	553	633	4,948	280	125	225	348	51	289	760
1994	9,944	498	742	6,191	360	156	262	389	71	304	971
1995	5,393	432	513	3,139	267	89	210	69	55	216	403
1996	6,751	386	581	3,835	327	108	307	157	62	261	727
1997	10,531	420	856	6,023	497	179	334	396	85	383	1,358
1998	10,893	453	992	6,088	521	151	402	435	70	347	1,434
1999	12,110	455	1,155	6,869	624	159	397	412	93	327	1,619
2000	13,061	431	1,252	7,250	700	171	466	453	102	415	1,821
2001	13,566	534	1,438	7,336	727	168	522	417	112	408	1,904
2002	13,062	526	1,289	6,676	776	217	399	394	121	515	2,149
2003	12,207	468	1,192	6,436	731	168	475	339	118	598	1,682
2004	13,194	565	1,170	6,913	784	228	480	355	139	584	1,976
2005	7,266	263	629	3,931	419	104	227	211	62	359	1,061

Note: Since 1995 PCT applications are incl.

Note: Since 1995 PCT (Patent Cooperation Treaty) applications are included.

[40] **Source:** Mexican Institute for Industrial Property: http://www.impi.gob.mx/impi/docs/bienvenida/impi_cifras.pdf

Table III.5. Granted patents by nationality of holder–main countries 1993–2005

Year	*Total*	*Mexico*	*Germany*	*United States*	*France*	*Italy*	*Japan*	*UK*	*Switz.*	*Other*
1993	6,183	343	458	3,714	251	138	220	206	256	597
1994	4,367	288	395	2,367	210	99	175	175	228	430
1995	3,538	148	205	2,198	162	83	123	136	109	374
1996	3,186	116	214	2,084	108	51	101	70	101	341
1997	3,944	112	227	2,873	120	44	98	90	112	268
1998	3,219	141	215	2,060	117	56	102	114	101	313
1999	3,899	120	351	2,324	209	59	134	124	152	426
2000	5,519	118	525	3,158	333	118	243	167	228	629
2001	5,479	118	480	3,237	298	73	218	167	181	707
2002	6,611	139	736	3,706	335	100	256	197	246	896
2003	6,008	121	610	3,368	337	98	197	156	241	880
2004	6,838	162	726	3,552	522	107	234	181	315	1,039
2005	3,611	55	358	1,969	252	56	134	101	157	529

Table III.6. Patent Activity in Mexico 1993–2003

Total Patent Applications in Mexico 1993 - 2003

Year	*Tota Global Level*	*Total in Mexico*	*%*
1993	8,212	553	6.7%
1994	9,944	498	5.0%
1995	5,393	432	8.0%
1996	6,751	386	5.7%
1997	10,531	420	4.0%
1998	10,893	453	4.2%
1999	12,110	455	3.8%
2000	13,061	431	3.3%
2001	13,566	534	3.9%
2002	13,062	526	4.0%
2003	12,207	468	3.8%
2004	13,194	565	4.3%
2005	7,266	263	3.6%

Total Granted Patents in Mexico 1993 - 2003

Year	*Total Global Level*	*Total in Mexico*	*%*
1993	6,183	343	5.5%
1994	4,367	288	6.6%
1995	3,538	148	4.2%
1996	3,186	116	3.6%
1997	3,944	112	2.8%
1998	3,219	141	4.4%
1999	3,899	120	3.1%
2000	5,519	118	2.1%
2001	5,479	118	2.2%
2002	6,611	139	2.1%
2003	6,008	121	2.0%
2004	6,838	162	2.4%
2005	3,611	55	1.5%

Granted Patent Rates in Mexico 1993 - 2003

Year	*Applications Received*	*Patents Granted*	*% of Approvals*
1993	553	343	62%
1994	498	288	58%
1995	432	148	34%
1996	386	116	30%
1997	420	112	27%
1998	453	141	31%
1999	455	120	26%
2000	431	118	27%
2001	534	118	22%
2002	526	139	26%
2003	468	121	26%
2004	565	162	29%
2005	263	55	21%

Source: *Mexican Institute for Industrial Property (IMPI)*

According to the numbers provided by the IMPI Northern Office, the country registered about 17,600 patent applications, 600 of which came from Mexico. In 2005, out of a total number of 263 Mexican patent applications 39.5% (104) of them were submitted by the state of Nuevo León (*see table III.7*). Applications from this state have an 80% chance of being granted due to their high level of conception.

Table III.7. Patent applications sent in Mexico and in Nuevo León by Area

Area	Region	2000	2001	2002	2003	2004	2005	Total	% N.L.
Biotechnology	**Mexico**	0	6	2	2	19	12	41	56%
	N.L.	0	4	0	2	10	7	23	
Electricity	**Mexico**	2	11	7	16	18	29	83	66%
	N.L.	1	10	5	10	8	21	55	
Mechanics	**Mexico**	4	28	20	18	32	29	131	71%
	N.L.	4	24	17	14	17	17	93	
Chemistry	**Mexico**	0	10	14	19	39	34	116	43%
	N.L.	0	10	10	5	11	14	50	
	Total Mexico	6	55	43	55	108	104	371	60%
	Total N.L.	5	48	32	31	46	59	221	
	% N.L:	83%	87%	74%	56%	43%	57%	60%	

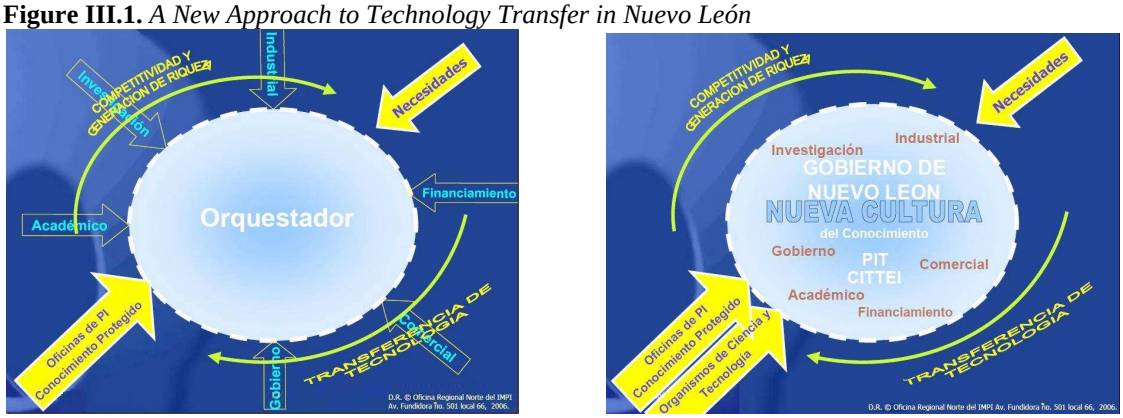
Source: *Mexican Institute for Industrial Property*

It has become increasingly important to create and to spread a new approach to technology transfer in those institutions and centers that are specializing in innovation and technological development, especially SMEs[41], but also other organizations that foster the creation of public and private businesses.

According to the latest figures reported to the IMPI, during its 65 years of existence the UANL had only submitted applications for 15 patents. After having signed a convention with the IMPI (approximately 3 years ago), the university has already submitted 14 patent applications. As far as the ITESM is concerned, before 2004 it had only submitted 2 technology patent applications. However, from then until today they have submitted 12 new applications. This year's increase is due to the convention that was signed between the university and the IMPI, as well as their efforts.

This increase is also partly due to the IMPI Northern Office, which has perfectly identified the main agents involved in the technology transfer and development process as well as the interaction mechanisms between these agents, as we can see on Figure III.1. The Nuevo León state government plays a complementary role by bringing together all different efforts and by aiming to promote a new approach and a new philosophy concerning innovation and development. The state government has provided the necessary base in order to establish cooperation agreements necessary to engage all parts. It has also created new authorities that are capable of creating connections in the technology transfer process, such as the MIKC Program and the I^2 T^2 Park.

Figure III.1. *A New Approach to Technology Transfer in Nuevo León*



Source: IMPI 2006

However, there are no existing defined policies concerning IP management in the region. Only those that have derived from federal labor law are applied. Additionally, there are not enough mechanisms, institutional policies or legal frameworks to help connect and coordinate all individual efforts (IMPI and CONACYT) with universities in the region. If this problem were to be solved, it would allow cultural barriers and inherent structural deficiencies to be overcome. For example, general and specific criteria used to evaluate and to distribute grants of the National System for Researchers.

Mechanisms to meet regional technology and innovation needs and demands

It has not yet clear if the IES will respond to the entrepreneurial community's demands – including SMEs – for research projects. There is currently a general belief that there is no connection between regional needs and university research programs. However, different sectors have already established mechanisms aiming to make both interact, even if projects are still usually carried out in an independent manner.

Besides the need to develop academic initiatives such as professional training and work placement programs (that enable teachers, researchers and students participating in technology innovation and development projects to enter the productive sector), universities have also found, in their management councils, the best mechanism for connecting their strategic planning with the real needs of the entrepreneurial and the industrial sectors.

[41] SMEs: Small and Medium-Sized Enterprises

Federal and state government organizations such as CONACYT, IMPI, NAFIN, SE, SEDEC, SEP, and COCYTE are the main agents involved in the process of identifying community needs and requests. Their mission is to stimulate regional development in the productive and non-productive sectors by offering financial support, awards, compensations and counseling. They use this community information to create programs and to open calls in order to assign funds to universities, companies and other organizations who submit project proposals, thus demonstrating their ability to implement actions in favor of regional and national development in their specific sector.

B. Framework Conditions for Promoting Research and Innovation

Legal framework

In Mexico, intellectual property is protected by the following laws:

- Industrial Property Law (OG[42] 2/8/94)
- Industrial Property Law Regulations (OG 23/11/94)
- Agreement in which the Legal Affairs Director at the Mexican Institute for Industrial Property is given the power to have information about administrative infringements regarding trade, in accordance with the Federal Copyright Law (OG 2/5/97)
- Agreement publishing the rates applied for the Mexican Institute for Industrial Property services (DOF 23/8/95)
- Agreement which establishes rules for submitting applications to the Mexican Institute for Industrial Property (DOF 14/12/94)
- Agreement which includes a list of institutions approved by the Mexican Institute for Industrial Property for biological material deposits (OG30/5/97)
- Federal Copyright Law
- Federal Copyright Law Regulations
- The National Copyright Institute's (*Instituto Nacional de Derecho de Autor* or INDA for its acronym in Spanish) Internal Regulations
- International Agreements
    - North American Free Trade Agreement (NAFTA)
    - Mexico-European Union Free Trade Agreement

These are all federal laws. Those organizations who are responsible for registering and protecting Intellectual Property are the National Copyright Institute (*Instituto Nacional del Derecho de Autor* or INDAUTOR) and the Mexican Institute for Industrial Property or IMPI. Both are undoubtedly the main instigators regarding research development.

The main aim of Mexican Intellectual Property laws is to stimulate creativity, aiming to help society as a whole, and to protect property by awarding rights such as patents, utility models, industrial designs and royalties. Likewise, these laws enable us to make decisions concerning controversies, licenses and transfers, and they impose sanctions whenever copyright is infringed and they also declare when rights are void, cancelled or have expired.

In spite of the fact that these Mexican laws exist, intellectual property – registering brands and patents – still presents problems related to management and operation, as well as to cultural barriers. Researchers are confronted by this. Some of the problems are

a) There are not enough IP policies in higher education institutions.
b) Roles and responsibilities concerning IP management in universities—transfer centers, legal offices, research centers, scientists and researchers—have not been properly defined.
c) Current laws offer little connection with real events.
d) Universities suffer from a lack of operational infrastructure and processes.
e) Lack of long term follow-up policies.

[42] Official Gazette of the Federation, this bulletin gives details of laws, regulations and agreements and is issued by the Federal Government.

f) Lack of IP culture in the scientific community – lack of interest in patenting, lack of awareness, and little respect for intellectual property.
g) Lack of knowledge of laws.

Mechanisms to stimulate innovation and knowledge transfer between researchers and industry

The most common mechanism used to promote scientific innovation is the use of "economic stimuli" by developing projects and giving researchers the possibility of specializing in particular branches. The National System for Researchers (NSR), which belongs to the CONACYT and therefore also to the federal government, is used as a national framework in order to promote, develop and stimulate research activities in Mexico. This system was chosen due to its importance in the national scene as well as the fact that it is a highly recognized institution in several universities and private or public research centers.

The NSR was created by a Presidential Agreement in 1984, in order to give recognition to the work of several individuals who have contributed to improving the country's scientific knowledge and technology. The NSR organizes a scientific and technological contest and grants awards to the best research activities in Mexico. Its aim is to increase Mexico's international competitiveness in this sector and to solve national problems. Awards include distinctions and economic stimuli. These awards certify the quality, productivity, importance and impact of the selected research projects and their researchers.

The NSR is divided into two main categories: researchers and technologists. The most important criteria in order to choose the best researchers are research results, technology and knowledge development and transfer, technological innovations, educational innovations, publications, business models, industrial and intellectual property, researcher and technologist training, publication of books, study guides, monographs, and manuals, among others.

The various distinctions and economic stimuli (several minimum wages[43]) awarded by the National Service for Researchers may be listed as follows:

a) National Researcher Candidate: three minimum wages
b) Level I National Researcher: six minimum wages
c) Level II National Researcher: eight minimum wages
d) Level III National Researcher: fourteen minimum wages
e) Distinguished National Researcher: fourteen minimum wages

Apart from this government initiative, other efforts have been made by several enterprises (micro, small, medium and large) and educational or scientific institutions that have developed their own framework and internal policies concerning recognition and financial awards. A good example of this is the ITESM Certification System for Teachers, which was created for permanent teachers working in the institute's high school, university and postgraduate programs. The system aims to foster the teachers' continuous participation in academic subjects, in any of the following three large classifications: (a) professor primarily dedicated to teaching; (b) consultant professor, active in his/her department; and (c) researcher and professor.

In regards to the UANL, the university has a stimulation system for the professors' performance that has been directly designed by the SEP for public universities; such as the *PROMEP* Program for the evaluation of professors for a desirable profile or POMEP (*Programa para el Mejoramiento del Profesorado*).

[43] The minimum wage in the state of Nuevo León is MXN47.16, daily.

Incentives and barriers in the higher education institutes industry relationship

Incentives for universities:

1. Students, teachers, researchers and technologists who participate in research projects linked to the productive sector acquire experience.
2. There is an increase in intellectual property protection of new developments and technological innovations created by these organizations.
3. New conventions, ties and cooperation networks between the productive, governmental and academic sectors (students and professors).
4. Obtaining additional funds in order to develop research.
5. Creating new financial resources by commercializing and transferring sustainable technologies.
6. Applying these incentives to field research.

Incentives for the industry sector:

1. Reducing new technology development costs.
2. Benefiting from the professional and scientific skills of researchers and technologists working in universities.
3. Creating a cooperation network between the scientific community, the government and the industry for better problem solving.
4. Establishing conventions, ties and cooperation networks between the productive, governmental and academic sectors through research centers.
5. Obtaining government funds exclusively aimed at higher education institutions in order to develop research.
6. Access to a specialized infrastructures—human resources and laboratories.

Barriers:

1. Lack of confidence in the research system because there is little knowledge regarding scientific activity.
2. Lack of IP and technology transfer culture in higher education institutions.
3. Little respect and protection for intellectual property.
4. Currently, there is no clear process or method in universities that allows the proper transfer or commercialization of technology.
5. Roles and responsibilities concerning IP management in universities and industry have not been properly defined.
6. Policies for royalty distribution are nonexistent (researchers-institutions).
7. Lack of common specialization strategies in both the industry and the universities – researchers lack specialization and experience, and this keeps them from responding to the demands of the industrial sector.
8. The process used to register patents is too slow for industry needs.

Funding programs for cooperative research

Currently, there are several programs that provide resources for scientific activity. These programs involve all three sectors: education, industry and government. Besides assigning a part of their budget to their research centers and carrying out research projects through their masters and doctoral students, universities collaborate with companies and the industry in order to promote the creation of technical schools, research projects and counseling projects. Additionally, students and researchers receive institutional support for scholarships, buying equipment, travel, and program expenses. The latest figures obtained from universities indicate that the ITESM spends USD25M each year for research activities; the UANL assigns a yearly budget of USD17.8M (MXN178,573,000) for scientific activities[44].

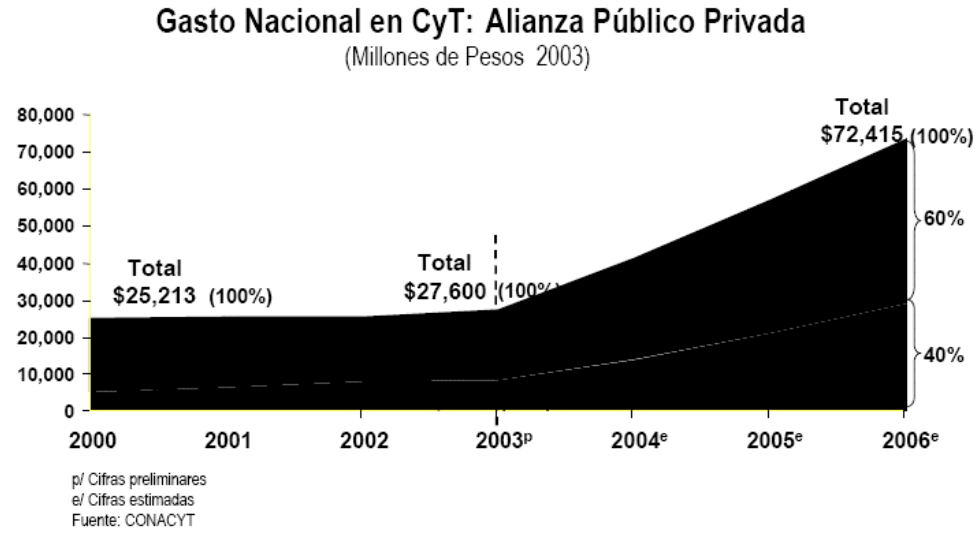
Aside from this, universities and research projects continually receive sponsorship (scholarships, state mixed funds, funds from other sectors, and tax incentive programs, among others) from private and

[44] UANL's Budget 2005: http://www.uanl.mx/transparencia/informacion_presupuestal/presupuesto_2005/archivos/Presupuestos2005.pdf

government organizations, such as national and international companies, international agencies and CONACYT. According to the 2005 budget appearing in Nuevo León's Government Investment Program, the COCYTE[45] was assigned a USD4M budget that year (approximately MXN40M). As for the Nuevo León budget for 2006, USD3.6M (MXN36,440,500) will likely be allocated to activities carried out by Nuevo León's I^2T^2.

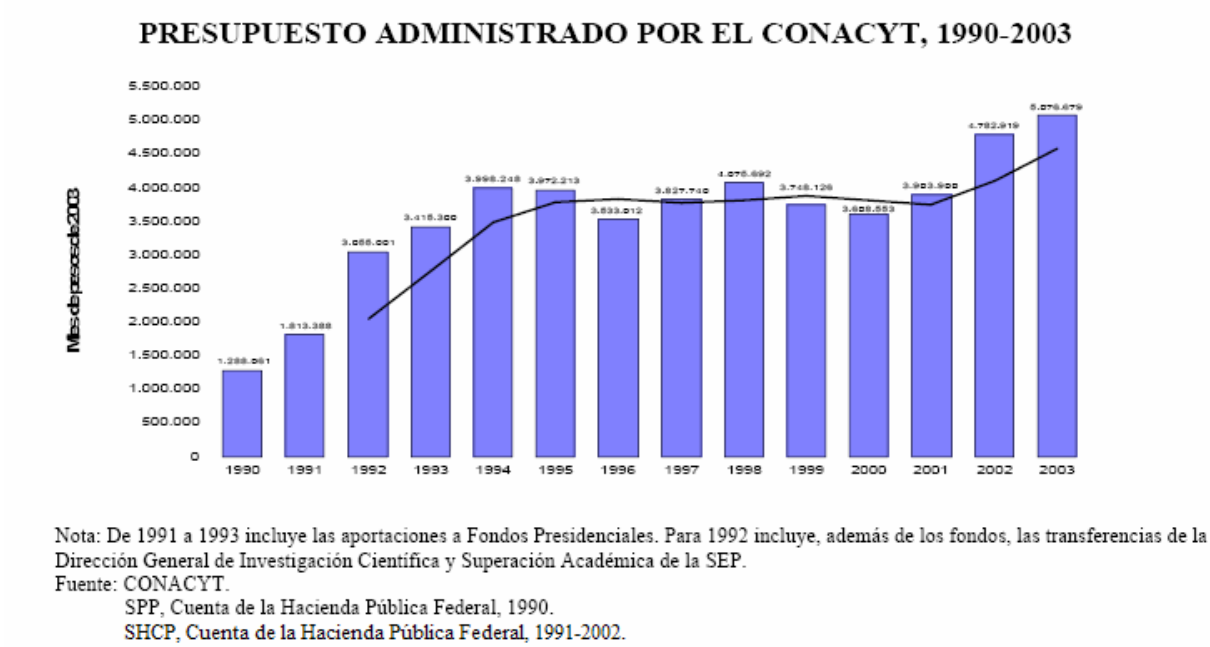
As far as CONACYT is concerned, this organization believes that specific programs such as the Tax Incentives Program or the AVANCE program will progressively increase investments from the productive sector towards scientific and technological activities. Please refer to Figure III.2.

Figure III.2. *National investments in science and technology: public and private sectors together*



This graphic shows how the amount of financial investment from companies in experimental research and development activities increased from 20% in 2000 to 30% in 2003, seeking to reach a 40% total investment in 2006.

Figure III.3. *Budget administered by CONACYT, 1990–2003*



Nota: De 1991 a 1993 incluye las aportaciones a Fondos Presidenciales. Para 1992 incluye, además de los fondos, las transferencias de la Dirección General de Investigación Científica y Superación Académica de la SEP.
Fuente: CONACYT.
SPP, Cuenta de la Hacienda Pública Federal, 1990.
SHCP, Cuenta de la Hacienda Pública Federal, 1991-2002.

This figure shows 2003 CONACYT's budget, which is approximately 30% of the federal investments in science and technology. This percentage would not reach 1% of the nation's GDP (estimated at MXN6B for 2006).

[45] Mexican National Board of Science and Technology in Nuevo León

According to the CONACYT's 2004 Federal Entity Activity report[46], during this period the organization authorized investing an equivalent of **MXN36,028,298**, in order to stimulate the development of scientific and technological activities carried out by several research and higher education institutions in the *Universidad Autónoma de Nuevo León*, in the state of Nuevo León.

In June 2005, for a total number of 91 calls opened by CONACYT, 1160 projects were submitted. 66% of the total funds allocated to these projects were assigned to higher education institutions located in several states, 16% were assigned to projects coming from CONACYT Centers, and 9.6% were assigned to entrepreneurial projects.

In spite of all the funds being invested by the federal government, it is important to mention that researchers believe that science is still lacking resources. They also believe that the projects being submitted for mixed funds or sector funds do not promote the type of research the country really needs. Instead they concentrate on developing institutional agendas. Researchers think that basic research should be the main concern to which resources are allocated, followed by applied research and technological development. Members of the NSR believe that the government, the scientific community and the private sector should all participate in planning and in the decision-making process concerning scientific and technological policies.

C. Interfaces Facilitating Knowledge Exploitation and Transfer

It is definitely important to mention that the state government has assumed a key role in the promotion and research of technological development in the state. Besides allocating funds and creating mechanisms for linkage among the academic, business and governmental sectors, the present administration has created a synergy in the efforts of its different agencies for the promotion of innovation as an instrument for the generation of wealth in the state. In order to achieve this goal, agencies such as the Ministry of Education, the Ministry of Economic Development, the INVITE Program, and the Project Monterrey International Knowledge City are continuously carrying out activities of communication and disclosure, such as:

- Organization of seminars, fairs, workshops and lectures on intellectual property.
- Publication of specialized magazines, articles, articles produced in congress proceedings, books, chapters of books, patents, technological developments, and disclosure articles, among the most important.
- Sponsorships and donations.
- Courses and consultancy.

While the topic of Technology Transfer (TT) is clearly identified by the universities, the concept of commercialization of technology is an issue that is starting to be understood and discussed in various sectors of the community. On one hand, research centers do not have an area responsible for carrying out the necessary activities for the process of commercialization of the developed technology. Also, researchers, besides lacking time and resources, do not have the specific knowledge and processes to make a mechanism for self-financing of research. However, although the activity of commercialization is inadequate in the region, two mechanisms to promote TT are clearly identified. These are:

Academic Programs

- Business incubators at universities and state and municipal agencies.
- An *Entrepreneur Program* specially designed for the creation of new technology-based businesses.

Collaboration Agreements

- Inter-institutional: Strengthen the linkage among the state and federal governments, education institutions and private sector, in order to promote technology innovation and development and to create new research centers in areas defined by the government, the academic sector and the

[46] CONACYT: CONACYT's activity per Federal Entity, Report 2004

industrial sector. Examples of these are the Project Monterrey International Knowledge City and I^2T^2.

- IMPI: To promote a culture of intellectual property in the scientific community and provide consultancy both to the academic sector and the community on the schemes of industrial and intellectual protection.
- Companies: For the development of collaborative projects of research and technology transfer.

Mechanisms to commercialize the research base and to promote technology transfer

As to TT issues, the government has played a key role in stimulating and promoting technological development in the region. On one hand, the TECNOS award organized by the Ministry of Economic Development of the State, which grants economic awards to the most distinguished research projects at the national level, has become one of the most important events for the promotion of innovation in the country. On the other hand, the INVITE[47] Program, through various actions, has become a factor in the promotion and adoption of the concepts of knowledge-based economy and of innovation as a generator of wealth. One example is the execution of a collaboration agreement with Institute IC2[48] of the University of Texas in Austin for the implementation of the project "Assessing Mexican Innovation and Training Entrepreneurs." Other projects aimed at promoting technological development in the region include the "Seminar on Nanotechnology" (held in May 2004) and the "Symposium on Knowledge Cities, Innovation, Incubation, and Wealth Creation" (held in June 2004).

Additionally, in response to this stimulation, in the last months universities of the state have made very specific efforts regarding this topic, showing a total aperture and articulation with the strategic projects of the state.

On August 10th, 2005, UANL opened the "World Trade Center NL," which houses the Business Incubator and Technology Transfer Center, a building founded on an area of 2,612 square meters and which represented for UANL a total investment of MXN21,773,178. The goal of this center, according to its technical description, is to integrate an efficient system capable of facilitating activities of innovation, incubation and technology transfer in order to identify areas of opportunity required by the university to influence the scientific, technological and economic development of the region and the country. This same year the UANL initiated activities with the CIDET (Center for Research and Technology Development) at the School of Mechanical and Electrical Engineering, which has incubator for Software development and intermediate technology business.

On November 30th, UDEM, through the Division of Architecture, Design and Engineering, opened The Technology Innovation Center "GENERA," which will offer free admission to the whole community.

Additionally, on February 8th, 2006, ITESM opened its Innovation and Technology Transfer Center (CITT for its acronym in Spanish), which constitutes another project added to the state's project of making Monterrey International City of Knowledge.

In respect of the topic of business incubation, the government has invested some MXN20M in incubators and additional investment funds for SMEs and productive projects. The purpose of these investments is to give impetus to the growing infrastructure of research and technology development centers in the various areas

Figure III.4. *Technologic Incubator ITESM*

[47] Program for the Integration of the Northeast Regional Development and its Linkage with Texas

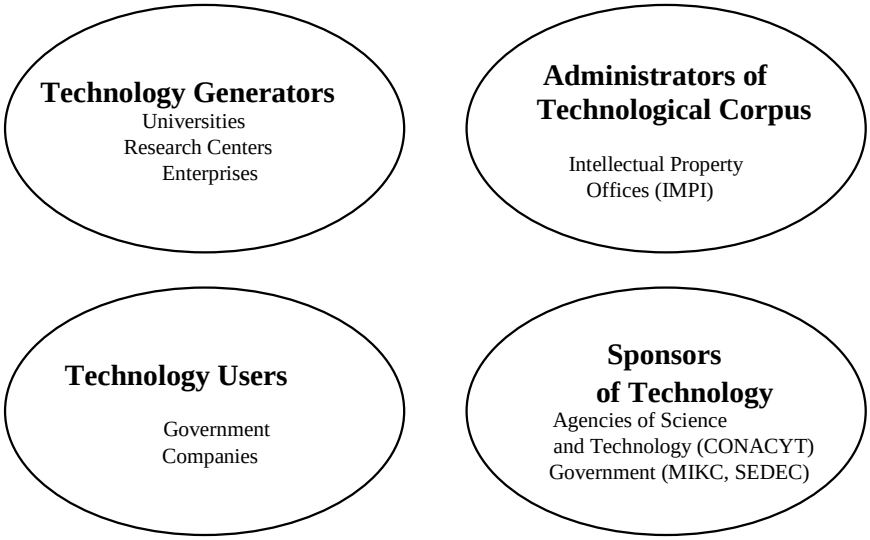
[48] Institute for Innovation, Creativity and Capital. Institute of the University of Texas at Austin, which performs economic development through commercialization of high technology.

of knowledge at institutions such as ITESM, UANL, UDEM and some others of the public and private sector. Until now, 15 business incubators have been constituted in Nuevo León. They are expected to include, as their goals, the incubation of technology-based enterprises.

Roles of the different region's players for commercialization and technology transfer

As shown in the following figure, the participants involved in the technological development of the region are identified in four sectors:

Figure III.5. *Participants involved in technology*



Source: IMPI 2006

In addition to the Nuevo León state government's function of linking efforts and its role as "orchestrator," specifically through project MIKC, at the present time, there is another linking tool necessary to consolidate the process of technology commercialization and transfer, especially in those technology-generating bodies. This tool is constituted by the Patenting Centers, which will be the base for the culture of innovations and shall carry out the following strategic functions:

- Creation of internal policies for innovation protection.
- Training of specialized human resources.
- Disclosure of IP.
- Creation and Administration of a portfolio of intangible assets→ knowledge, experience, etc.
- Technological positioning and monitoring.
- Transfer and commercialization of technology.

In addition to the Patenting Centers, a key linking tool that plays a determining role in the new culture of knowledge is the function of the *Institute of Innovation and Technology Transfer of Nuevo León.* This institute was officially formed in June 2005 with the purpose of increasing the competitive level of the state and promoting its development by giving sense and orientation to the linkage between the generation of new knowledge and its capitalization in the commercial sector.

Its main goals are: (a) to encourage scientific research and technology based on market needs; (b) to provide support for the creation of technology development businesses through the safeguard of industrial property, access to venture capital, and assistance in the commercialization of new technologies; (c) to promote and link the interdisciplinary participation of academic sectors, research and productive centers in order to give impetus to the transfer and generation of new products, processes, or services; (d) to promote the formation of intellectual capital through the articulation of

programs between academia and knowledge enterprises, design centers and research centers; (e) to promote and strengthen networks of researchers and consortia with productive sectors in strategic areas of knowledge; (f) to take the steps to form strategic alliances with national and international bodies in the private and academic sectors; and (h) to promote a culture of innovation in society, in general and in the productive sectors of the state, in particular.

Technology Research and Innovation Park

This project is one of the first initiatives of I^2T^2, which constitutes an alliance between society and the government with the purpose of pursuing growth via innovation. The PIIT will be located within the limits of the Monterrey's metropolitan zone and will cover 70 hectares (donated by the state government). 30 hectares will start to be developed in the short term, and 40 will be left in reserve for enterprises of knowledge and/or other research and development centers. It is estimated that the total investment for the development of the first 30 hectares may be USD100M (MXN1B).

The aim of the park is to concentrate and promote the efforts of technological innovation and development, and to facilitate technology transfer to the productive sector. The five areas to be developed are:

1. Biotechnology
2. Nanotechnology
3. Mechatronics
4. Information technologies and communications
5. Health

Institutions participating in this start-up are:

- Consejo Nacional de Ciencia y Tecnología, CONACYT
- Universidad Autónoma de Nuevo León, UANL
- Instituto Tecnológico y de Estudios Superiores de Monterrey, ITESM
- Universidad de Monterrey, UDEM
- Government of the State of Nuevo León

The I^2T^2 has a citizen council represented by the state government, universities and business associations, which have jointly defined the following goals and roles for each of their parties. See table III.8.

Table III.8. Goals and roles of each of the parties involved in technology development

Goals	Responsibilities or roles				
	Federal Government	State Government	Universities	Research Institutes	Productive Sector
1. Creation of innovation businesses			X	X	
2. Intellectual Property protection	X	X	X	X	
3. Access to venture capital and other funds	X	X	X	X	X
4. Commercialization of new technology		X	X	X	X
5. To form the Regional System of Innovation with universities and research centers, major companies, SMEs and their clusters, and…		X …technology research and innovation park	X ...university parks	X …technology research and innovation parks	X
6. Formation of intellectual capital, promotion of postgraduate studies, seed intellectual capital and others			X	X	
7. To form strategic national and foreign alliances	X	X	X	X	X
8. Redesign of the agenda of the		X	X	X	X

educational system of Nuevo León					
9. To attract technology innovation and development centers and businesses, and promote the existing centers		**X**	To form new centers **X**	**X**	
10. Promote innovation in the existing enterprises	**X**	**X**	**X**	**X**	**X**
11. Urban and cultural equipment for the furtherance of knowledge parks and promotion of creativity		**X**	**X**		
12. Disclosure of the new culture	**X**	**X**	**X**	**X**	**X**

Mechanisms for research and development and innovation initiatives dissemination

Undoubtedly, universities have been distinguished for disclosure, at the internal level, as well as in other sectors of society. Research and development activities have been carried out in the institution. With the use of physical and electronic media, bulletins are periodically issued; specialized magazines, reports, publications and articles are printed out; symposia, conferences, courses, workshops and diploma courses are organized; and reports and programs on radio and television are constantly presented.

As to the efforts made by the government for the promotion of innovation and development at the regional level, three mechanisms have been identified at present:

Federal and State government

- Competitions and contests to obtain funds through the presentation of research projects. Some examples are:
  - National Juvenile Competition of Science and Technology organized by CONACYT. In this competition public and private universities of the country take part.
  - National Award of Technology (TECNOS Award) developed by the SEDEC with the collaboration of other universities with the purpose of stimulating scientific development.

- Fairs and Exhibits to divulge the research works and regional technological development. Some examples are:
  - National Week of Science and Technology organized by the CONACYT; universities and research centers take part with projects.
  - SMEs Week, organized by SE, in which universities and research centers disclose their services and achievements in research and development.

- Electronic and printed media, such as electronic pages, electronic bulletins (*newsletters*), specialized magazines, information systems, press, and publications, amongst others. Some examples are:
  - CONACYT Web page reveals projects, results, awards given, and different kinds of publications.
  - IMPI web page.
  - Annual publication of the National Board of Science and Technology in Nuevo Leon (COCYTE) book in which included the science and technology projects that were financed.
  - COCYTE's State System of Interaction and Scientific and Technological Information to disclose project opportunities, which some enterprises show to receive solution proposals made by the community of scientists, technologists and inventors.
  - Monthly publication of the review "Science, Knowledge and Technology", elaborated by COCYTE.

- Cooperation commitments and agreements to disclose strategic actions that might result in new options to develop research. Some examples are:
  - Technical Cooperation and Collaboration for the Innovation and Technology Development between UT Austin-IC[49]2 and CORPES[50]-INVITE.[51]
  - Collaboration Agreement between UT Panamericana-INVITE-CORPES for the development of regional research.

- Seminars, conferences, workshops and diploma courses to create environments suitable for the exchange of experiences on new technological advances. Seminar "Nanotechnology and its probable applications: an emergent field in science", jointly organized by UANL, INVITE and Nanotechnologies Inc.
  - Symposium "Regional and bi-national societies for Global Competitiveness," organized together with UANL, INVITE and the IC2 of the University of Texas in Austin, in order to disclose themes related to knowledge cities, clusters and innovation as wealth generators.
  - Tutor training program in the search for innovation and technology projects and the "Forum of New Technologies on the way to commercialization in the Northeast Region," organized by the INVITE Program and the IC2 Institute of the University of Texas in Austin, in which more than 40 research projects carried out in the region were identified.
  - "New Technology Venture Workshop," organized by the INVITE program and the IC2 Institute of the University of Texas in Austin, in order to train researchers and incubator representatives on the techniques for the commercialization of technology.
  - SEDEC projects of great technological vision to identify and promote technology-based intellectual capital of organizations (universities, research centers, inventors, consultants, and enterprises, among others).

D. Conclusion and SWOT Analysis

Undoubtedly, development and the economic growth of societies and nations in the framework of globalization are based, more and more, upon the creation of value through knowledge, associated with a constant increase in competitiveness. The state of Nuevo León has very favorable conditions for that. The conditions make the state suitable for consolidation as the center of a region which great economic power might be translated into wealth creation and social welfare for the benefit of the residents in Nuevo León.

Nuevo León, besides its industrial, enterprising and business culture, is already a highlight in the scope of high level education in Mexico and in Latin America. Nevertheless, today, thanks to the vision of the state government, as well as the collaboration and commitment of universities and institutions in the region, the state is in a transformation process. The purpose of this transformation is to respond to the growing local demands, supported by an effective linkage with the productive sector based upon knowledge and technological development, and to promote a virtual circle of productive investment, entry of foreign capital, employment creation and economic growth in the region.

Through the implementation of the project for Monterrey International Knowledge City, the grounds have been established, and will continue, for a permanent and efficient linkage between the academic-scientific, productive and governmental sectors. Whereas the actors involved in the technological development have already been identified, the funds to support the initiatives of knowledge-based development are being granted through new and existing allocation mechanisms. In addition, the government, as well as the HEI, has already established some of the linking mechanisms between them and the productive sector, such as the agreement entered into between the state and most of the important higher education institutions, CONACYT, the state government, as well as the creation of the I^2T^2 and the PIIT.

[49] IC2: Institute for Innovation Creativity and Capital
[50] CORPES: Strategic Projects Corporation of Nuevo León
[51] INVITE: Program of Northeast Regional Integration and its Linkage with Texas

These actions are just the first concrete efforts to promote technological development and innovation programs, as well as the creation of national and international knowledge enterprises and technological bases in strategic areas for regional and national development. These efforts are also aimed at strengthening higher education centers in order to make them extend their offers to new areas of knowledge and promotion in foreign countries, turning scientific and technological research into opportunity areas for economic development. Other goals include supporting competitiveness; developing the necessary urban infrastructure to guarantee high competitiveness of governmental and private sectors as a main axis of economic development; creating appropriate and sustainable urban equipment; and developing the required communication infrastructure to link the university infrastructure and technological enterprises with new knowledge parks. This would involve integrating traffic and transportation services with digital and optical fiber nets, as well as the required urban infrastructure, to create a suitable environment for the development of scientific and cultural activities.

Finally, the promotion of a cultural change and the disclosure of a new culture of knowledge and innovation among people in the state of Nuevo León are already starting in schools, and leaders of different sectors in the city and state are coming together as agents of change and promoters of this new culture. Talking about Monterrey International Knowledge City, is talking about Monterrey, International City of creativity and innovation. The productive sector is more aware of the fact that the previous economic model of providing products and services that someone else conceived, created and/or designed has been worn out, and it only generates a hard survival. Creation and innovation is what will generate wealth within a knowledge economy. The productive sector must become the fundamental motor of enterprising activity, and the government should promote competitive participation in such fields as financing and venture capital, technological innovation, job training, and formation of intellectual capital, efficient management systems, scale economies, logistic systems, and national and international networks of commercialization, knowledge of international markets, business incubation, as well as the creation of clusters and networks of producers and suppliers. All of this has to be established within a framework of a new linking model for the academic training system with productive sectors and the labor market.
The region already has the vision, and even for the long term, it involves the conversion of each individual in Nuevo Leon from a simple inhabitant into an innovator-creator. It is a simple but ambitious vision, totally involving, since creating and innovating is not limited to experts, professionals or researchers. Everybody can innovates its environment in order to increase the value of its work

Strengths

a) Definition of a clear vision on the part of the State Plan of Development 2004–2009, which considers the idea of joint efforts between the public sector, the private sector and higher education institutions to stimulate regional development through technological innovation, development and culture.
b) Effective implementation of one of the main projects created by the state to consolidate Monterrey as the International City of Knowledge.
c) Adoption of a common vision among the academic, productive and governmental sectors.
d) Clear identification of the state government as the great “orchestrator” of this process of regional transformation, focused on development via technology innovation and transfer on the part of the academic and productive sectors.
e) High commitment to collaboration acquired among the three most important universities in the state, federal entities, (CONACYT) and the state government, to support the visions and strategic actions of the state with respect to economic development.
f) Development of mechanisms to work as a team (commitments and agreements) among higher education institutions, government and other institutions.
g) Citizen participation in consultative councils of entities linked to science and technology, as well in boards of directors of the universities.
h) Allocation of federal, state, municipal, and private financial resources for the construction of new public research centers, and in general, to support technology research and development in productive and nonproductive sectors of the region.

i) Acknowledgment and leadership of higher education institutions at the regional, national and international levels (international accreditation of two universities by SACS[52]).
j) Carrying out specific actions, such as the formation of I^2T^2 and PIIT[53], to increase scientific activity at universities in the region.
k) Formal commitments of the universities (execution of collaboration agreements) with organizations (enterprises, non profit corporations, etc) and municipalities of the region to provide social services, for the implementation of practical schools and research projects.
l) Formation of citizen councils for industry development (software, electronics, etc.), science and technology, among others.
m) Training of the teaching personnel.

Weaknesses

a) Insufficient funds for technology research and development (less than 1% of the National GDP).
b) Lack of activitie in topics of technology innovation, development, and transfer by the state.
c) Weak of a culture of protecting intellectual property in general, in all sectors.
d) Lack of policies to regulate innovation and research at universities and in the industrial sector.
e) Lack of policies of PI at universities. If existing, they are limited to copyrights, as provided in the Federal Labor Law, and are not included in the agreements.
f) Lack of public and private patenting centers as foundations of this new culture.
g) Lack of economic and personal incentives to researchers to promote applied research and the transfer of the same to the productive sectors.
h) Lack of knowledge among researchers and universities about the processes to commercialize technology.
i) Existence of greater interest in basic research (academic) than in applied research by scientists and researchers.
j) Insufficient interaction and participation among universities as to research topics; there is still rivalry among them.
k) Insufficient incorporation of scientific and technological subjects in elementary and secondary education.
l) Insufficient participation of the private sector in the promotion of science research within the universities as key driver for the future economic development.
m) Lack of development in information systems for the development and administration of:
   - Cooperative projects between universities and industry;
   - Technological vision projects to identify and promote technology-based intellectual capital of organizations;
   - System of interaction and scientific and technological information to create communities of scientists, technologists, inventors, and companies interested in science and technology;
   - Financial resources available for technological research and development; and
   - Disclosure and administration of specific policies for technology management, evaluation, and transfer.

Opportunities

a) To create a culture of protection and investment for intellectual property.
b) To develop interactive mechanisms to match the work of intellectual property protection agencies with organizations of science and technology to ease technology patenting and commercialization processes in educational institutions, research centers, and companies.
c) To take advantage of new national and international options and sources for any financing available to research, cultural, education and technological develop.
d) Execution of collaboration agreements among universities (local and foreign) to synergize efforts and encourage priority research lines for the region, and at the same time to optimize equipment and resources (human and financial).
e) Implementation of exchange programs for professors, students and researchers to achieve specialization of universities in particular areas to elaborate joint projects.

[52] SACS: Southern Association of Colleges and Schools
[53] PIIT: Technological Research and Innovation Park in which ITESM, UANL, UDEM and CONACYT created research centers.

f) To establish mechanisms to align any long-term research done at the three universities with the priority areas of the state.
g) To promote a culture based on technology innovation and development through the strengthening and incorporation of issues in science and technology for elementary and secondary education.
h) To create mechanisms for allocating efficient and sufficient funds available for research and development in technology.
n) To create policies for:
   - Administration of technology innovation, research and transfer processes at universities, governmental bodies and companies.
   - Linkage among the entities and participants involved in the process of technology innovation and transfer.
o) To develop information systems to assist and support the administration and management of research activities at a regional level.
p) To promote synergies, optimization of resources and establishment of common objectives of development between universities.

Threats

a) Competitive countries and regions have culture, mechanisms and public policies that guarantee the development and research for the long term.
b) Worldwide growth of culture and economy based on knowledge, causing higher competition.
c) Existence of economies with greater financing and investment in research and development.
d) Loss of interest by technology enterprises in investing in the region due to lack of incentives and greater benefits offered in other states or regions.
e) Brain drain due to the lack of recognition of their work and low economic incentives that are offer in other countries and regions.

IV. CHAPTER FOUR: CONTRIBUTION OF TEACHING AND LEARNING LABOR MARKET AND SKILLS

A. Localizing the Learning Process

Mechanisms to meet regional teaching and learning needs and demands

One of the most important coordination instruments in the area of higher education is the State Committee for Higher Education Planning in Nuevo León - a state agency pertaining to the National System of Higher Education Planning which main aim is to plan, on a permanent basis, the development of higher level education in the State of Nuevo León, consistent with the National and State Development Plans. At the same time, it is responsible for linking these works with the National Coordination for Higher Education Planning and higher education-related regional and state agencies.

COEPES Nuevo León is a state government social body of that consults on matters related to the higher education sector. The agreements, results, and resolutions produced by this body are consensual and propositional in nature; it aims to contributing to the betterment of higher education through participation and exchange of experiences. Its goals are:

a) To plan and encourage the development, growth, and orientation of higher education in the state;
b) To formulate strategic guidelines for facing challenges and problems of professional performance and quality for those finishing higher education studies;
c) To further programs and projects, and coordinate actions supporting the development of higher education in the state;
d) To encourage inter-institutional coordination, as well as the disclosure and evaluation of state policies;
e) To establish general criteria as to the creation of new education institutions and programs;
f) To encourage reorientation of academic offers in accordance with the perspectives of the development of the state; and
g) To propose alternatives to the state government regarding attention to unsatisfied demands, and to initiate due actions with the federal government.

To carry out its functions, COEPES has 13 inter-institutional groups available in the following areas:

1. Evaluation
2. Science and technology
3. Academic offers and labor demand
4. Internationalization of higher education
5. University-industry linkage
6. Virtual education
7. Research
8. Career counseling
9. Academic training
10. Regulation and administrative simplification
11. Statutes
12. Admissions
13. Studies and opinions

Complementary to the efforts on the part of COEPES, there are other governmental and non-governmental agencies that influence the conduct of curricula at universities. As stated earlier, these agencies include the following:

- **Ministry of Public Education**[54]
  - *Integral Program of Institutional Strengthening (PIFI for its acronym in Spanish)*
    Instituted by the SEP in March, 2001 as a mechanism for providing orientation to the development of higher education and substantiating support for projects formulated by higher education institutions, leading to the strengthening and consolidation of educational programs, as well as academic-administrative processes for achieving accreditation or certification,

[54] Ministry of Public Education: http://www.sep.gob.mx/wb2

respectively, and also preservation of the high quality already achieved in other educational programs.

- PROADU[55]
  This is part of the PIFI program and constitutes a strategic means for supporting the integral improvement of higher education institutions within the framework of its Integral Programs for Institutional Strengthening. PROADU considers the support of activities related to university projects, based on the support subprograms: systematization and improvement of education and evaluation methods, disclosure and extension of culture, operational improvement of libraries and information centers, improvement of the relevance of the academic curricula, and human resources training. Its main goals are:

  a) To encourage and consolidate quality, for which it is important to give support to evaluation processes, to strengthen training and development of academic bodies, and to provide the proper infrastructure for academic work.
  b) To promote relevance in higher education, paying more attention to social, cultural and economic needs at the regional and national levels through the encouragement of linkage with the productive sectors in the process of teaching, research, and technology transfer.
  c) To stimulate the organization and coordination of the system, seeking mechanisms that foster the generation of new financing sources, as well as strategies allowing for the optimal use of public resources and the improvement of institutions' normative frameworks.
  d) To develop innovative strategies allowing the diversification of offers in educational programs and the improvement of their quality.

- **Ministry of Education (SE)**
  Through its Undersecretary of Middle-high and Higher Education, the Ministry of Education coordinates all efforts to attain fair and high-quality middle-high and higher education for students in Nuevo León.

- **CONACYT**
  The relationship between CONACYT and the universities is more oriented to the strengthening of education at the postgraduate level. Through specific programs such as the SEP-CONACYT Program, they look for constant improvement and the assurance of quality in Postgraduate Educational Programs (PEP) offered by higher education institutions (IES). Additionally, they have more specific programs, such as the following:
  - Program for the Strengthening of National Postgraduate Studies (*Programa para el Fortalecimiento del Postgrado Nacional* or PFPN), which in turn, consists of the National Postgraduate List (*Padrón Nacional de Postgrado* or PNP) and the Integral Program for the Strengthening of Postgraduate Studies (*Programa Integral de Fortalecimiento del Postgrado* or PIFOP). They contribute to the improvement of the national postgraduate system through the application of objective evaluation processes and the generation of relevant policies. They also encourage and support processes of continued improvement or assurance of quality in postgraduate programs offered by institutions of higher education, so as to have more choices of training to offer scientists, humanists and technologists of a high competitive level.
  - Mixed funds, which are a supporting instrument for the scientific and technological development of the state and the municipality, through a trust constituted by the contributions of the state, municipal or federal government through the CONACYT.
  - Sector funds. These are trusts that can be constituted by the contributions of agencies and entities of the Federal Public Administration, together with CONACYT, to assign resources for scientific research and the technological development of the corresponding sector. They are addressed to universities and private or public institutions of higher education, research centers, laboratories, public and private companies, and others listed on the National Registration of Scientific and Technological Institutions and Companies which can produce scientific and/or technological solutions to problems in various sectors. The goal of these funds

[55] PROADU: http://sesic.sep.gob.mx/dg/dges/dpe/Proadu/antecedentes.htm

is to promote the development and consolidation of scientific and technological capabilities for the benefit of the sectors, as well as to assign resources to contribute to the integral development of the sectors through scientific and technological actions.

- **ANUIES**[56] (National Association of Universities and Institutions of Higher Education).
  This is a nongovernmental association of plural character that includes the main higher education institutions of the country (144, serving 80% of the students at undergraduate and graduate levels). Its common denominator is to encourage integral improvement in the fields of teaching, research and extension of culture and services. Since its foundation in 1950, it has participated in the formulation of national programs, plans, and policies as well as in the creation of agencies focused on the development of higher education in Mexico.

- **AMPEI**[57] (Mexican Association for International Education).
  This is a nonprofit association which mission is to contribute to the strengthening of academic quality in Mexican higher education institutions through international cooperation. It is subsidized by various funds granted by various agencies that support higher education institutions at the international level and also by the collection of moneys from annual membership fees. The AMPEI carries out various activities related to the following: promotion of academic and collaborative exchange among the HEI of the country and abroad; research and analysis of the steps to be taken for academic exchange activities; the promotion of the professional improvement of its members; recommendation of policies and practices that encourage the development of education programs and research projects with the participation of academics, students, and university officials both from Mexico and from other countries; representation of the interests of members before national and international bodies; promotion of meetings and academic and professional events related to international education and cooperation.

- **FIMPES**[58] (Private Mexican Institutions of Higher Education Federation**)**
  This is a group which goal is to promote academic excellence and institutional quality, improve communication and collaboration among its members and between the federation and other education institutions of the country, respecting each of these as to their mission and philosophy, which is for them to fully assume the responsibility of serving the nation. Its objectives include the following: to promote and coordinate multi-institutional programs for teaching, research and service; to organize training programs for the academic and administrative bodies of member institutions; to study and propose solutions for problems affecting the functioning of private Mexican institutions of higher education; to encourage relationships of cooperation and harmony with the education authorities of the country and with public institutions of higher education.

In the area of research and technological development, there is, at present, a general consensus that it is necessary to implement a more effective connection between educational offers (academic programs) by universities and regional needs. In addition to the government agencies created to pursue this objective, universities have created their own mechanisms to match academic programs with the demands of the region. These mechanisms are as follows:

- *Market surveys:* Conducted occasionally to become knowledgeable, in more detail, of the concepts, attitudes and abilities that should be incorporated into the curricula.
- *Alumni network:* Establishment of close contact with the alumni network in order to continuously monitor the needs of the labor market.
- *Board of Directors of the Universities:* Integrated by leading representatives of the business and industrial sectors, in which regional needs and priorities are recurrently posed in order for these to be included in the strategic plans of the institution.

[56] National Association of Higher Education Institutions: http://www.anuies.mx/
[57] Mexican Association for International Education: http://www.ampei.org.mx/ampei/
[58] Mexican Private Institutions of Higher Education Federation: http://www.fimpes.ur.mx/

- *Academic Programs and Projects:* Designed to support the professional formation of students and address the professional and labor needs of the region through professional practice, practical schools, and social and community service, among others,
- *Continuing Education and Extension:* Academic programs designed and delivered to meet specific training needs in the various sectors of business, government, and social and community service.
- *Business Sector Agencies:* Through linkage with chambers (CAINTRA, CNIC, Chamber of the Furniture Industry, etc), Associations (ERIAC[59]), federations and foundations (*Fundación UANL*), and companies, they make specific requests and suggestions.
- *Collaboration Agreements:* With various agencies and civil associations (e.g., *Vamos México*) to implement joint projects allowing for the detection of needs in other contexts.

On its end, the private sector has also established its own mechanisms for linkage with the education sector to bring the needs of the business sector close to the academic field. An example of this is the Education Committees within associations and chambers, such as the Employer's Confederation of the Mexican Republic - *Confederación Patronal de la República Mexicana* or COPARMEX[60], which Education Committee, besides participating as coordinator of the group of education offers and labor market demand within COEPESNL, has as one of its key objectives, to narrow the gap between the productive and education sectors.

Therefore, the education system of the state is characterized by a continuous linkage between universities and the business and government sectors. This constitutes a clear example of the interests and efforts on the part of higher education institutions for the permanent updating of their curricula and the continuous suitability of the courses and programs offered, at both the undergraduate and postgraduate levels. Although it is a reactive, not proactive, practice, the institutions endeavor to provide students with the abilities, knowledge and competences that truly respond to specific needs posed in the region, in the short and the long term. This is exemplified by the introduction of new priority areas for the state: mechatronics, biotechnology, digital graphic design, nanoscience, and software design, among others.

Initiatives and learning programs enhance the capacity of students to be enterprising

Today, universities are distinguished by their excellent programs of activities linked with the business sector and carried out in order to incorporate their students to the labor market. These activities are

- *Entrepreneur Program*[61]
  Aimed at encouraging an entrepreneurial spirit amongst the students. Most universities have designated an ***Entrepreneur*** area, which focuses on guiding students through the first semesters in the acquisition of managerial tools and abilities, allowing for the creation of their own enterprise in such a way that eventually, when they finish their studies, will allow students to start up their own enterprises.

  These programs aim at forming innovative, enterprising students through a process involving motivation, training and offering the necessary support to facilitate a practical experience through the creation of an enterprise, as well as promoting an entrepreneurial culture oriented to the national and international community. They are also responsible for the generation and coordination of educational programs and spaces (workshops, fora, lectures, etc.) in order to promote competences, abilities, attitudes and values to create a culture centered on the development of the region.

[59] Institution integrated by professionals dedicated to the administration and enrichment of the Human Process in the business sector.
[60] Agencies with a national representation of 55,000 companies; out of which 2,200 are based in Nuevo León. http://www.coparmexnl.org.mx/
[61] UANL: http://www.emprendedor.uanl.mx/index.php; UDEM: http://www.udem.edu.mx/centros/ef/estudiantes/

Also, they provide entrepreneurs with the tools to develop value-added projects that encourage the creation of new enterprises, generating increased productivity and employment in the country. These programs seek linkages among entrepreneurs, professors, incubators, and government with the purpose of promoting and implementing new enterprising ideas. They offer an opportunity for the academic and business community to accumulate and renew knowledge, become updated with the latest models of business incubation, and gain opportunities for linkage with new, developing enterprises and business incubators at the national level that are interested in the creation of new projects.

- *Professional practices*

  These are projects of practical application that aim to reinforce and demonstrate knowledge, abilities and values acquired in the classroom by students and applied in the solution of a real problem. They normally last an academic term and involve the participation of seventh and eighth semester students and professors-advisors.

  The main benefit of these practices is the opportunity for the students to develop abilities of adaptation to the actual demands of the labor market. The students work on projects that solve actual problems of organizations, and this allows them to have a projection in the labor market, which, in time, will make it easier for them to obtain a job.

  A special case is the UDEM, which has a program of guided professional practices that can be carried out in teams according to each project's specific needs. These practices have a distinct characteristic: in all the cases, an advisor and two mentor experts in the field are assigned, and they evaluate and provide constant input for the development of the project. When the project is finished, the student's work is evaluated by the company and the academic institution, so that if any of the parties does not approve the project, the student does not obtain credit for the corresponding subject.

- *Practical schools*

  This is an academic program in which students from different specialties have the opportunity to actively participate in the daily operation of companies in Mexico and around the world. They apply the knowledge they have acquired during their studies and are in charge of some challenging and important short-term project for the organization, producing excellent results and high quality work. The goal of the Practical Schools or Professional Internship program has been designed to encourage abilities and knowledge on the part of the students, so that he/she can develop him/herself in a real work environment and thus become more confident when entering the labor market in the future. It also aims at satisfying the needs for self-fulfillment and completion of short-term projects and/or research that may be available at the participant company. On a regular basis, these programs are implemented every year in six-week periods during the summer, and they involve the participation of students in the last semesters. For the ITESM, especially, this program can represent the revalidation of one or two subjects, depending on the complexity of the project.

- *Business Incubators*

  The relationship with SMEs has also been reinforced through the development of public and private physical and/or virtual business incubators. Through these incubators, universities provide support to enterprising students, and in all cases, the service is open to students and alumni.

  Typically, the incubation model encompasses 3 stages: *Pre-incubation*, in which the business plan is generated to set the required solid foundations for an enterprise; *incubation*, in which the enterprise is legally constituted and generates sales to continue growing; and *post-incubation*, which is a support service for the enterprise in new managerial situations in the face of its expansion in the market.

At present, there are municipal incubators in the region providing physical space and consulting on the part of the government. Aiming at meeting the various needs and expectations of entrepreneurs, universities have developed different models in which a business can be incubated:

a) *Physical model*: The entrepreneur shares a workstation, computer equipment, secretarial services, and meeting rooms. All this makes the enterprising process easier and reduces the costs of the initial investment.
b) *Virtual model*: Designed for those entrepreneurs who, given the conditions of time and space, do not have the possibility of dedicating 100% of their time to the project, or have their own locations but require the enterprising support to initiate their business. By means of virtual spaces (portals), the entrepreneur receives all the services of tutoring, consultancy, training, business linkage and rapports with investors.

Supporting activities from the government

As to the business incubation in the state, the federal government invests 20 million pesos in incubators and additional investment funds for SMEs and productive projects. These resources have undoubtedly given impulse to the creation of a growing infrastructure in the entrepreneurship sector, especially in institutions such as the ITESM, UANL and UDEM. Until now, 15 business incubators, both public and private, have been constituted in Nuevo León.

Traditional incubators:

1. School of Public Accounting and Administration (*Facultad de Contaduría Publica y Administración* or FACPYA).
2. Municipality of Monterrey.
3. Municipality of San Nicolás - certification pending.
4. Chamber of Commerce of Monterrey (*Cámara de Comercio de Monterrey* or CANACO) - certification pending.
5. Training Center for Industrial Work (*Centro de Capacitación para el Trabajo Industrial* or CECATI).
6. Social programs of the ITESM, incubator devoted to providing support to rural projects.

Intermediate Technology:

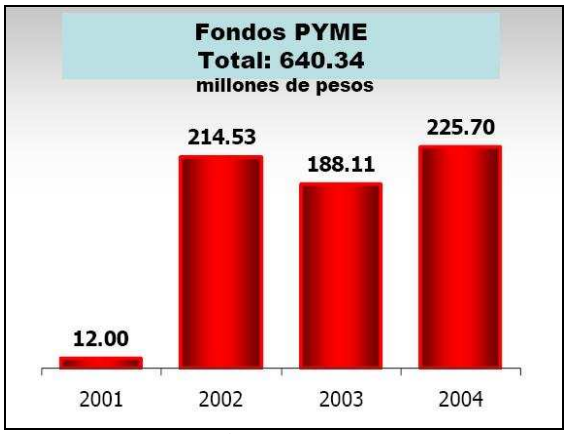
7. *Universidad Tecnológica de Mexico* (UNITEC).
8. *Universidad de Monterrey* (UDEM) – Business Incubation and Development Center.
9. *Instituto Tecnológico y de Estudios Superiores de Monterrey* (ITESM) – Business Development Center.
10. *Universidad Autónoma de Nuevo León* (UANL) – School of Mechanical-Electrical Engineering.
11. *Universidad Autónoma de Nuevo León* (UANL) – Magna Library.
12. *Universidad Regiomontana.*
13. *Universidad Tecnológica Gral. Mariano Escobedo.*
14. Municipality of San Pedro.

High Technology:

15. *Instituto Tecnológico y de Estudios Superiores de Monterrey* (ITESM) – Innovation and Technology Transfer Center.
16. *Universidad Autónoma de Nuevo León* (UANL)– Business Incubation and Technology Transfer Center.

Additionally, the federal government has taken important steps regarding the granting of funds for the furtherance of SMEs and technological development, more specifically through the Undersecretary for Small and Medium-Sized Enterprises pertaining to the Ministry of Economy, with an investment of MXN640M until the year 2004, as is shown in the following figures:

Figure IV.1. *SME Funds 2001–2004*



***** Includes Incubators of High Technology New Businesses, Sector Fund of Science and Technology for the Economic Development (with CONACYT contributions) Capital Semilla and resources from SME Fund to R&D.[62]

Table IV.1. Resources from SME Fund 2004 for Technology-based Incubators

Resources from SME Fund 2004 for Technology-based Incubators					
Incubator	**Trans. Model**	**Equipment**	**Infrastructure**	**Consult.**	**Total**
Program CENTRIS (B.C.)	$ 500.00	$ 330.00	-	-	$ 830.00
IPN-CIEBT (Mexico City)	-	$ 900.00	-	-	$ 900.00
ITESO-IEBT (Jalisco)	$ 200.00	$ 107.00	-	-	$ 307.00
ITESM-CITT(N.L.)	-	$ 1,500.00	$ 1,000.00	-	$ 2,500.00
CEDEITEQ (Qro.)	$ 150.00	$ 900.00	$ 60.00	-	$ 1,110.00
Silicon Valley (USA)	$ 495.00	$ 3,000.00	$ 1,000.00	$210.00	$ 4,705.00
Total	**$ 1,345.00**	**$ 6,737.00**	**$ 2,060.00**	**$210.00**	**$ 10,352.00**

Figure IV.2. *Entrepreneur Expo ITESM*

In the case of ITESM alone, for example, through the delegations of the Ministry of Economy and some state governments, during 2004 it captured MXN22.8M through the SME Fund.

At the same time, the development of new projects is favored with the support of agencies such as the Ministry of Economy, CONACYT, *Nacional Financiera*, state governments, as well as the private sector, which owing to collaboration agreements, provides the services of an incubation model to give potential to the economic growth of the country. As a result of these agreements, various resources have been granted to 78 of the enterprises of our incubators. All this has allowed ITESM to develop 670 businesses through its incubator network on its various campuses.

[62] M.B.A. Sergio Alejandro García de Alba Zepeda, Undersecretary for Small and Medium-Sized Enterprises, Ministry of Economy. XVII ADIAT Congress 2005. SME

Some of the activities and services provided at the incubators are:

a) Physical business incubator, which provides the entrepreneur with a program that develops the abilities and tools (business plan) necessary to become a successful business.
b) Business Consultancy for students, entrepreneurs and businessmen in the areas of business creation (format of the business plan, financing, steps to take, and documentation) and foreign trade (format of the export plan, steps to take, and documentation for exporting, international markets and trade agreements).
c) Business education for the entrepreneurial community in general, through courses, seminars, and workshops focused on the application of tools and methods needed for the development of enterprises and businesses.
d) Disclosure and promotion of workshops, lectures, congresses, training courses, contests, and awards, among others.
e) Business linkage through the integration of contact networks, new clients and vendors, as well as a printed and electronic directory of SMEs in the country.

Technology in incubation

Business incubation has been primarily focused on the creation of businesses in the commercial and services sectors. However, since the creation of the state strategic project MIKC, and based on the new approach of the economy toward a society of economies and knowledge, universities have strategically increased the support and furtherance of technology-based business incubation.

As previously mentioned, the Federal Government has played a crucial role in giving impetus and promotion to the development of technology in the region. As a response to this impetus, specific efforts have been made to this incubation model. UANL opened the Incubation and Technology Transfer Center with the purpose of integrating an efficient system facilitating the activities of innovation, incubation and technology transfer to contribute to the scientific, technological and economic development of the region and the country. UDEM on the other hand, through the Division of Architecture, Design and Engineering, opened the Technology Innovation Center "GENERA", with free admission to the community in general. ITESM opened the Technology Innovation and Transfer Center to give impetus to technology-based businesses, to facilitate the activities of technology transfer, and to speed up the commercialization of new technologies, providing a proper atmosphere to promote growth, reduce risks and facilitate the adaptations of these businesses to the global markets.

Another important aspect to underline is the training work that some universities are carrying out with academic programs, allowing students to develop initiatives for the creation of new businesses with the highest added value. Such is the case of ITESM and its program "*Emprendedores Tecnológicos*," in which students, before embarking on the development of their business plans and thus their start-up in the business incubation model, devote one or two semesters to the development of their products or services (idea of the business), incorporating scientific or technological advances and thereby achieving a competitive advantage.

Table IV.2. Incubation data form ITESM, UANL and UDEM

	ITESM[-1]	**UANL**	**UDEM**
Starting date of the program	2001	2003	2005
Incubated businesses	114	13	6
Businesses in incubation	809[-2]	-	15
Number of people involved in the incubator	8	9	3
Available infrastructure (offices, computers,	In the Physical Business Incubation Model there are	Office equipped with a computer, telephone,	17 offices for incubated businesses, equipped with a

facilities, etc.)	offices for the entrepreneurs, these having computers. Also, the entrepreneurs have access to the Service Center in which they can use the meeting and training rooms, as well as of basic services, such as a telephone, fax machine, copy machine, scanner and printer.	internet service and communal services, such as a copy machine, scanner, fax machine, meeting room, video projectors, laptop, etc.	computer, telephone and internet service. Common area for the virtually incubated, with computers. 3 consultant workstations with a telephone and computers. Printing and fax machine rooms, warehouse and reception area.
Line of the business in incubation	Services and trade, agricultural industry, industrial area, export, information technologies and high technology.	Environmental, business trade, legal and accounting consultancy; systems training, architectural design, purchase and sale of computing equipment, Webpage design, commercialization and import of products, engineering and design projects; and specialized technological development.	Software, food, agricultural industry, robots, and services.
Efficiency rate of incubation (number of businesses entering the program/incubated businesses)	90%	100% in the initial incubator (*Biblioteca Magna*) and 45% in the incubator of recent creation, "Mederos."	Businesses not yet graduated. At present, with a year of operation, they are 80%.
Cost per incubation	Physical or virtual pre-incubation: MXN1,800 for 6 months; physical incubation: MXN3,500 for one month; and virtual incubation: MXN1,600 pesos for a year.	Office Rent: MXN3,000, and with grant by UANL and the Institute of the Youth: MXN1,000.	MXN3,000

[1]15.8% of the businesses operating under the incubation model are oriented to technology in various sectors of the economy.
[2]Includes businesses in incubation at system level and under the virtual model.

Career services in the process of localizing learning

With the objective of counteracting the unemployment rate in the region, universities are dedicated to linking recent graduates with different public and private organizations by different means, with job boards being the method most widely used.

Job boards at universities offer a wide range of services for students and graduates, as well as for individuals looking for a full- or part-time position. Some of the most common services offered are:

- *Available openings bulletin*: After determining the current needs in the work field, job boards generate a space that provides an employment opportunity in a part-time or full-time position, as well as internships and social services practices available within the state.
- *Resume posting*: Database with information and profile of recent graduates; such information can be accessed by headhunters and recruiters from different companies.
- *Web sites*: Web site development with job openings posted in international job boards Web sites, as well as links to other Web sites with information about worldwide job searches, conferences and recruitment.
- *Training in job searching topics*: By attending conferences and workshops, as well as developing personal handbooks; the job boards provide basic information and suggestions for looking for a job. Topics include the following: life and professional career development, suggestions and tips for job search, how to write a resume (including English), how to conduct yourself in an interview, salary wages, and requirements for work permits in other countries, just to name a few.

- *Hiring and selection for job positions within the university*: Where to find faculty, staff, classified, and support positions within the institution.
- *Job fairs*: Job boards are responsible for regularly setting up and promoting job fairs for the university, as well as for other colleges.
- *Hiring for companies*: Job boards provide support for the companies' hiring process, as well as candidates, according to their specific requests.

Furthermore, there are other methods like internships, hands-on training, and social service that provide the foundation for students, since most of them are hired after completing a project with such companies. On the other hand, some colleges have developed additional tools to support graduates' integration into the work field. Some of them are:

The Observatory: Your Working World[63]
The Observatory is a tool linked with the productive sector. Developed by the UANL, this tool provides students and alumni with the necessary tools to start a productive working life. On its Website, the Observatory has a job board, an interview section and access to the *Mexican Labor Observatory*[64].

Professional Orientation Center
This program was developed by the UDEM and is a strategic part of student development, so that by the "auto-knowledge" process and by detecting opportunities in the environment, they are able to identify and carry into action their professional and personal goals. It provides guidance, support and resources to increase their professional development satisfaction. In addition, the university has specific courses called "transversals," which focus mainly on immersing the student in social and productive problems in order to facilitate the student's transition into the workforce.

This center is very important because it supports students' preparation, beginning with their admission to the university. The center helps to ensure that students will be ready to comply with the demands of the job market, and focuses their learning experience towards their professional goals and plans. Students develop self-responsibility in the development of their own professional career, and at the same time they create personal marketing strategies to deal with selection processes in the job market.

Benefits for professionals and employers include the following: major consulting, psychological evaluations, placement skill development workshops, professional path and development plans, mock interviews, resume editing, and programs for business leaders.

Job Fairs

Job fairs have the objective of creating a setting for interaction between recruiters and students and/or alumni. They are organized by different job boards from different universities. Their objective is to find job opportunities and bring students to these opportunities in the workforce.


Figure IV.3. *Job fairs in UANL and ITESM*

Usually, job fairs are organized at universities on a periodic basis, with the objective of matching companies looking for qualified candidates from different fields with students, recent graduates or alumni with professional experience.

[63] El Observatorio UANL: http://www.uanl.mx/capital_intelectual/observatorio/
[64] On-line public service information on labor market. The Ministry of Labor and Social Provision provides this site freely and permanently to answer any job-related questions: http://www.observatoriolaboral.gob.mx/

Job fairs are organized with the objective of matching companies in the region with the university. Another objective is for companies to visit the infrastructure and, more importantly, to know the students.

Mechanisms to monitor/accredit extracurricular activities

As mentioned before, universities make concrete efforts to integrate students into different activities and programs within the community, such as social and community service, hands-on training schools, and collaboration with nonprofit and charitable public organizations. In addition to students' academic formation, universities from the region offer several programs in the integral formation area. These programs try to complement and awaken students' interest in their environment. These programs include leadership, values, ethics, culture, and health, just to name a few.

Through control mechanisms, such as follow-up of performance evaluations, reports, logs and accreditations from the students, universities are searching for a way to provide follow-up in the formation process, as well as the commitment developed towards the community.

Only a few campuses establish mandatory extracurricular activities and courses for academic grades. After attaining all credits, students involved in extracurricular activities are recognized. Examples of such activities include physical education, health, cultural broadcast, leadership, and skill development, among others.

Postgraduate activity towards meeting regional needs

Generally speaking, we can state that graduate programs have the purpose of satisfying the specific needs within the area. In order to reassure its relevance, the courses for masters and doctoral graduate degrees are structured to include the considerations of committees, professionals, employees and faculty from the area. Special focus is placed on the collaboration form research centers, since graduate students are normally in charge of research and consulting projects in universities throughout the development of dissertation projects.

In addition, we have national and international organizations that assess and grade the different academic course studies in the graduate programs. They include the following: Southern Association of Colleges and Schools (SACS), Accreditation Board for Engineering Teaching (ABET), SNI, CONACYT and the ANUIES, just to name a few.

Nuevo León is considered a state with high-level quality education at all its levels. As you can see in Table IV.3, approximately 55% of graduate students are enrolled in the ITESM, UDEM or UANL. This information implies that only 3.9% of the total graduate student population in the country, either in masters or doctorate programs, is registered in any of these 3 colleges (150,852[65]). However, considering the mean national average of 7% for students pursuing a post graduate degree, the percentage for this state is 9.4%, placing the state as a location with a specialization level above the national average.

Table IV.3. Graduate Programs Data from the ITESM, UANL and UDEM

	UDEM	UANL	ITESM
Total graduate students	367	4,170	2,698
Masters programs	10	70	50
Doctorate programs	0	25	10

**UANL is also providing 53 programs of specialization.*

There are not any studies that show the quality in graduate programs. Nevertheless, graduate students have become the best linking mechanism among colleges and the research and productive sectors. It is

[65] SEP 2005 (see Table II.4. Students in Graduate programs)

safe to say that research and consulting efforts developed to satisfy projects from the business and productive sectors are concentrated in masters and doctoral dissertations performed by the graduate students as part of their curricula.

B. Student Recruitment and Regional Employment

Currently we don't have internal or regional policies for student recruitment, nor do we have a recruitment fee policy between colleges. The higher education institutions have several admission requirements and different recruitment mechanisms for their students. They range from visits to regional, national and foreign high schools, up to job fairs and advertisement in local and national media.

In the case of public colleges in the region, their main student sources are state and federal public high schools – mainly young students who cannot afford to pay private tuition. Even though the state per capital income is USD11,149 per year (84% higher than the national average, USD6,042, it can be stated that it is a very big segment of the population, and such demand makes the space in public colleges insufficient.

On the other hand, in the case of private colleges, we can see a strong competence among education institutions in recruiting most of the student market segment. This segment has been decreasing lately, due to the evolution and behavior of the country's demographic structure. As a result of the natural decrease in demand, and based on the recruiting goals established individually by each institution, it is safe to say that at a certain point the academic levels in the different colleges were at risk, due to the low standards of quality in student selection criteria. (e.g., the minimum average passing grade to be qualified to register in college was 7.5.)

The higher education institutions as part of a regional education supply chain

Other than the relationship between colleges and recent graduates and the monitoring systems that provide information about alumni placement, as well as the labor market satisfaction regarding their knowledge, skills, and values, we don't have concrete evidence of any strategic system that provides follow-up and/or evaluation[66] about the hiring rate and destination of recent college graduates. Nevertheless, colleges are aware of their role as providers of professionals not only at the regional level but also at the national level and, sometimes, at the international level. Therefore, they have established the necessary mechanisms to keep a constant interaction with different companies (big, medium-sized, and small). Example of such mechanisms are performing activities such as informational breakfasts, job fairs, creation of agreements (to make it formal), symposiums and workshops for students and alumni about current and professional development topics, creation and design of linking tools (like job boards Websites and continuing education on-line), communication and networking with alumni, etc.

Nevertheless, besides the role of producing human talent, these days state universities are defined as the main promoters of the creation of SME in the region. The effort to develop an entrepreneurial attitude and mentality, as well as to provide our professionals with the skills and knowledge necessary to create their own companies during and after completion of their professional courses, has been a key element within the educational models in universities. The entrepreneurial programs in some colleges have been transformed as an example of successful practices at the national level. That is the case with ITESM Campus Monterrey, which, besides working in close collaboration through several agreements with international and recognized universities, has distinguished itself with the management and sale of training courses and programs for its entrepreneurial program in Latin America.

Besides the formative aspect for students, the universities are recognized as training centers approachable by any professional wishing to acquire the knowledge and tools needed to promote and grow their own company. This area is strengthening the SME sector, and is making it one of the most

[66] In addition, some HEI have international accreditation systems and they have to comply with placement and hiring information regarding recent graduates.

important economic sectors within the state's economic development. One of the key activities within the small business creation process is the critical function performed by the colleges; they act like possible links for funding, especially focusing on the private and federal sectors. That is, the federal and state governments have found the mechanism to assign and issue economic funding for specific business projects with high priority in the country. In addition to the services described above, the colleges offer (sell) the business community the following services: specialized consulting services for the start-up, incubation and post-incubation period for businesses; training and tutoring; links with businesses, agreements and partnerships; links with financing resources; links with laboratories and research centers; lease of buildings with basic infrastructure (telephone, fax, copier machine, scanner, printer, Internet, meeting room, safety and security, maintenance and janitorial services, etc.).

An important aspect to mention is the regional and national coverage of the state universities. Regardless of the efforts to increase alumni relationships with the community through the development of collaboration programs with public and private institutions, the direct contact between student-businesses (social service, internships and research collaboration), the business incubators, and the entrepreneurial programs, the students come from other states – and countries. That does not guarantee the positioning of recent graduates into the state's productive sector. One typical example is the ITESM. Most of the population is from out of state, representing around 50% of the student population.

In conclusion, due to the regional coverage factor, the universities represent by nature one of the main sources of qualified human resources for the productive sector (without putting aside the role of technical and vocational institutions, which represent another important source of specialized labor). Although it hasn't been long since its implementation, most of them are the most important element for the creation of new businesses and, therefore, self-employment in the state.

C. Continuing Professional Development and Training

Continuing education and continuing professional development activity

Continuing education has found an important place within universities: to expand educative services to other sectors of the community, as well as to generate additional economic resources.

In all circumstances, the practice of continuing education and extension in the universities is characterized by a solid, established and structured area of the institution. This fact has allowed the different departments to offer a wide range of educational programs in the classroom, in virtual mode, and long-distance learning. The programs normally offered are qualified training, seminars, courses, certifications, workshops, hands-on training, laboratory testing and analysis, and other professional services like text translations into several languages.

Continuing education is managed exclusively by universities. However, according to market demand and the needs of specialized topics, agreements are established with other education institutions, as well as consulting and development companies for the development of practical guides, content and delivery of courses. Furthermore, universities collaborate with governmental and nongovernmental entities in the design and implementation of outreach programs.

Through the constant relationship with state, federal and municipal government offices; corporations and businesses; foundations and associations; public and private college councils; and other international entities (World Bank, United Nations, etc.); universities have detected the basic and specialized needs of different sectors in the region, in order to create their own portfolios of training and modernization courses.

Continuing Virtual Education

The incorporation of virtual modules for formal and continuing education is a mechanism that has gained strength in the region. The most successful case is the ITESM, which currently has an enrollment in their Virtual University of 500 to 700 individuals from government entities and large

corporations. They are self-learning courses and have a structure of on-line tutors. In addition, through the Community Learning Centers (*Centros Comunitarios de Aprendizaje* or CCA), the virtual university has provided the capacity to expand learning to marginal and rural zones, where emphasis is placed on basic courses about the field, family, ecology, etc. It is designed with an educational model designed to fit the needs and skills of the people in those areas.

Continuing Health Education
The UANL has a specific continuing education and assistance programs for health that is called Telemedicine, where specialist from the University Hospital assist doctors and patients that are located in the 6 rural hospitalities of the region. This program also covers the educative and assistance needs of different health centers within the metropolitan area.

D. Changing Forms of Educational Provision

Current mechanisms for promoting flexible education provision

Although it only applies to certain areas, the *Universidad Autónoma de Nuevo León*, the *Instituto Tecnológico y de Estudios Superiores de Monterrey*, and the University of Monterrey have certain mechanisms used to provide education in a more flexible way. The mechanisms are the following:

- Videoconference.
- On-line education throughout technological platforms (LMSs)
- Courses by satellite
- Telephone links

Complementarily, we use information and communication technology to offer our services to a wide range of individuals. Currently, the most advanced technologies used are the Internet, educational platforms, satellite, TV and radio. In the particular case of the ITESM, the institute has receptor rooms in the headquarters' offices, as well as receptor substations in each of the campuses across the nation and abroad.

With the purpose of keeping institutional coherence at the local, state and regional levels, universities make their courses and programs consistent with the objectives and strategies defined in their mission and vision. Some of them have their own education model clearly defined, and sometimes it can be supported by a qualified faculty system.

Regardless of all the flexibility to deliver content, all efforts are in a way, independent efforts made by each institution. On the other hand, they are education sources with a high cost and not accessible to most of the population in the state.

Even though some people consider the classroom and virtual modes as backlash and not complementary options, there is a strong belief in most of the population that the classroom mode is better than the virtual or on-line mode. It is a strong belief that the students learn better with the presence of a teacher in the classroom. The idea of turning the student into the main actor in his/her learning process is not considered; in this situation the teacher role is as the learning facilitator.

E. Enhancing the Regional Learning System

Unfortunately, without considering the extraordinary efforts made by universities in professional formation, we currently do not have a coherent regional vision for the higher education system. There are several initiatives supported by the state government that allow academic programs where credits can be transferred between different universities, and independent efforts are being made to incorporate specific knowledge and skills in demand by the community, such as job experience through hands-on training, establishing relationships with the society providing social services, entrepreneurial spirit and businesses start-ups, and distance learning methods, just to name a few. However, notwithstanding all

efforts made, we are still too far from having a standardized higher education learning system adaptable to the demands of the workforce, as well as to the priorities of the area. In fact, in order to establish the workforce demands and determine the education supply in all its aspects, universities look for a way to analyze workforce demands in the market by performing temporary market analysis and, more importantly, though its alumni and councils, in order to incorporate new courses to the curriculum.

The Ministry of Education provides feedback and contributes to the State Development Plan and State Education Plan by considering the statistical data obtained from the evaluation of programs issued, the number of students in each institution, and the priorities and strategic developmental programs in the area of education. Particularly, the State Education Plan establishes the priority areas for promoting educational projects. For example, the projects currently have priority in the areas of health, nanotechnology, biotechnology, and information systems.

A great benefit of the national education system, and therefore a benefit to the state of Nuevo León, is the existence of an invertebrate system, in which education objectives and priorities in the higher education area are defined independently by each university, without a set of regulations with which to comply, and reassuring an even education at the transversal level. As a consequence of this breakup, there is only one procedure for validating courses from other institutions through the Ministry of Education in the state. However, the procedure lacks a standardized curriculum automated system, as well as credit transfers between institutions. There are certain initiatives supported by the state government to standardize academic programs, allowing credit transfers between the HEI. Nevertheless, up until now, there has not been a system with relevance in the region.

From the point of view of equity in education, Mexico and the state of Nuevo León lack regulations to promote equity in this field. There is also a lack of procedures with which to comply regarding the percentage of students of the same sex.

F. Conclusion

The strong collaborators within the higher education system are the federal, state, and municipal government offices; corporations and businesses; foundations and associations; public and private education councils; international bodies (World Bank, United Nations, etc.), as well as universities and technology institutions.

Strengths

a) Promoting vision with the state government especially in topics related to business incubation, curriculum standardization and collaboration efforts between universities.
b) Active participation among higher education institutions, other institutions, and public and private companies, especially in defining relevant academic topics that would help the economic development in the state.
c) Excellent business connection programs among universities and companies that incorporate students into the workforce.
d) There are identified public entities responsible of defining the higher education strategic lines, as well as providing the financial resources to promote them.
e) The universities have the information technology and communications infrastructure to allow the use of flexible education.
f) There is a clear identification of the key players in the higher education system. This helps to identify the possibilities for establishing new collaborative relationships between institutions and different sectors.
g) Higher standards of gender and socioeconomic equity in public universities and some private institutions.

Weaknesses

a) Elementary and secondary are not effectively connected with the programs and goals of high school and higher education.
b) More active participation from the government regarding the creation of learning regulations and evaluations that could detect areas of opportunity and improvement.
c) Insufficient precision in the framework with clear and detailed priority areas for development that leads to coherent academic offers among universities in the region.
d) High cost associated with distance learning.
e) Insufficient interaction and participation among universities for the standardization of curricula and accreditations.
f) Cultural rejection of distance learning by population.
g) Insufficient policies established to promote continuing education by the organizations.
h) Lack of policies in some institutions to promote equity in education regarding gender and socioeconomic level.
i) Insufficient efforts to offer superior integral education which includes diverse essential values for the development of any region.
j) Lack of public infrastructure and support for increasing community service programs as well as access to them.
k) Lack of equilibrium regarding current connection programs available in several universities (Social, Business and Entrepreneur development). While some of them are highly committed to social development, they lack momentum for entrepreneurial activity.
l) Lack of measuring and indicator mechanisms that allow for evaluation and comparison of performance in the higher education institutions in the region.

Opportunities

a) Creation of new collaboration agreements between universities.
b) Creation of new collaboration agreements to standardize the regional curriculum.
c) The HEIs have telecommunications infrastructure to create a regional network of faculty based in specialty area.
d) Promote distance learning as an alternative method in order to make higher education accessible in places without access to a classroom.
e) Create more support programs that make continuing and social education more accessible to the rest of the population.
f) Make joint education plans for medium and long term.
g) Promote the use of measuring indicator mechanisms that allow for evaluation and comparison of performance among higher education institutions in the region.

Threats

a) Entrance of national and international new, low-quality universities not identified with the region's needs and that have flexible revalidation and accreditation criteria.
b) Widening the gap between regional priorities and program implementation in the different universities.
c) Development of a gap between the academic offers and the real needs and priorities for development in the state that are articulated in other countries and regions.

V. CHAPTER FIVE: CONTRIBUTION TO SOCIAL, CULTURAL AND ENVIRONMENTAL DEVELOPMENT

A. Social Development

Mechanisms to provide students a significant experience in the community

The region's universities offer community support programs through the following mechanisms:

- *Health Programs:* Schools of medicine, health and development centers where general and specialized physicians are educated, community health is promoted, research is done and extension services provided, innovative methods are created and applied in the teaching-learning process of medicine, teaching is integrated with up-to-date practice of the different areas of medicine, and graduates are encouraged to engage in service and to respect human life. In addition, the three universities with the greatest impact in the state own the most important hospitals, private and some public medical clinics, and private doctors' offices that serve the entire region.

- *Social Service Programs*: Using assistance, social promotion and community development intervention methods that focus on encouraging awareness and social responsibility. These educational areas pursue a better quality of life in indigenous communities with low income or in extreme poverty.

  Social service has been mandatory in the national educational system since 1944, when the executive order published on December 30th of that year in the Official Gazette emphasized that social service was required in order to obtain a professional degree. This executive order mandates temporary, professional service by degree candidates for benefit of the country. This service lasts for a maximum period of two years and a minimum of six months, as currently established in the Regulation of articles 4 and 5 of the constitution, in relation to the exercise of professions in the federal district and territories. This did not become effective throughout the republic until 1945. The Law is known as the Law of Professions[67].

  Even though social service programs are mandatory in the national educational system, most universities traditionally emphasize assistance and social promotion programs, giving a lower priority to *community development*, which is the key factor for developing community sustainability.

  The ITESM, in particular, is noted for having one of the most important community development programs region-wide: Community Centers of Learning[68].

  Community Centers of Learning

  The Community Centers of Learning, or the CCA, as they are commonly known, are educational places which primary objective is to provide quality education to the inhabitants in geographically isolated zones or those that do not have traditional educational services.

  The most valuable aspect of the program is the degree of willingness the ITESM has found in terms of support by many foundations and public and private organizations, which are acknowledged publicly in the section on participating institutions. Each and every one of them, with their great commitment to social responsibility, makes this project possible.

[67] Since the 1974 reforms, the final form or the establishment of the mandatory nature of social service is called the Regulatory Law of Article 5 of the Constitution related to practice of professions in the Federal District and Federal Territories.
[68] CCA: http://www.cca.org.mx/portalcca/info_gral/

The ITESM provides the academic content and the processes for operating the centers through a Web site. This technological process began with the support of the "*Puentes al Futuro*[69]" (Bridges to the Future) program financed by J.P. Morgan, the Ford and Kellogg foundations, the huge amount of aid from the William and Flora Hewlett foundation, as well as Sun Microsystems in terms of technological infrastructure.

> *Puentes al Futuro* (PAF) is an educational program in which a variety of public and private entities participate, such as the National Adult Education Institute- *Instituto Nacional para la Educación de los Adultos* or INEA, CONEVYT, ITESM, as well as foundations, for the purpose of coordinating and developing innovative basic literacy and technological actions.
>
> *Puentes al Futuro* offers an interactive basic and technological education program through the use of multimedia and the Internet, directed to youth and adults. The characteristic of this innovative educational program is flexibility in terms of time, content, homework and tutors. Furthermore, the participant has an advisor who is present and provides support with interactive literacy activities.
>
> Its goal is to develop and implement basic literacy and technological literacy programs that contribute to improving the quality of life in the country's marginalized communities, with a focus on strengthening intercultural and linguistic aspects, linked with other educational life and work options.

The Community Centers of Learning project began in February, 2001, with the creation of the first CCA in the town of Dr. Arroyo in southern Nuevo León. In April of the same year, thanks to an alliance with Nuevo León's Ministry of Education and the telephone company Telmex (*Teléfonos de Mexico),* another 30 centers began operating, and today there is a center in every municipality of the state.

In May of 2001, hoping to expand the program to other areas of the country and supported by the "*Puentes al Futuro*" program, ITESM extended its borders to the south of Mexico and signed an agreement with the federal government through the Social Development Ministry to set up a CCA in every one of the 250 poorest micro-regions of the country. This process has continued gradually since then, and to date there are more than 700 centers covering all the states in the Mexican Republic.

In addition, with the participation of private parties and state and municipal government initiatives, the network is expanding, and many other centers are operating in Mexico, the United States and other countries. The ITESM provides educational content, the organizations and governments provide human resources and infrastructure, and the universities provide volunteers, all looking for windows of opportunity for development and a policy that includes all of society through technology.

For many communities, the CCA is their first opportunity for Internet connection, because of their geographical situation. This is how bridges are built that join them with the rest of the world and how new opportunities are developed for educational and socio-economic development.

On the other hand, the UDEM is at present well recognized as a university highly focused on service. Here, the traditional and essential goals that every university have, such as culture preservation, communication and progress, professional education, integral human formation and scientific research, were topped with a unique characteristic and an essential goal established by Universidad de Monterrey as university focused in service.

Being formed as professionals at Universidad de Monterrey also means becoming sensitive to the needs of others and adopting a supportive attitude toward those who lack the most basic well-being; at UDEM, professors as well as students integrate the university community, which is attentive to the environment and is also committed to the needs of the less privileged sectors in the

[69] Puentes a Futuro: http://www.cca.org.mx/puente/homedoc.htm

community. As a result the university has created the Center for Solidarity and Philanthropy; a space that provides the university community the opportunity to develop a social awareness and responsibility through their participation in community work programs, focused on "dignifying" people and social growth, finding throughout this process the meaning of "transcending" in serving others.

Center for Solidarity and Philanthropy

In order to achieve the goals and as a result of this commitment towards service, the UDEM has created the Center for Solidarity and Philanthropy which mission is providing the University Community the opportunity to develop an awareness and social responsibility through their participation in community service programs focusing on dignifying people and social growth, thus finding the meaning of transcendence in serving others.

At UDEM, faculty and students comprise a university community that is attentive to the surrounding environment and committed to the needs of the less privileged sectors. Thus, students experience social service as a true service to the community.

The academic programs promote the creation of social awareness through different courses. Such social formation obtains the full meaning when it is expressed through practice throughout the field projects: social service projects. The courses are: Mexican Reality, Ethics and Social Responsibility, Social Awareness and Social and Community Development.

For the last 20 years, UDEM has been present in the low income communities in the municipalities of San Pedro and Santa Catarina in the State of Nuevo León through community development programs, being the Health and Development Center, the Summer Camps, and Self-managed Centers for Early Childhood Education some of them. Likewise, there are more than one hundred collaborative programs with social work institutions that are classified into three types: Social, Community and Development programs. In order to privilege the community development, the Center for Solidarity and Philanthropy will also support three strategic projects: the polytechnic high school, the neighborhood university as well as the center for entrepreneurial incubating and development.

- *Support for Indigenous Communities*: Through program designs directed at solving the specific needs of one indigenous community in particular, such as the improved standard of living program achieved through the teaching of garden produce growing with the UDEM's bio-intensive orchard technique.

- *Values Programs*: Through academic programs which goal is to encourage a culture of ethical values inside the institution and in the community. In the case of ITESM, the institute has a Center for Ethical Values[70], which offers courses in response to the demand for educational, entrepreneurial, governmental, and institutional courses specializing in different topics or with a focus on ethics, and coordinates and supports the teaching of ethics in the study plans. Despite the fact that, officially, education in Mexico has to be nonreligious, some religious institutions have created or financed private universities. The UDEM for example, has a faith-based values program called University Pastoral program, which encourages students to have meaningful encounters with Christ, so that they give witness to their faith and live and celebrate it, committing themselves to service to others. Participation in the Pastoral program is not just by students who have to fulfill co-curricular requirements; a large number of members are young people who work voluntarily in missionary activities. The main activities of the program are missions, services, and activities provided to the UDEM community (employees, students, alumni and relatives), so as to give them the opportunity to know themselves and to come closer in their private spirituality to an experience of God and commitment to others[71].

[70] Ethical Values Center - *Centro de Valores Éticos* ITESM: http://www.mty.itesm.mx/dhcs/centros/cvep/1.htm
[71] Pastoral Universitaria UDEM: http://www.udem.edu.mx/vida/pastoral/

Engagement and partnership with the community in the provision of social and community services

For community activities, the universities have the cooperation and economic aid of a variety of public and private, regional and national institutions (companies, associations, foundations, civil organizations, and the media), especially those institutions which activities are connected with the universities so as to implement social responsibility strategies in the region.

The following are some of the programs that grant funds from the government sector:

- SEDESOL[72]. A federal government organization that formally develops and coordinates the joint and subsidiary social policy of the federal government, directed toward the common good and toward its execution in a manner jointly responsible with society. It is also directed toward overcoming poverty through integral human development that is both inclusive and jointly responsible, in order to attain sufficient levels of well-being with equality by means of policies and actions that provide territorial ordering, urban development, and housing, thereby improving the social, economic and political conditions in the countryside and the cities.

- Training and Connection with Civil Society Organizations - *Formación y Vinculación con Organizaciones de la Sociedad Civil* or OSC[73]. A government organization with citizen participation which main functions are to train and reinforce the professional nature and self-sustainability of the OSCs in terms of basic management needs, legal procedures, production, and operation of projects in areas of extreme poverty. This organization also has volunteers who visit marginalized districts to perform diagnostics and to supervise courses and workshops given by the Civil Society Organizations.

B. Cultural Development

Facilities, expertise and learning programs for cultural development

Cultural Development

All the universities have Cultural Dissemination Departments or centers, which purpose is to complement the cultural part of students' integral, harmonious education by having them participate – actively or as spectators – in different cultural and artistic activities. They also strive to disseminate culture in the media and to extend to the regional community.

The Government of Nuevo León has begun implementation of the ***Regia Metrópoli*** project, contained in the 2004–2009 State Development Plan, and expects to create a culture of maintenance to bring about a historical and cultural heritage conservation movement, making citizens aware of the current image and making a commitment to improve it in the direction of a harmonious image of the future metropolitan area.

Most of the cultural activities are coordinated by the state through CONARTE[74], a government agency in charge of developing and coordinating relations with the federation, the states and the municipalities, as well as public and private institutions, to offer cultural options and alternatives to all of society.

Universal Forum of Cultures 2007

Besides being considered the industrial pole of Mexico, the capital of the state of Nuevo León, Monterrey, has had the privilege of becoming the headquarters for important Mexican and international

[72] SEDESOL: http://www.sedesol.gob.mx/index/main.php
[73] Training and Connection with OSC: http://www.nl.gob.mx/?P=vol_vinculacion
[74] Art and Culture Board of Nuevo León : http://www.conarte.org.mx/

events which have had great success. As a city specializing in business tourism, Monterrey has a large amount of infrastructure for events, and provides modernity, safety and versatility. The spaces have evolved, and new projects are being built that will give the city an even more avant-garde feeling.

This is the case with the Universal Forum of Cultures 2007, a world-class cultural and architectural project that will last between approximately three and five months and will take place in the city of Monterrey. Its main activities are held in a central location and include expositions, shows, conferences, and other activities. The objectives are the defense of peace, sustainable development and cultural diversity.

At the beginning of 2004, the governor of the state of Nuevo León, José Natividad González Parás, proposed Monterrey as the organizing city for the next Forum in 2007. In September of the same year, in a press conference in Barcelona, the Forum Foundation officially designated Monterrey as the host city for the Universal Forum of Cultures 2007, a UNESCO-supported event.

The Monterrey Forum 2007 will be a cultural event lasting ninety days between September and November. The topics of this Forum center will be **science and knowledge**, together with cultural diversity, and it will also promote an encounter between Anglo-Saxon and Amerindian culture, as well as compliance with the UN Millennium Goals.

The state currently has a network of museums, theaters, and libraries, where exhibitions and artistic activities are presented – free or for a price. They are open to the entire community. Most particularly, the city of Monterrey has intensive cultural activity with numerous music and dance activities, exhibitions, literature and theater, etc., organized by the private sector and by the main universities of the metropolitan area.

Figure V.1. *City of Monterrey Theater*

Through its cultural centers and exposition areas, each year the universities present to the community in general (free or for a cost) cultural weeks, theater works, expositions, movie seasons, music festivals, concerts, dance presentations, artistic shows, and events to promote literature in brief tributes to world renowned authors. Most of the universities have publications of specialized books and magazines.

Some universities – the UDEM is a case in point – have developed “co-curricular” courses (sports, culture and leadership) that are part of the study plan in all programs, with the aim of all-round student education. Other universities also have academic programs and research centers that specialize in humanistic studies, languages, values, ethics, science, culture, and literature.

Among the cultural programs offered are theater works, musical theater, ballet, folk dance, contemporary and jazz dance, concerts, and recitals, from the classical to the most modern and popular.

An important example is the Symphonic Orchestra of UANL, which musical fame extends beyond the region, and that in 2005 gave 46 concerts during its different seasons.

The community in general also has a wide agenda of classes and workshops in a wide range of areas, such as dance, music, theater, gastronomy, plastics, and graphics. There are additional activities, such as photography competitions, festivals and awards, literary creation, monologues, dance, singing, etc.

An excellent example of these events is the International Book Fair, organized each year since 1989 by the ITESM Library. Its purpose is to develop a reading culture in the community. Consequently, its central idea is to bring together a wide variety from the world of books: authors, publishing houses,

their publications, and the reading public. Entrance to the event is free, and for more than a week the public has access to the exhibits of the state's and the country's most important publishing houses, as well as a complete cultural program consisting of lectures by well-known writers, book presentations, shows, workshops, the exhibits of more than 200 participating companies, and other cultural activities of the Fair. Although the fair is organized by ITESM, it is made possible thanks to the support of companies, organizations and institutions committed to promoting books and encouraging reading. The following are some of them: A&B Catering, *Alianza Francesa de Monterrey*, *Anagrama España*, Random House Mondadori, *Santillana Ediciones Generales*, "*Instituto Italiano di Cultura*," *Dante Alighieri de Monterrey, A.C.*, *Consejo Estatal para la Cultura y las Artes de Nuevo León*, CONACULTA[75], the Embassy of France in Mexico, *Fondo de Cultura Económica*, the media, museums, Mexican publishing groups and companies, etc.

Figure V.2. ***Overview of exhibition area.***

- Exchange Activities

  The purpose of exchange activities for pupils and students who manage the universities is to actively support and enrich the academic development of the university community, incorporating it into the processes of internationalization. This function is usually performed by a department, center or director's office of international programs, which primary function is to contribute to the internationalization of students by developing new opportunities for student exchange with foreign universities. Likewise, these departments are responsible for developing and offering students and international visitors a variety of academic programs in different specialty areas, and to attend to them while they are in the city.

  The internationalization process also involves an exchange of experiences and academic development abroad for university professors to complement the program, as well as for foreign professors to join the academic activity for short periods of time.

- Radio and Television Programs.

  There are university radio and television programs in cooperation with commercial radio and television companies. The three universities have radio programs and, in the case of UANL, a television channel as well. The use of these media is seen as an educational, cultural and entertainment tool for students and those who form the academic community. It also extends the benefit to the population by widening coverage to the metropolitan area of Monterrey. Radio and television are alternatives to education that requires a physical presence, such as for didactic, cultural, sports, and entertainment programs, as well as the broadcasting of informative programs and national and international special events related to education and culture. Students and teachers have the chance to produce and put into practice their skills in the field of communication and media technology.

Sports Development

As in the cultural area, sports are considered part of the student's formation. On a general level, universities aim to have students develop in different disciplines, so as to forge values in them such as

[75] National Board of Culture and Arts - *Consejo Nacional para la Cultura y las Artes*

responsibility, punctuality, honesty, physical well-being, and team work, among others. Their purpose is also to have young people develop the character to face the different adversities they might encounter in their daily lives.

The sports programs are well consolidated and strongly supported in the universities. However, the benefits derived from sports activities are seldom taken to the community. In terms of tournaments and competitions, there are events that charge and events that are free for the community to attend, mostly as spectators rather than participants. Some of these events are the 10K race organized every year by ITESM, the annual race "Terry Fox" organized by the UANL, and the triathlons that UDEM and ITESM hold annually, to which both the university community and the general Monterrey community are invited.

Only in the case of ITESM does support for sports development extend to the community through continuing education (courses and diploma courses), such as the Sports Entertainment Diploma Course, which objective is to provide learning places for community sports administrators in order to update their knowledge of biology, technical aspects, and sports training tactics in their specialty; to update their knowledge in education, theory, and methodology of sports training and in sports management; and to learn successful training techniques, applied in Mexico and in other countries.

For the most part, the universities have development infrastructures for both culture and sports. Culturally, the higher education institutions have theaters, cultural centers, auditoriums, and exhibition areas, as well as centers for the visual arts, dance halls, libraries, bookstores, and radio and TV stations. The sports infrastructure, on the other hand, includes indoor soccer fields, volleyball, basketball, swimming pools, gyms, track and field courses, and in the case of UANL and ITESM, two stadiums for professional soccer[76] games. The sports and cultural facilities are often shared with different institutions, organizations and companies for the benefit of the community.

For cultural dissemination courses and workshops, and for teaching sports, the universities have specialized teaching faculty, as well as instructors who are experts in their disciplines.

Figura V.3. University stadiums: UANL's "Volcán" Technological Stadium and the baseball stadium.

Figure V.4. ITESM tennis courts and UDEM indoor soccer.

[76] One of the priority sports and the most representative of the regional identity, that characteristically also promotes a very active commercial sports sector, with high investment.

C. Environmental Sustainability

Supporting activities for environmental issues

The importance of environmental topics is obvious. In general, the universities are aware of the importance of a sustainable environment, and therefore have developed different programs and actions related to the following:

1. Water treatment
2. Cleaning and control of solid wastes
3. Lowering of pollution
4. Recycling activities
5. Choosing environmentally-friendly products
6. Optimizing of energy-producing activities (water, electricity, gas)
7. Building-related consulting
8. Reforestation

In particular, besides implementing a waste water treatment system in its daily operation to service the campus, at the academic and research levels, the Monterrey Campus of the ITESM has the Center for Environmental Quality (CCA)77. The center has been engaged since 1961 in the area of environmental quality through activities such as teaching, research, consulting, laboratory services, extension courses, and continuing education, as well as information and disclosure, all related to environmental quality. The general purpose of these is to generate, transmit and apply scientific and technological knowledge for analyzing, evaluating, preventing and solving environmental problems through projects, services, teaching and continuing education within a framework of sustainable development. Using the set of human, technological, information-access, and administrative resources that it has, the CCA develops projects that impact the different aspects of our society. One of the main courses of action for the CCA is the training of personnel with postgraduate education who are able to solve problems that relate to environmental quality and promote the sustainable development of the country.

In addition, the educational institutions take part in a variety of federal, state and municipal government projects and programs, as well as those of NGOs[78] involved in environmental conservation and care. They also direct attention to complying with all the measures and standards the government and institutions issue for the purpose of encouraging sustainable development. In the particular case of the UDEM, it is in the process of certification by the CERES[79] agency, with which it has signed a contract to be the first university in the world recognized with "Ecological Gardens."

To complement this, the universities design campaigns and participate actively in programs to optimize and care for natural resources. Some examples are the implementation of programs that care for water resources. Besides using treated water throughout its campus for watering its green areas, the UDEM in particular is currently participating in the Organizing Committee of the Fourth World Water Forum[80], to be held March 16–22 in Mexico City. Furthermore, it is involved in community reforestation and recycling efforts through committees that include both professors and students.

Finally, through the Community Social Service and the Centers for Development, the universities also support rural and urban communities in relation to health, hygiene, human promotion, productivity and education in terms of the rational use and advantage of natural resources.

[77] CCA: http://uninet.mty.itesm.mx/acerca.htm
[78] NGOs: Nongovernmental Organizations
[79] CERES: Certification of Environmental Standards GmbH, http://www.ceres-cert.com/sp_home.html
[80] **http://www.worldwaterforum4.org.mx/home/home.asp**

D. Conclusion and SWOT Analysis

The responsibility for social, cultural and environmental development in the region is shared by the different regional participants. For its part, the state government, and most especially the current 2004–2009 administration, has included an entire program in its State Development Plan. The program is aimed at transforming the urban image of Monterrey's metropolitan area on the one hand through specific actions and common projects in cooperation with the municipalities involved, and, on the other, through building up an urban center using a series of symbols embodied by cultural and recreational, educational, religious and leisure centers. The urban center will also be used for housing, stores, and streets, which will give a huge impetus to tourism and will bolster the historical, cultural and recreational heritage of the inhabitants of Nuevo León.

In addition, there are state government bodies, such as the Nuevo León Cultural Council, which are responsible for assisting cultural development through a plural, democratic, participative program that encourages and provides incentive for artistic expression, increases cultural values, and protects, conserves and disseminates cultural heritage. It is also responsible for developing and coordinating relations with the federal government, the states and the municipalities, as well as with public and private institutions in order to offer cultural options and alternatives for all of society.

Strengths

a) A vision that promotes the state government, seeks to encourage a common outlook (Regia Metrópoli), and attracts important cultural universities events such as the Universal Forum of Cultures 2007.
b) Solid cultural, sports and ecological programs in he universities and sufficient infrastructure for cultural and sports activities.
c) Excellent radio and TV programs directed by the universities that promote cultural and sports-related values and knowledge in the community.
d) Joint efforts by higher education institutions and other centers that promote social, cultural and environmental development.
e) High social awareness and promotion of aspects related to environmental conservation and sustainability.
f) Dynamic sports activity that is deeply established in the cultural identity of the region.
g) Social Service that is mandatory in order to receive a university degree.

Weaknesses

a) Insufficient funds to develop the population socially, culturally, and with a focus on the environment.
b) Universities with solid cultural, sports and ecological programs but that have scant coverage of the rest of the community.
c) Deficient elementary and middle education on social, cultural and environmental topics.
d) Lack of mechanisms to connect the activities of the universities, the state and other cultural centers.
e) Scant participation by the government in developing these activities between the universities and cultural centers.
f) Low interest in the majority of the population in terms of high-quality cultural activities.
g) Insufficient community development programs created by the universities.

Opportunities

a) Creation of agreements between the universities, the government and NGOs to encourage the spread of cultural activities, sports and environmental conservation.
b) The universities have existing infrastructure that could be use to train and publicize the region's artists, athletes and ecologists.
c) Incorporate and extend the social, cultural and environmental programs in the regional media (radio, TV and the press).

d) There are many organizations, associations and societies that promote cultural, sports and environmental international world class events.
e) Create student awareness of the importance that participation in athletic, cultural and social activities has for personal development, so that more young people will become involved in them.
f) Strength the regional identity incorporating the immigrant population.

Threats

a) Since the advantages of technology and its incorporation in videogames and the development of the internet, among other factors, there has been a loss of interest in cultural and athletic activities.
b) Detriment to quality of life in the region.

VI. CHAPTER SIX: CAPACITY BUILDING FOR REGIONAL COOPERATION

A. Mechanisms to Promote the Higher Education Institutions Regional Involvement

Formal and informal mechanisms to identify regional needs and coordinate regional engagement

As discussed earlier, the government is traditionally responsible for promoting regional cooperation and development, as the state government is the organization responsible of designing the State Development Plan, where regional needs are expressed in order to incorporate them into the different industries through boards of citizens. For example:

- There is a State Commission for Higher Education Planning in the state of Nuevo León that collegially discusses problems related to higher education development in the state, involving government authorities on the one hand and higher education institutions on the other.
- Additionally, there is a formal mechanism to create public organizations in charge of coordinating regional development activities, such as the Monterrey International City of Knowledge Project, the INVITE program, and the COCYTE, among others.

In addition to the formal mechanisms arising from the three government-level initiatives, the universities have developed different formal and informal mechanisms to identify regional needs, such as the following:

- Direct contact and strategic alliances among universities, governments, private sectors, business associations, and service partnerships, organized to work on developing the regions.
- Through agreements with companies, business chambers, associations, and nonprofit organizations to develop relationships close to the labor market.
- Following up on federal, state, and/or municipal government notifications to perform research and/or consulting projects.

Nevertheless, there are no current instances responsible for collecting strategic information on intellectual capital, research centers, and infrastructure for knowledge, funds available, and priorities of the productive and educational sectors in the region. Therefore, isolated efforts are carried out by the universities and the federal and state governments to manage this type of information.

A linking body needs to be created with the capacity to articulate the different efforts that certain institutions are performing, such as:

1) A system to manage cooperative projects between universities and industries (CONACYT Northeast Delegation).
2) SEDEC projects with great technological vision to identify and promote intellectual capital in organizations based on technology.
3) COCYTE State System of Scientific and Technological Interaction and Information to create communities of scientists, technologists, inventors, and representatives from companies interested in science and technology.
4) SEDEC TECNOS Prize Evaluation Administration System.

Higher education institutions as a key element for regional cooperation

The State Development Plan foresees the importance of higher level educational institutions in regional development. Nevertheless, in the current administration (2004–2009), this document unifies the collaborative efforts very clearly among the different sectors required for regional development, based on the economy of knowledge. This collaboration is reflected through the agreement held between the

state government and the three most important universities in the state (UANL, UDEM, and ITESM), as well as CONACYT, within the frame of the Monterrey International City of Knowledge project.

Upon signing this agreement, the roles assumed by the universities have become key elements in linking all the efforts designed for technological innovation and development as triggering elements of economic growth and social welfare. Together, the government and the universities have set forth a work scheme highlighting the competencies and capacities of each university to contribute to the needs identified as priorities in the region.

This scheme of collaboration has allowed greater funds to be assigned more effectively and efficiently by the federal and state governments and the universities themselves. The government has an exhaustive process that ensures the funds are applied correctly, beginning with identifying the needs and demands in the region, continuing with the launch of an open call for universities and centers to submit their proposals, and for the best to be selected. After signing the contract or agreement, the funds are applied and audited to ensure their correct application, and, finally, the results are assessed.

Some of these funds arise from:

- Domestic: CONACYT fund to promote the development of basic science, and the SEP fund to develop didactical instruments for basic, middle, and higher education.
- Domestic and Regional: SME fund to develop the small and medium-sized companies, and the ProSoft fund to develop the software industry.
- Regional: Science and Technology Coordination Fund to support basic science projects for regional development, and the Trust to Develop the State Citrus Zone.

To follow up on the resource collaboration and assigning efforts, two main mechanisms have been identified: following up on the agreement implementations and assessing the project's results. An example is the SEDEC, which uses agreements with universities, such as regional academic linking instruments, to solve municipal SME problems in the state with the work of researchers, faculty, and students responsible for presenting the advances and indicators of the project results.

On the other hand, there are collaboration agreements between the universities and businesses to develop joint projects and use the research laboratories of both institutions. The UANL and the UDEM, for example, allow access to the public and certain free access to facilities such as libraries, sports fields, and others. Nevertheless, there is a need for a certain mechanism to help monitor collaborative relationships among the different government entities and the productive and academic sectors, to know the lines of research of each organization, and to make the efforts more efficient, assigning and using human, economic, and technological resources.

B. Promoting Regional Dialogue and Joint Marketing Initiatives

Mechanisms exist to promote communication and dialogue between regional stakeholders

The COEPES are among the most common mechanism. These are organizations set forth by state governments – Nuevo León, in this case – to promote dialogue and discussion on priority subjects through their Board of Citizens[81], partially integrated by the HEI representatives, where people discuss, analyze, and reflect on the needs, demands, and most of all, ways to solve regional problems. The primary reason for involving universities is to add to and engage in the state government's efforts to offer solutions to the needs and demands of the region, assigning human, physical, and economic resources. The state government has been very careful in forming the boards of citizens, as they consist of representatives from the universities, chambers of industries and commerce, and public and private organizations.

[81] Such composition and operations are regulated by state laws and decrees.

Nevertheless, mechanisms have to be created and set forth to help follow up on the agreements and projects arising from these board meetings and gatherings, to help translate them into true regulating mechanisms for advances in strategy.

Additionally, the universities have found in their boards of directors, which consist of prominent businessmen, alumni, directors, and government officers, among others, the best mechanism to discuss and make decisions that address the course of the universities, linking the business and industrial sectors' needs with the institutions' strategic plans.

Finally, both the HEI and the state government are permanently organizing different activities to promote dialogue and exchange experiences, such as prizes, lectures, workshops, forums, and conventions, among others.

There are joint incipient marketing collaboration efforts with other entities responsible for promoting regional development, where support has been limited solely to organizing international level exhibitions and fairs, advisory on commercializing strategies, support for marketing negotiations, and market research and intelligence. The government, through the Commercial Missions, invites representatives from universities and businesses to promote the regional universities – their products and services – and simultaneously know the best practices and attract foreign investment.

C. Evaluating and Mapping the Impact of the Regional HEI System

There is no formal or clearly established mechanism to monitor the HEI's impact in the regional development. Individually, each university has its own studies to generate the information and allow them to determine the impact of their activities in the region. Specifically, the UDEM measures the impact of the work of its students, faculty, and researchers in three levels: the institution's economic impact, its contribution to developing the municipality or region, and the social and/or cultural impact.

The regional impact studies are used by the HEI to promote their academic and nonacademic achievements, as well as to attract resources for technological research or development, commercializing, and at times to increase registration, donations, and others.

VII. CHAPTER SEVEN: CONCLUSIONS: MOVING BEYOND THE SELF-EVALUATION

Concepts of society, culture and education are indivisible. The three integrate the identity of a town. Higher education generates the key human factor for the development of a region or a country, and for that reason must have an active role that can be projected towards this commitment in a more social sense. Higher education, besides forming professionals, must commit to quality of life, where the environment, the culture, and the arts will be the most important agents. According to the axis of government, universities must think and do a reflexive exercise based on two lines of action:

- Rescue of a vocation of the universities or higher education institutions for the environmental culture and the arts in the region and the metropolitan area of Monterrey.
- Rescue and redefinition of the concept of "identity" within the new global context, especially when the concept acquires multiple meanings.

Lessons to be learned from the self-evaluation process

There is no doubt that Nuevo León is facing a very exciting but challenging transformation process at all levels. The spine of this transformation is the State Development Plan 2003–2009, which includes, in a very detailed but projected form, all the actions required to make Nuevo León one of the most important states in Mexico within the new knowledge economy.

It is a fact that this evolution has forced all sectors – economic, academic and governmental – to emphasize the need to make structural changes at all levels, such as creating new policies frameworks that respond to the new need, managing more effective resources allocation, and creating new collaborative efforts, just to mention some examples. However, all these changes require a common vision and the full commitment of all players within Nuevo León's society.

Two of the most crucial initiatives that have been implemented are the key role as "orchestrator" that the state government has played during the last two years of administration, and the signature of a collaborative work and commitment among the three most important universities of the region, UDEM, ITESM and UANL, and also with CONACYT and the state government. Besides the objectives contained in this agreement, the realization of new collaborative efforts, like the one that was made for the development of this self-report, are a clear example of the level of commitment that institutions of higher education have established toward the development of the state, especially in educative issues. This self-report represents the first step in gathering information and highlighting the important factors that need to be addressed or improved in order to create regional capacity building of cooperation.

Although a new culture based on universities-industry-government collaboration is emerging, key players such as federal and local entities like IMPI, CONACYT, SE and COPARMEX, CONAPES, SEDEC, INVITE, MIKC, and I^2T^2, are required to continuously provide additional support and contribute to the accomplishment of the state's objectives. In addition, there is clearly a need to create a new policy framework for science and technology development and transfer, as well as a larger provision of those cultures, sports, and social aspects that are required for a more balanced and healthy society.

The analysis obtained from this report demonstrates that universities must become the motor of progress within the society and be responsible, with the direct and continuous support of industry and government, for the creation of future professionals and, most of all, the persons capable of managing the economic, social and public activities. It is necessary that universities start to work together and, instead of competing or making independent efforts, be capable of joining efforts in order to consolidate those areas that have been defined as strategic, such as science and technology development, health, security, and education.

The potentialities and problems, opportunities and threats involved in increasing the contribution that HEIs make to the region

Some reflections about the strengths, weakness, opportunities, and threats that the state and, most importantly the education system, are facing in terms of art and culture within the universities:

Strengths

a) Strong infrastructure of HEI within the state that offers a diversity of undergraduate and graduate programs, as well as continuing education programs for different areas of knowledge.
b) Enough infrastructure and individual efforts to promote cultural and sporting events that aim to extend the provision of these activities to the whole community.
c) Increase of additional support from federal and state entities to promote the development of strategic sectors for economic development, such as entrepreneurship, science and technology transfer, and business incubation.
d) There is a cultural transition within the different private and public institutions, based on collaboration and commitment to regional development.
e) Common vision, led by the state government, of wealth creation in the region.
f) Increase and improvement of new and more efficient mechanisms of collaboration between the different sectors: universities, industry and government.
g) Existence of state-of-the-art practices performed by the universities in areas such as social and community service, health, entrepreneurship, and distance education, among others.
h) High recognition between universities.

Opportunities

a) Increasing the number of cultural, social and sporting events through collaborative efforts between the universities, and also with the support of the state governments.
b) Promoting the vision and strategic planning developed by the state government within the young population attending the universities.
c) Increasing the participation of professors in the promotion of art, culture and innovation within classrooms.
d) Establishing new collaborative agreements with local governments, the Ministry of Education, and universities to promote and realize strategic efforts for cultural and social development.
e) Optimizing federal and state funds by focusing economic resources on those programs that are strategic for the state's priorities.
f) To take advantage of the competitiveness among universities to be recognized as the top in the state.
g) Strength the regional identity incorporating the immigrant population.
h) Strength the coordination among universities with the state government to promote education, cultural, social, and scientific development within the region.

Weakness

a) Mass media culture, information and electronic games have created a fascinated and estranged young population, which is abandoning cultural, social and sporting activities.
b) Growth of the metropolitan area is causing a more complex society and more inaccessible city.
c) Insufficient economic resources to provide education, health and social services to poor sectors.
d) Elementary and secondary are not effectively connected with the programs and goals of high school and higher education.
e) It is required to identify and apply the "best practices" among the HEI in the state
f) Lack of policy framework for effective cooperation among federal, state and private institutions.
g) Lack of policies that promote continuity of long-term programs.

Threats

a) An accelerated population growth without an adequate planning would produce a lack of job opportunities that will generate social problems (i.e. insecurity, limited infrastructure for education, etc.)

b) A limited offer of culture and instruments to promote regional and national values could debilitate the regional cultural and social characteristics; in the presence of an increasing globalization trend in the communication and information media.
c) Without an adequate planning there is a risk of losing both, the fundamental habits for an integral development such as the reading and artistic and re-creative activities; and the community activities that promote the consolidation of a social structure and prevent a individualist culture.

The way forward: the discussion of the region's vision for future policy

The vision of the region has been established for future decades, and key players have integrated this vision into their mission statements, as well as into their strategic planning. What will be the results of the implementation of this regional vision? We do not know, but what is for sure is that Nuevo León is facing a very crucial transitional moment that is generating many positive changes, but also creating a sense of uncertainty among different sectors. While universities and government have clearly established a formal commitment to collaboration, industry is facing the challenges that result from a knowledge economy that still a real challenge to the manufacturing and *maquiladora* industries.

Considering Mexico GDP and economic growth, enough funds for science and technology development are available, but the mechanisms for funding still being inefficient, new policies are need for both. This involves improving management and administering new strategic actions related to education, science and culture.

Poverty is still an important issue, especially when comparing Nuevo León with other states, and even more important when comparing Mexico with other countries. Mexico still has basic problems to solve, such as wealth distribution, violence, corruption, levels of education, marginal cultures, and health, among others.

New vision implementation requires, first, a change in the perception of government's role among people; they need to believe in government and the efforts it has been making to create a better place to live. The more effective the government and universities are in promoting a common vision and making collaborative efforts, including the industry sector, the faster the change will be adopted by people. The Monterrey International Knowledge City has its own vision per se, and includes the key elements to succeed within a global context. It is the effective promotion, administration, operation, capitalization, and, most importantly, the continuity of this program that will determine the regional development of the state in the future decades.

ACRONYMS

ABET:	Accreditation Board for Engineering Teaching
AMPEI:	Mexican Association for International Education - *Asociación Mexicana para la Educación Internacional*
ANUIES:	National Association of Universities and Institutions of Higher Education - *Asociación Nacional de Universidades e Instituciones de Educación Superior* ()
CAINTRA:	Chamber of the Transformation Industry of Nuevo León - *Cámara de la Industria de Transformación de Nuevo León*
CANACO:	Chamber of Commerce of Monterrey - *Cámara de Comercio de Monterrey*
CCA:	Community Learning Centers – *Centros Comuntarios de Aprendizaje*
CECATI:	Training Center for Industrial Work - *Centro de Capacitación para el Trabajo Industrial*
CERES:	Certification of Environmental Standards GmbH
CIDESI:	Engineering and Industrial Development Center - *Centro de Ingeniería y Desarrollo Industrial*
CIMAV:	Advanced Materials Research Center - *Centro de Investigación de Materiales Avanzados*
CINVESTAV:	Center of Investigation and Advanced Studies - *Centro de Investigación y de Estudios Avanzados*
CITT:	Innovation and Technology Transfer Center - *Centro de Investigación y Transferencia de Tecnología*
CNIC:	National Chamber of the Construction Industry - *Cámara Nacional de la Industria de la Construcción*
COCYTE:	National Board of Science and Technology of Nuevo León – *Consejo Nacional de Ciencia y Tecnología del Estado de Nuevo León*
COEPESNL:	State Commission for Higher Education Planning of Nuevo Leon - *Comisión Estatal para la Planeación de la Educación Superior de Nuevo León*
CONACULTA:	National Board of Culture and Arts - *Consejo Nacional para la Cultura y las Artes*
CONACYT:	National Board of Science and Technology - *Consejo Nacional de Ciencia y Tecnología*
CONAPO:	National Board of Population - *Consejo Nacional de Población*
CONARTE:	Art and Culture Board for Nuevo Leon - *Consejo para la Cultura y las Artes de Nuevo León*
CONEVYT:	Educational Board for Life and Work - *Consejo Educativo para la Vida y el Trabajo*

CONPES: National Coordination for Higher Education Planning - *Coordinación Nacional para la Planeación de la Educación*

COPARMEX: Employer's Confederation of the Mexican Republic - *Confederación Patronal de la República Mexicana*

CORPES: Strategic Projects Corporation of Nuevo León - *Corporación de Proyectos Estratégicos de Nuevo León*

ERIAC: Executives of Industrial Relations - *Ejecutivos de Relaciones Industriales A.C.*

FACPYA: School of Public Accounting and Administration - *Facultad de Contaduría Publica y Administración*

FIMPES: Private Mexican Institutions of Higher Education Federation - *Federación de Instituciones Mexicanas Particulares de Educación Superior, A. C. (Programa Integral de Fortalecimiento del Postgrado)*

GDP: Gross Domestic Product

HEI: High Education Institution

I^2T^2: Innovative and Technology Transfer Institute of Nuevo Leon - *Instituto de Innovación y Transferencia de Tecnología de Nuevo León*

IC^2: Innovation Creativity and Capital

IMPI: Mexican Institute for Intelectual Property - *Instituto Mexicano de la Propiedad Intelectual*

IMSS: Mexican Social Security Institute - *Instituto Mexicano del Seguro Social*

INDA: National Copyright Institute - *Instituto Nacional del Derecho de Autor*

INDAUTOR: Intellectual Property of the National Copyright Institute - *Instituto Nacional del Derecho de Autor*

INEA: National Adult Education Institute - *Instituto Nacional para la Educación de los Adultos*

INEGI: National Institute of Geographic Statistics and Computer Science - *Instituto Nacional de Estadística Geografía e Informática*

INVITE: The Regional Integration Program of Northeastern Mexican States and Linkage with the State of Texas - *Programa para la Integración del Desarrollo Regional del Noreste y su Vinculación con Texas*

IP: Intellectual Property

ISSSTELEON: Security and Social Services for Workers in the State of Nuevo Leon Institute - *Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado de Nuevo León*

ITESM: Instituto Tecnológico y de Estudios Superiores de Monterrey (Monterrey Tec)

MIKC:	Monterrey International City of Knowledge - *Monterrey Ciudad Internacional del Conocimiento*
NAFIN:	National Financier - *Nacional Financiera*)
NAFTA:	North American Free Trade Agreement
NSR:	National System for Researchers
OECD:	Organization for Economic Cooperation and Development
ONG:	NGO: Non-Governmental Organizations - *Organización No Gubernamental*
ONU:	United Nations Organization - *Organización de las Naciones Unidas*
PECYT:	Special Science and Technology Program - *Programa Especial de Ciencia y Tecnología*
PFPN:	Program for the Strengthening of National Postgraduate Studies - *Programa para el Fortalecimiento del Postgrado Nacional*
PIFI:	Integral Program of Institutional Strengthening - *Programa Integral de Fortalecimiento Institucional*
PIFIEMS:	Integral Program of Medium-High Educational Strengthening - *Programa Integral de Fortalecimiento de la Educación Media Superior*
PIFOP:	Integral Program for the Strengthening of Postgraduate Studies - *Programa Integral de Fortalecimiento del Postgrado*
PIIT:	Technology Research and Innovation Park - *Parque de Investigación e Innovación Tecnológica*
PNP:	National Postgraduate List - *Padrón Nacional de Postgrado*
PYME:	SME or Small and Medium-sized Enterprises - *Pequeña y Mediana Empresa*
R&D:	Research and Development
SACS:	Southern Association of Colleges and Schools
SE:	Ministry of Education - *Secretaría de Educación*
SEDEC:	Ministry of Economic Development - *Secretaría de Desarrollo Económico*
SEDESOL:	Ministry of Social Development - *Secretaría de Desarrollo Social*
SEMARNAT:	Ministry of Environment and Natural Resources - *Secretaría de Medio Ambiente y Recursos Naturales*
SEP:	Ministry of Public Education - *Secretaría de Educación Publica*
SME:	Small and Medium-sized Enterprises
SNI:	National Researchers System - *Sistema Nacional de Investigadores*

SS:	Ministry of Health - *Secretaría de Salud*
SSA:	Ministry of Public Health and Assistance - *Secretaría de Salubridad y Asistencia*
TECNOS:	National Award of Technology
TT:	Technology Transfer - *Transferencia de Tecnología*
UANL:	Universidad Autónoma de Nuevo León
UDEM:	Universidad de Monterrey
UNITEC:	Universidad Tecnológica de México
UT:	Texas University - *Universidad de Texas*

EXHIBIT I

Monterrey International City of Knowledge Project

In order to promote technological development and the establishment of ventures of education, it is imperative to perform actions that will recover national ventures established in the region by propelling programs of technological innovation, by supporting already established technological businesses—national and international, by attracting new technological enterprises to areas strategic for national development, as well as by fortifying higher education centers so that they may broaden their choice of majors in new areas of knowledge.

It is necessary to make scientific and technological research an area of opportunity for economic development and support competitiveness in order to make higher education in Nuevo León comply with international standards of quality. This is why it is intended to greatly increase the following: the number of technical programs in middle and higher education, the number of national and international out-of-state paying students, the number of university professors with graduate degrees, the number of teachers and academic researchers whose specialty is the new areas of knowledge, and the number of scientific and technological research programs.

Rendering Monterrey into the city of knowledge requires generating adequate and arguable urban equipment, as well as infrastructure for communications. This is why the project embraces actions to connect university and technological business facilities with new educational establishments by integrating road and transportation systems with digital and fiber optic networks, as well as the urban infrastructure with housing complexes for professors, researchers and students. This integration will be aimed at creating a proper environment for the development of scientific and cultural activities, while transforming Monterrey into an embellished city by using forest resources and managing other resources wisely.

The project's fourth objective is based on boosting the government and private sectors' competitiveness so that they become the axis for the economic development of the entity. Consequently, public administration is planning several actions for fortifying democracy, security, transparency, simplification, administrative detachment, citizens' participation, and digitalization of processes while taking strategic advantage of new technologies. At the same time, public administration is considering promoting, locally and nationally, the economy's structural reforms to improve the competitiveness of the region and of the country, as well as redesigning the model of basic, middle and higher education by considering the priorities brought upon by the era of knowledge and competitiveness.

Finally, regarding the actions to make competitiveness in the productive sector become the fundamental driving force of entrepreneurial activity, the project plans to promote competitive participation in areas such as financing and venture capital, technological innovation, vocational training, and the development of intellectual capital, efficient administrative (management) systems, scale economies, logistic systems, national and international commercialization networks, knowledge of international markets, business incubators, as well as the development of producers and providers' networks and clusters. All of this would occur within the setting of the establishment of a new model to connect the system of academic training with the productive sector and the job market.

The following are initial actions the state government is considering for the development of this strategic project.

Actions

- Elaborate and run short-term, medium-term, and long-term plans to develop the project.
- Identify the strategic areas of knowledge susceptible to further development in the region and perform a comparative study among the best international practices in cities of knowledge.
- Present the project to the current person in the Federal Executive seat and involve the concerning federal parties in efforts to start and strengthen the development of the project.
- Formalize the participation of involved institutions by means of an agreement.
- Establish a promoting council in which the main universities of the region, the state government, CONACYT, and representatives from the business sector participate in order to promote and oversee the model for the development of intellectual capital for competitiveness and knowledge.
- Establish the Organization for the Innovation and Competitiveness of the Productive Sectors as a civil association where the public and private sectors participate.
- Reinforce the state government functions for the Organization for the Governmental Innovation and Competitiveness.
- Sign an agreement on the design and establishment of educational programs with the SEP regarding the society of knowledge, as well as with institutions of middle and higher education in order to promote the development of areas of knowledge.
- Sign an agreement to connect the project with Tamaulipas and Coahuila.
- Initiate the activities to establish centers for technological innovation and the first knowledge park.
- Design and promote the establishment of a museum of knowledge and a center for the exhibition of high technology for the support and development of knowledge linked to traditions, art, and formal education.
- Establish a permanent calendar of conferences, conventions and fairs about knowledge.

EXHIBIT II

Location of UANL campuses in the State of Nuevo León

Municipality/Campus	College or Academic Unit
Cadereyta Jiménez	College of Public Accounting and Administration (Cadereyta Unit)
Linares	Center Farming and Animal Husbandry Production College of Nursing College of Earth Sciences College of Forest Sciences College of Public Accounting and Administration (Linares Unit)
Marín	College of Agronomy
Monterrey	College of Economics
Mederos Unit (South of Monterrey)	Center for the Research and Development of Bilingual Education Center for Language Teaching and Certification College of Dramatic Arts College of Visual Arts College of Communication Sciences College of Political Sciences and Public Administration College of Veterinary Medicine and Zootechnic College of Music
Medical Área (Monterrey)	College of Nursing College of Medicine College of Odontology College of Psychology College of Public Health and Nutrition
Sabinas Hidalgo	College of Law and Criminology (Sabinas Unit) College of Public Accounting and Administration (Sabinas Unit)
University City (San Nicolas de los Garza)	College of Architecture College of Biology College of Physics and Mathematics College of Chemistry College of Public Accounting and Administration College of Law and Criminology College of Philosophy and Fine Arts Language Center College of Civil Engineering College of Mechanic and Electric Engineering College of Sports Organization College of Social Work
Vallecillo	Regional Center for the Promotion of Animal Husbandry
Zuazua	Center for the Information of Regional History