TERRITORIAL LOGISTICS COMPETITIVENESS IN THE REGIONAL URBAN SYSTEM IN CENTRAL MEXICO MESOREGION

Rodrigo Alarcón & Juan Pablo Antún
Laboratorio de Transporte, Logística, Tráfico y Sistemas Territoriales
Instituto de Ingeniería, Universidad Nacional Autónoma de México
Apdo Postal 70-347, Ciudad Universitaria, México DF (04510), México
jantunc@iingen.unam.mx
ralarconmo@iingen.unam.mx

ABSTRACT

This paper is based on a PhD Thesis (Alarcon, 2011) and a research carried out by the Transport and Territorial Systems Group of the Institute of Engineering of the National Autonomous University of Mexico (UNAM), by request from the Ministry of Economy of the Mexican Federal Government and the Committee for the Central Region Development (FIDCENTRO) (Antún et al.; 2009).

The paper contains two main parts. The first one is dedicated to the logistics competitiveness theories: the logistics competitiveness is described as a factor for the companies' competitiveness, then the territorial competitiveness is described in the context of the grown theories; later, the territorial competitiveness from a logistical perspective is presented, and the territorial logistical competitiveness is described.

The second part of the paper is focused on the strategic logistical nodes (SLN); they are presented as a strategy for the territorial logistics management; a methodological base for the identification of SLN is proposed; a base for the identification of SLN in the Central Region is presented, and the identification of outstanding logistical nodes, strategic logistical nodes, and type and profile of equipment and logistical infrastructure, in the Central Region, is presented. Finally, conclusion and references are included.

Keywords: Logistics Platform, Logistics Facilities Location, Territorial Logistics Land Planning

1. OBJECTIVES

The objectives of this paper are:

i. To built the theoretical and methodological concepts on *territorial logistics competitiveness*
ii. To make a *prospective diagnosis* on Mexico's logistics situation
iii. To *benchmark* the international experiences on urban goods distribution vs the logistics practices in Mexico City Metropolitan Area
iv. To develop *a methodology in order to find the Strategic Logistics Nodes (SLN)* to promote a territorial logistics planning in a regional urban system
v. To apply the methodology at the *Central Mexico* planning mesoregion.

2. METHODOLOGY

The methodology have three level of analysis:

a) *First level analysis:*
Identification of Logistics Nodes (LN): connectivity analysis on national & regional road networks and railways, freight vehicles flux, in relation to industrial and commerce activity, market attraction and logistics services

b) *Second level analysis:*
Identification of Strategic Logistics Nodes (SLN): profile analysis of freight flux, city characteristics, urban markets and the offer of logistics and transportation services for the supply chain management

c) *Third level analysis:* Identification of the type, market profile and infrastructure & equipment for the feasibles logistics services in the SLN

3.THEORETICAL AND METHODOLOGICAL CONCEPTS ON TERRITORIAL LOGISTICS COMPETITIVENESS

3.1 LOGISTICS COMPETITIVENESS, A FACTOR FOR THE COMPANIES' COMPETITIVENESS

The competitiveness of a company mainly depends on the advantages linked to lower costs and the factors for making differences versus its competitors. The generation of competitive sustainable advantages is based on the structure and segmentation of the company, the competitive scope of the companies on similar segments, the management and coordination of activities through chains of value, and strategies for innovation. Instead of contesting on comparative advantages, the companies have to contest on competitive advantages (Porter, 1990); the latter advantages correspond to the capability of supplying products and services in a more effective and efficient way than the competitors do, in order to get a sustainable success in the market (Berroeta et. al., 1999).

An industry is formed of a set of companies with similar economical activities (Porter, 1990). Key elements for the competitive performance of the companies can be identified with base on the industry´s structure and characteristics. The belonging to a competitive industry does

not guarantee that a company will be successful in the market, but the company's competitive strategies do. The chain of value is also linked to the generation of competitive advantages (Porter 1997). The operation of any company includes interdependent primary and secondary activities, which contribute to the product final value; hence the strategies for management and coordination of the company operation must be integral at internal and external levels. The competitive sustainability of a company depends on the implementation of innovation strategies, developing more competitive advantages in a shorter time that its competitors can do. The innovation doesn't only respond to the possibility of changing, but rather to the speed for such change. The introduction of operative, organizational and technological innovations increases the company´s productivity and competitiveness. Logistics has become a fundamental factor for the generation of competitive advantages and creation of value, through the planning, implementation and control of processes linked to physical flows, and the integration of processes along the supply chain.

The competitive advantages associated to the logistics of a company are based on the same premises about costs and differentiation elements.

On one hand, the efficient management of the key and supporting logistical processes allows reduce the costs related to the goods flow through the supply chain, the production and physical distribution costs, and especially the storage, inventories and transportation costs (Antún, 1994).

On the other hand, the capacity for putting a product in the place and at the time where a demand exists, satisfying the clients' requirements before its competitors can do (levels of service), is an important differing element for a company. The management and execution of the activities, which form the internal and external operation of a company, contribute to the final value of the product; in logistical terms, the management of the goods physical movements generates opportunities for the creation of value. The product value can be increased through the supply chain management, implementing strategies designed according to the client's requirements, demand performance and consumption patterns, sustained on an appropriate management of information and cash flows. The sustainability of the competitive advantages, related to the company's logistics, depends on the capability of the company for developing and implementing innovations and re-engineering strategies on logistical process practices along the whole supply chain, whose objective is to reduce costs and increase level of service to clients.

3.2 TERRITORIAL COMPETITIVENESS, IN THE CONTEXT OF THE THEORIES ON REGIONAL AND ENDOGENOUS GROWTH, AND THE NEW APPROACHES ON REGIONAL GROWTH

Theories on regional and endogenous growth and the new focuses on regional growth, consider that the territory is an active entity with autonomous dynamics, an agent for the economic development and social transformation (Friedman and Weawer, 1981; Furió Blasco, 1996a; Nijkamp and Poot, 1998; Bailly and Gibson, 2003).

On one hand, regional growth theories can be convergence or divergence theories. The former consider that the market forces are established by themselves without public intervention or friction that moves away regions from the free competition ideal; such forces balance rent and employment in the regions. The latter consider that regional disparities are part of the economic growth process and they don't tend to disappear, but rather they maintain the conditions for an equilibrated system (Peña-Sánchez, A.R.; 2006).

On the other hand, the endogenous growth theories present a new development paradigm or a territorial approach for the development (Aydalot, 1985; Furió Blasco, 1996; Caramés, 1990; Bal and Nijkamp, 1998). Two important endogenous growth theories are the following:

- The new approach of space and endogenous development, which considers that the territory is a transformation agent and not just a support of resources and economic activities, where the companies and the other stakeholders in the territory interact among them, developing the economy and the society (Vázquez Barquero 1999).
- The local development model, where companies, organizations, local institutions and civil society have a predominant role in the growth and structural change processes (Stöhr, 1985), considering the economic, socio-cultural and politics-administrative dimensions (Vázquez Barquero, 1986; Furió Blasco, 1996).

Some factors which generate the new regional growth approaches are the following: the invigoration of local companies, the creation of subcontracting networks, the externalization of production systems, and the introduction of more flexible organization ways in large companies (Scott, 1998). The new economical geography establishes that the regional growth follows a circular causes logic, where the forward and backward links of the companies produce an activities mass until a point where amassing (centripetal) forces are compensated by centrifugal forces as land costs, transportation cost and negative externalities (Krugman, 1995). The interaction of such two types of forces models the space´s structure of an economy (Fujita and Krugman, 2003).

Another new regional growth approach is the territorial competitiveness. Since the eighties, the competitiveness concept, traditionally linked to the companies, began to be used for comparing the economic performance of countries, taking into account its economic advance and its participation in international markets.

Porter (1990) considers that the competitiveness of a country depends on its industry's capability for continuous innovation and improvement, and the capability of their companies for reaching high productivity levels which can be sustainable and increasing along time.

The competitiveness analysis for a country should be made in terms of productivity, through the creation and sustaining of competitive advantages (Porter, 1990). According Krugman (1991), the decisive factors for the competitiveness of a country are internal to the company

and not external; this means that the competitiveness of a country is sustained, in an almost exclusive way, by the economic performance of their productive units (Krugman, 1994).

3.3 TERRITORIAL COMPETITIVENESS FROM A LOGISTICAL PERSPECTIVE

The positions which are based on endogenous growth theories and new approaches of regional growth emphasize the importance of the territory as an agent for economic development and not just as the support of resources and economic activities.

The territorial competitiveness depends on the capability of the companies for increasing their productivity and economic performance, and the capability of the territory for attracting, developing and facilitating economic activities, by means the creation of a favourable environment which generates sustainable competitive advantages and impels the companies' innovation and growth increasing their productivity.

Logistics has acquired more importance for the company's competitiveness, being a key factor for the generation of competitive advantages in the creation of value and innovation, through planning, implementation and control of logistical processes linked to physical flows along the supply chain. From a logistical perspective, the territorial competitiveness grows when the territory has the required infrastructure and management for improving the performance of the companies' logistical processes; the territorial logistical requirements are useful for improving the efficiency of the good physical movement along supply chains, reducing logistical associated costs, increasing levels of service and diminishing the adverse economic, social and environmental impacts.

In the last decades, territorial analysis has acquired more relevance (from a logistical perspective) due to the globalization process where some companies have geographically expanded their production (taking the competitive advantages of a territorial location) and commercialization operations (entering to new potential markets). Such companies need re-construct their productive systems by means of the logistical re-designing of their supply chains, and the implementation of strategies for optimizing their logistical networks, reducing and/or relocating production plants and distribution centres, designing more efficient transport chains and improving operations of line-haul and urban goods distribution.

An important factor for managerial decisions making on the global logistical chain re-design is the territory's logistical quality, which is determined on the base of the processes efficiency, the local level of service, and mainly the costs (not just direct cost, but also costs related with unpredictability and unreliability).

The international trade logistics is essential for the economic development of the countries, because it allows the access to world markets favouring economic growth and development, becoming a strategic resource to obtain competitive advantages and to integrate global supply chains by means of the ability for moving goods through the borders in a fast, foregone, and reliable way and at low cost (World Bank, 2007).

The logistical territorial analysis can be national, regional and urban. Studies and programs on urban goods transportation have been developed for urban analysis. These studies and programs have produced strategies and recommendations on public policies for the improvement of logistical operations in urban areas through the identification of the

problematic, the best practices and cases of new local public policies which could be implemented in similar and less competitive urban areas.

Urban goods transportation has acquired more relevance; it has been integrated to the design of global transport chains and it is essential for final goods delivery. Also, it is a fundamental component for urban life, essential for the operability and operation of the cities.

3.4 TERRITORIAL LOGISTICAL COMPETITIVENESS

In this paper, the territorial logistical competitiveness is linked to: i) the performance of logistical processes practices in supply chains of the companies in the territory; and ii) the infrastructure and management conditions, associated to territorial logistical requirements, that improve the companies´ logistical performance and increase the physical goods flow efficiency (reducing costs, elevating level of service and diminishing adverse economic, social and environmental impacts). These territorial logistical requirements depend on the analysis level:

- For a national level, the territorial logistical requirements are linked to the following: freight transportation infrastructure, port and airport systems, border crossings, road and rail networks, and intermodal points, considering the goods physical flow in supply chains for domestic and foreign markets and the concentration of economic and market activities.
- For a regional level, the territorial logistical requirements depend on the specific characteristics of the region: the type of current transport infrastructure (ports, airports, border crossings, intermodal points, etc.), the conditions of the road and rail network, the goods flow in supply chains which are related to intra-regional and inter-regional relationships, the location of production centres and logistical facilities (distribution centres, warehouses, deposits, etc.) and the final market which is concentrated in urban areas or urban-regional areas.
- The urban level has aspects which are similar to the national and regional levels, as the current transportation infrastructure and the location of production centres and logistical facilities in the urban area. However in an urban environment, the goods physical flow operations depend on the following factors: complexity of the urban structure, characteristics of the urban road network, equipment for freight transportation operations, congestion levels, fleet size, local regulation on access limitation for freight vehicles and on loading and unloading operations, market size and segmentation (associated to distribution channels), etc.

3.5 STRATEGIC LOGISTICAL NODES (SLN)

Strategic logistical nodes (SLN) as a strategy for territorial logistical management (TLM)

A territorial management from a logistical perspective (territorial logistical management), which combines instruments for land-use assignment and regulates the flows generated by interactions among the supported (contained) activities in the territory, is a key factor for the territorial logistical competitiveness because it contributes to lower logistical costs, modifies the space conditions and allows a more efficient management of the goods flows inside of and among territorial units.

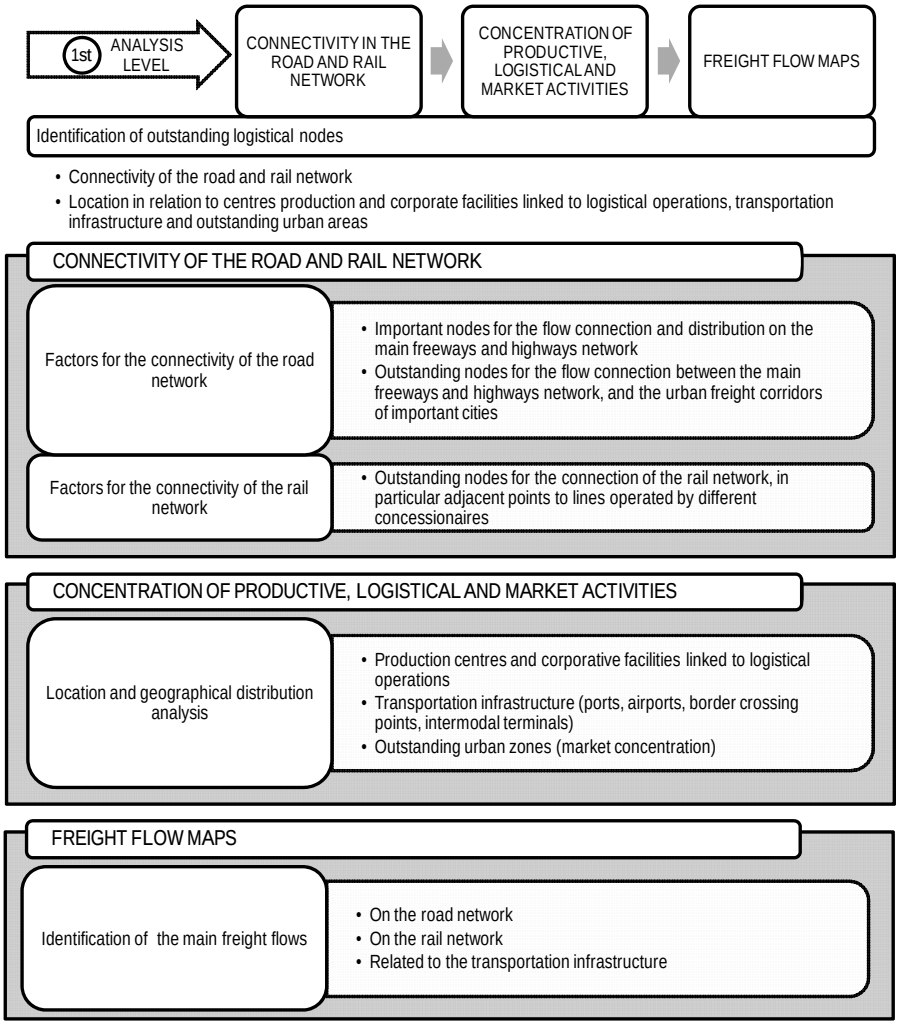
The identification of SLN is a base for impelling territorial logistical management, by means the integration of several analyses on: road and rail network; freight flows; production centres and corporate facilities linked to logistical operations; final market characteristics; economic and commercial activities; and logistical processes operations of supply chains and freight flows.

The identification of SLN allows the implementation of strategies for increasing territorial logistical competitiveness; some of them are the following: i) to identify Reserve Areas for Logistical Activities (RALA), for avoiding conflicts due to inadequate land-use mixture; ii) to place appropriate logistical infrastructure in the territory (logistics platforms, logistics centres and urban orders freight centres); and iii) to develop the complementary infrastructure for suitable logistical connectivity and accessibility.

Methodological base for the identification of Strategic Logistical Nodes (SLN)

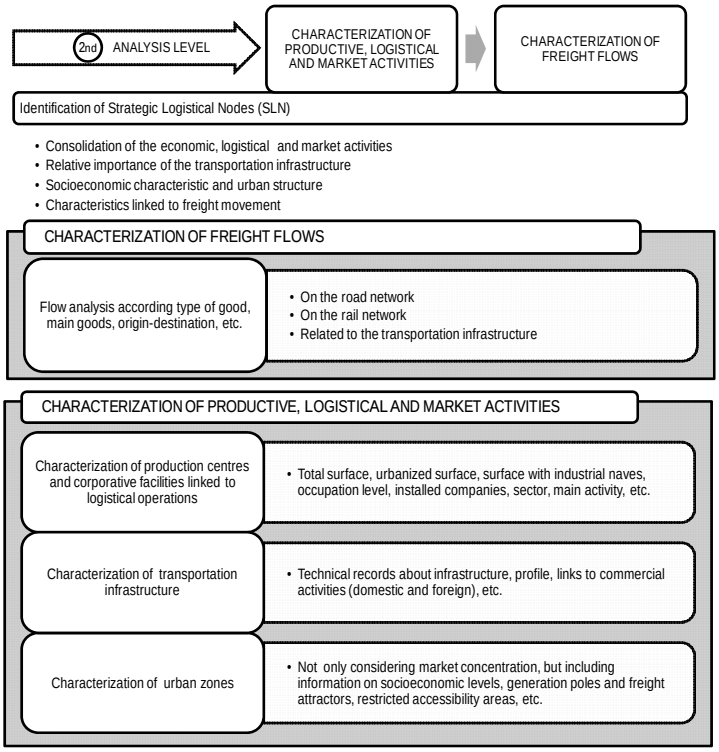
There are three levels of analysis for the identification of SLN:

i) in the first level of analysis, a set of outstanding logistical nodes are identified in the territory (see Figure 1);



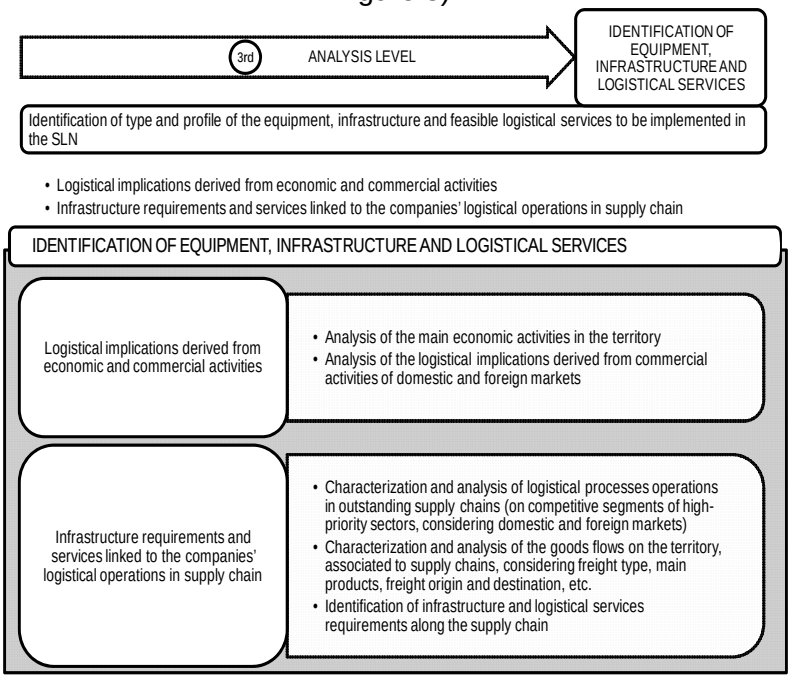
- Figure 1 First level of analysis

ii) in the second level of analysis, a subset of strategic logistical nodes are chosen from the previous set (see Figure 2); and



- Figure 2. Second level of analysis

- iii) in the third level of analysis, the bases for the definition of the equipment type and profile and the feasible services to be implemented in each SLN, are provided (see Figure 3).



- Figure 3 Third level of analysis

4. IDENTIFICATION OF STRATEGIC LOGISTICAL NODES (SLN) IN THE CENTRAL REGION OF MEXICO

4.1 BASES FOR THE IDENTIFICATION OF STRATEGIC LOGISTICAL NODES (SLN) IN THE CENTRAL REGION

The identification of SLN in the Central Region of Mexico considered the following three aspects (see Figure 4).

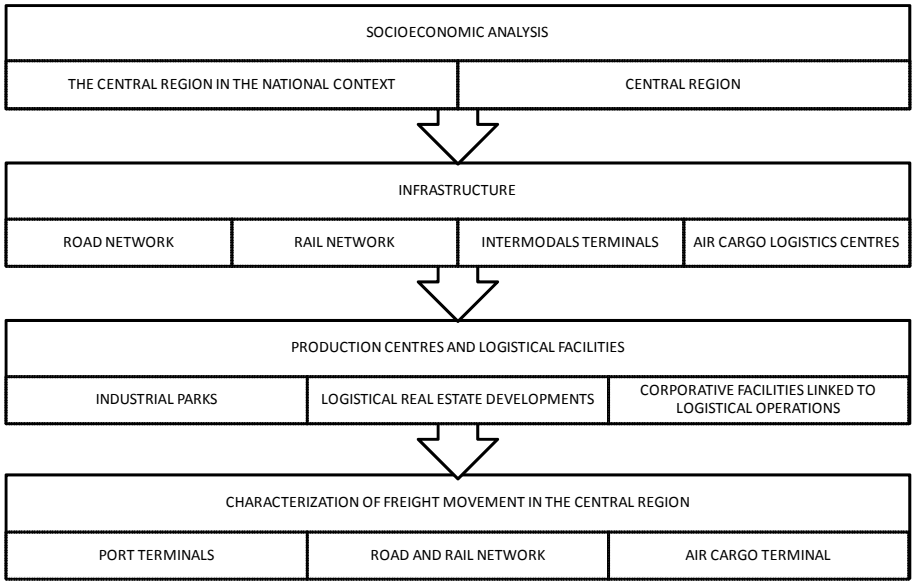


Figure 4 Information for the identification of SLN in the Central Region

(1) Identification of outstanding logistical nodes: i) important nodes for the flow connection and distribution on the main freeways and highways network; ii) outstanding nodes for the flow connection between the main freeways and highways network, and the urban freight network of important cities; iii) outstanding nodes for the connection of the rail network, in particular adjacent points to lines operated by different concessionaires; iv) nodes related to transportation infrastructure; and v) nodes related to urban areas where access is difficult.

(2) Identification of SLN: i) location of production centres and corporative facilities linked to logistical operations; ii) characterization of freight movement in the Central Region; iii) geographical distribution of the companies in industrial parks in the Central Region, according sectors.

(3) Identification of equipment type and profile, and logistical infrastructure: i) set of priority levels for the alternative logistics centres within each SLN; ii) identification of the profile for alternative logistics centres proposed for each SLN; iii) identification of the potential demand for the proposed logistics centres implementation; iv) identification of complementary logistical infrastructure, considering logistical connectivity and accessibility, for each SLN; and v) identification of the characteristics of each SLN.

4.2 IDENTIFICATION OF OUTSTANDING LOGISTICAL NODES IN THE CENTRAL REGION

The outstanding logistical nodes are the following:

1) *Important nodes for flow connection and distribution on the main freeway and highway network.* 13 nodes, which are important for the flow distribution on the road and highway network, were identified considering: the main corridors of the national road system (México-Nogales, México-Nuevo Laredo, México-Tuxpan, México-Puebla, y Altiplano), the main road infrastructure for their connectivity (Libramiento Norte de Toluca, Champa-Lechería highway, Circuito Mexiquense, Ecatepec-Pirámides-Tulancingo, San Martín Texmelucan-Tlaxcala-Apizaco highway y Amozoc-Perote highway), and the external link of Mexico City (Arco Norte).

2) *Outstanding nodes for the flow connection between the main freeways and highways network, and the urban freight network of important cities*. 7 outstanding nodes were identified in the Central Region: Pachuca, Toluca (2), Tlaxcala, Puebla, Cuernavaca, and another one linked to south-eastern access of the Metropolitan Zone of Mexico City (MZMC).

3) *Outstanding nodes for the connection of the rail network*. 11 points, with at least two lines operated by different concessionaires, were considered.

4) *Nodes related to transportation infrastructure*. In the Central Region, such 2 nodes are linked to air cargo terminals in the international airports of Toluca and Puebla.

5) *Nodes related to urban areas where access is difficult.* The selection of such nodes is based on the historical centres of the most important urban areas in the Central Region. 8 nodes were identified, 3 of them within the MZMC.

4.3 IDENTIFICATION OF STRATEGIC LOGISTICAL NODES (SLN) IN THE CENTRAL REGION

A subset of the outstanding nodes set was chosen according to criteria on: the location of industrial parks, logistical real estate developments and corporative facilities linked to logistical operations, and the characterization of freight movement in the Central Region. Also, a criterion on the number of companies within each industrial park, classified according sector was considered: sector C1 (textile, clothes and footwear, car parts, food and drinks, pharmacy and personal care products, electric and electronic items), C3 (metal-mechanics, construction and mining items), and C4 (chemical items, plastics, wood and paper, fuels, rubber, latex and resins; glass and ceramic, packs and containers).

30 SLN were identified in the Central Region (see Figure 5); nine of them belonging to the national road system (SLNR), six belong to the regional rail system (SLNRA), two are located within air cargo terminals (SLNA), five are in the urban periphery (SLNP) and eight are in urban areas (SLNU).

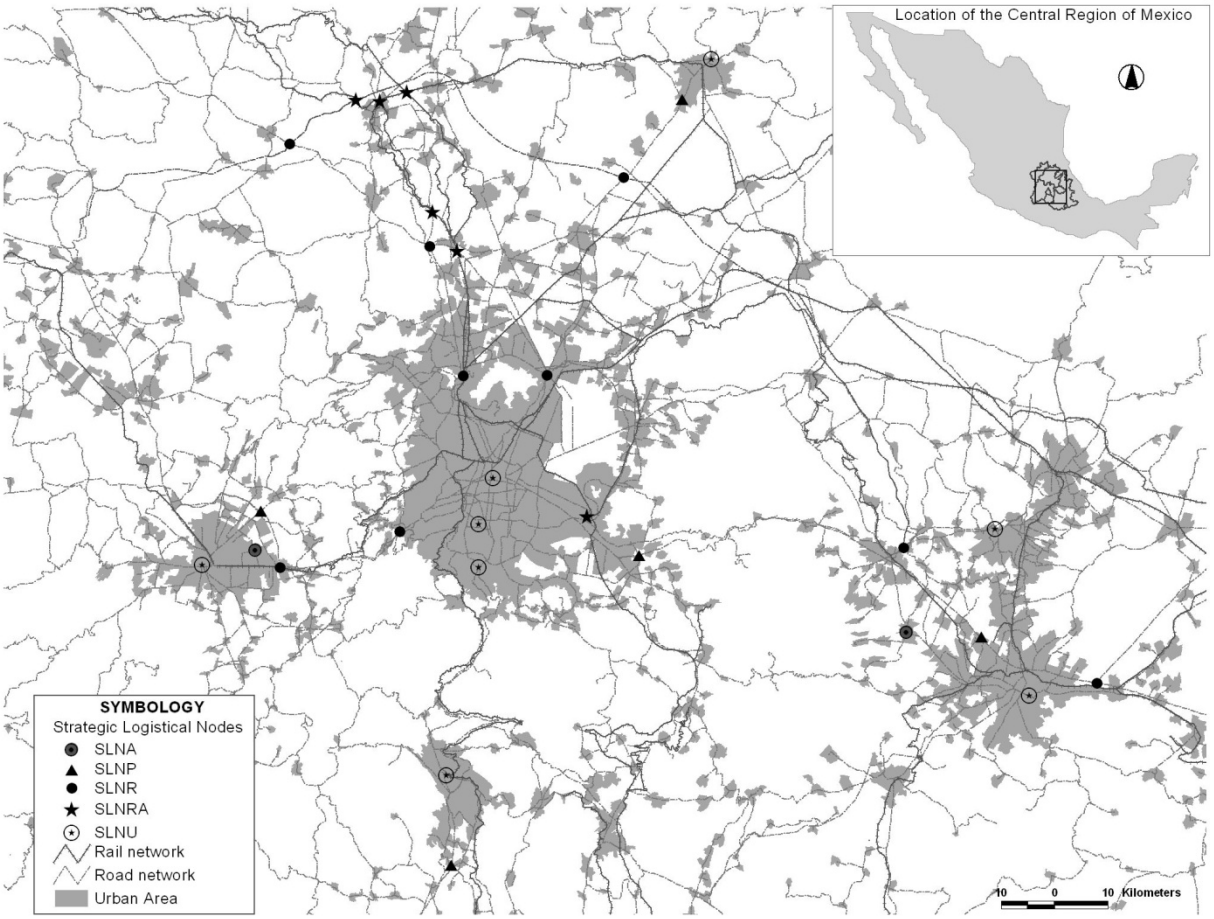


Figure 5. Strategic logistical nodes (SLN) in the Central Region

5. IDENTIFICATION OF THE TYPE AND PROFILE OF EQUIPMENT AND THE LOGISTICAL INFRASTRUCTURE

5.1 ALTERNATIVES AND POTENTIAL PROFILE AND DEMAND FOR THE DEVELOPMENT OF LOGISTICS CENTRES IN SLN

The alternative logistics centres (CL) for each SLN take into account the following classification (Antún et al., 2008; Lozano et al., 2006): Merchandize Centre (MC), Corporative Logistics Platform (CLP), Logistical Rail Modal Interface Platforms (LRMIP) or Inter-ports, Air Logistics centres (ALC), and Urban Logistics Micro-Platform (ULmP). Several types of logistics centres can be developed in a SLN; it depends on the node characteristics (transportation modes, operation scheme, etc).

The identification of the profile of the logistics centres to be implemented in each SLN was based on the geographical distribution of the companies located in industrial parks, and in the following distribution schemes: urban, regional and relative to foreign trade. The considerations on the potential demand for the implementation of the proposed logistics centres were based on variables related to the current market and the associated economic and commercial activities. The profile and potential demand for the alternative logistics centres scenarios to be developed in each SLN are presented in Table 1.

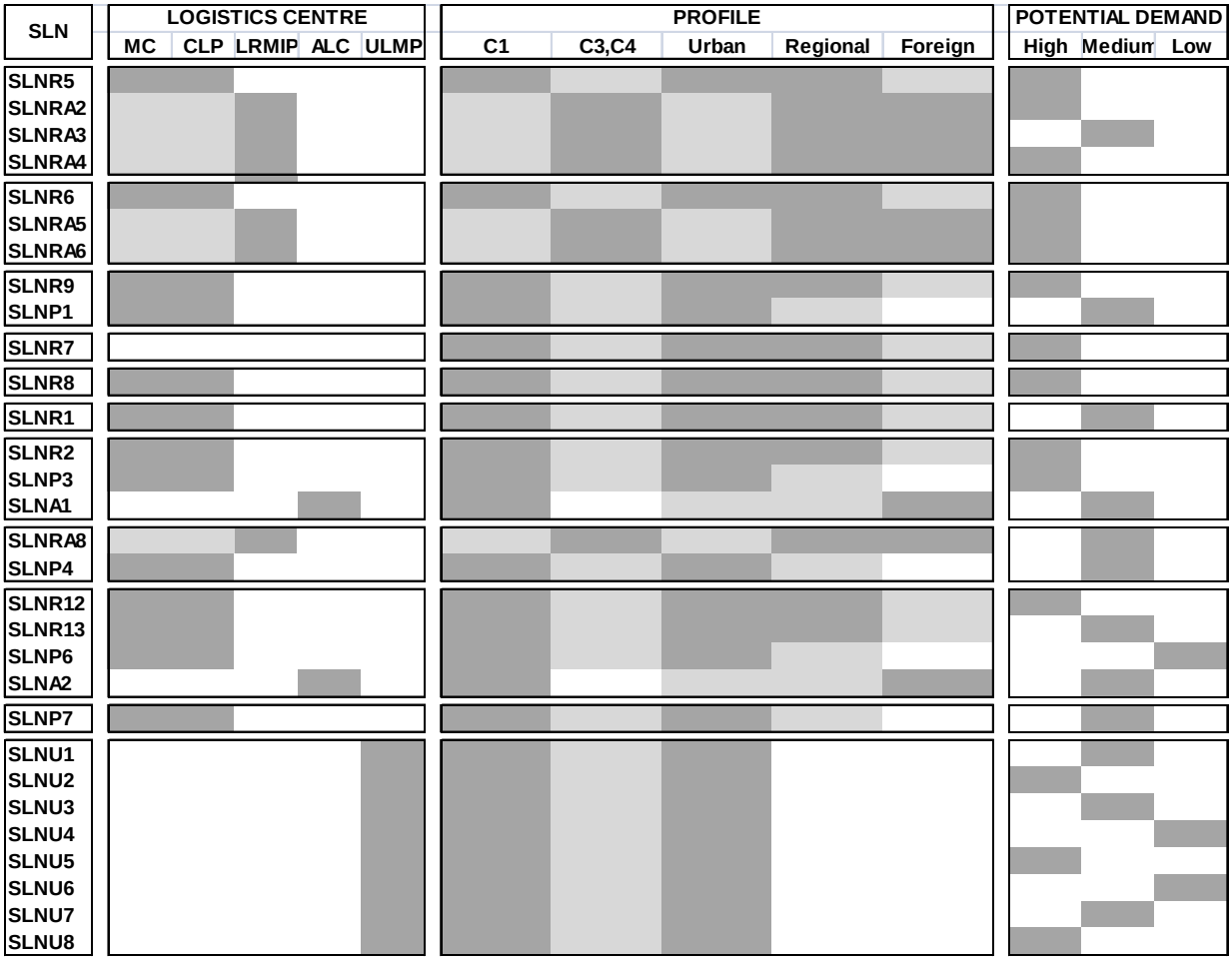


Table 1. Alternative scenarios, profile and potential demand for the development of logistics centres in Strategic Logistical Nodes (SLN) of the Central Region

5.2 IDENTIFICATION OF COMPLEMENTARY LOGISTICAL INFRASTRUCTURE, AND GENERAL CONSIDERATIONS ON STRATEGIC LOGISTICAL NODES (SLN) IN THE CENTRAL REGION

The identification of the complementary logistical infrastructure for each SLN, according to a logistical connectivity and accessibility perspective, was based on field work (see Table 2).

The general considerations on each SLN characteristics let to identify opportunities for the development of logistics centres, mainly related to operative aspects, connectivity and location (see Table 3).

CONCLUSION

Results of this research provide a guide for designing public policies for promoting a wide portfolio of logistical facilities projects, as freight transportation centres or integrated merchandize centres oriented to truck transportation, intermodal railways platforms, air cargo logistics centres, and corporative logistics centres.

SLN	COMPLEMENTARY LOGISTICAL INFRASTRUCTURE IN STRATEGIC LOGISTICAL NODES
SLNR5 **SLNRA2** **SLNRA3** **SLNRA4**	Construction of links for accessing the Arco-Norte highway and the whole road network
SLNR6	Re-design the intersection between the Mexico-Querétaro highway and the Circuito-Mexiquense highway, spetially for north to south movements.
SLNRA5	Improvement the Jorobas-Tula highway avoiding crossings roads which access the local residence developments
SLNRA6	Construction of roads for accessing the Circuito-Mexiquense highway Improvement the geometrical design of the bridge located near the Tepeji Industrial Park
SLNR9 **SLNP1**	Improvement the accessibility of the Mexico-Pachuca highway and the Libramiento-Sur-Pachuca highway
SLNR7	Improvement the geometrical design of the access to the Chamapa-Lechería highway and change of location toll point for new accesses
SLNR8	Improvement the connexion among the Mexico-Pachuca highway, the Circuito-Mexiquense highway and the Ecatepec-Piramides-Tulancingo highway
SLNR1	Improvement the connexion between the Mexico-Toluca highway and the Chamapa-Lechería highway
SLNR2	Geometrical re-design of the link between the Libramiento-Norte-Toluca and the López-Portillo Avenue
SLNP3	Geometrical improvement of the López-Portillo Avenue in order to become an urban freight corridor
SLNA1	Improvement the local avenues for connecting the ACLC with the main network, in particular with the López-Portillo Avenue
SLNRA8	Construction of roads for accessing the highway network, in particular to the Mexico-Puebla highway
SLNP4	Improvement the accessibility to the Mexico-Puebla highway, considering the location of the toll point
SLNR12	Improvement the connexion among the Mexico-Puebla highway, the Arco-Norte highway and the San Martin Texmelucan-Tlaxcala highway
SLNR13	Improvements the geometrical design of the link between the Puebla-Amozoc highway and the Amozoc-Perote highway
SLNP6	Improvement the accessibility of the Mexico-Puebla highway and the Libramiento-Ecológico-Puebla freeway
SLNA2	Improvement the connections to the Mexico-Puebla highway
SLNP7	Improvement the connexion between the Mexico-Cuernavaca highway and the Airport-Cuernavaca freeway

Table 2. Complementary logistical infrastructure for the Strategic Logistical Nodes (SLN) in the Central Region

SLN	GENERAL CONSIDERATIONS ON STRATEGIC LOGISTICAL NODES
SLNR5 **SLNRA2** **SLNRA3** **SLNRA4**	Excellent connexion with the México-Querétaro and Arco-Norte highways Opportunities to carry out inter-modals rail-road operations Offer of rail services (three concessionaires) Proximity to the Arco-Norte and the México-Querétaro highways
SLNR6 **SLNRA5** **SLNRA6**	Opportunities to carry out operations inter-modals rail-road operations Rail services offer (four concessionaires) Proximity to the México-Querétaro and Circuito-Mexiquense highways
SLNR9 **SLNP1**	Excellent connexion with the Mexico-Pachuca and Arco-Norte highways Opportunity to improve the goods distribution efficiency in Pachuca (freight consolidation, cross-docking, etc)
SLNR7	It is one of the main logistical clusters in the region; but there is not available space for its expansion
SLNR8	Proximity to the México-Pachuca, the Circuito- Mexiquense and the Ecatepec-Piramides-Tulancingo highways
SLNR1	This location allows the freight movement without crossing Mexico City
SLNR2 **SLNP3** **SLNA1**	Excellent connexion to the México-Toluca and the Libramiento-Norte-Toluca highways Opportunity to improve the goods distribution efficiency in Toluca (freight consolidation, cross-docking, etc) Opportunity for the development of an Air cargo Logistics centre (ACLC) in third line; limited available plots
SLNRA8 **SLNP4**	Opportunity to improve freight flow on the Mexico-Puebla highways toward Mexico City Rail services offer (three concessionaires)
SLNR12 **SLNR13** **SLNP6** **SLNA2**	Connexion node among the México-Puebla, Arco-Norte and San Martin-Texmelucan-Tlaxcala highways Node for the redistribution of freight flows toward the south-eastern part of the country Opportunity to improve the goods distribution efficiency in Puebla (freight consolidation, cross-docking, etc) Opportunity for the development of an Air cargo Logistics centre (ACLC) in third line
SLNP7	Opportunity to improve the goods distribution efficiency in Cuernavaca (freight consolidation, cross-docking, etc)

Table 3. General considerations on the Strategic Logistical Nodes (SLN) in the Central Region

ACKOWLEDGES

The authors thank Lizbeth Guarneros for her valuable help to make some maps.

REFERENCES

Alarcón, R (2012) *Competitividad Logística Territorial: Caso de Estudio en el Sistema Urbano-Regional en la Región Centro País,* Phd Dissertation on Urban & Regional Planning, Facultad de Arquitectura, Universidad Nacional Autónoma de México, Director: Professor Juan Pablo Antún, Mexico City, February , 2012

Antún, JP (1994) *Logística: una visión sistémica*, Series D-30, Instituto de Ingeniería, Universidad Nacional Autónoma de México, México DF. Pp. 198.

Antún, JP; Alarcón, R (2011) *Términos de Referencia del Estudio Sistema Nacional de Plataformas Logísticas para México*, LTLST-IIUNAM para Secretaría (Ministerio) de Comunicaciones y Transporte-Secretaría (Ministerio) de Economía-Banco Interamericano de Desarrollo (BID), México DF

Antún, JP; Lozano, A; Hernández, R; Alarcón, R; Muñoz, MA; Vargas, F; Romero, E; Lobo, J; Gómez, H (2008) *Centros Logísticos*, SD-50, Series del Instituto de Ingeniería, Abril, México DF; 185 p.; ISBN 970-32-0710-3/ISBN 978-607-2-00042-1.

Antún, JP; Lozano, JP,; Alarcon, R; Granados F, et al (2009) *Estrategias para el Ordenamiento Territorial Logístico competitivo de la Región Centro*, Proy 8134, realizado por convenio con la Secretaría de Economía del Gobierno Federal de México (Fondo PROLOGYCA) y Fideicomiso para el Desarrollo de la Región Centro País (FIDCENTRO), Instituto de Ingeniería, Universidad Nacional Autónoma de México, México DF; 1235p

Aydalot, P. (1985). "*Économie régionale et urbaine"*. Ed. Económica, París.

Bailly, A.; Gibson, L.J. (2003). "Regional Science: Directions for the future". *Papers in Regional Science*, vol. 83, nº 1, pp. 127-138.

Bal, F.; Nijkamp, P. (1998). "Exogenous and endogenous spatial growth models". The *Annals of Regional Science*, vol. 32, nº 1, pp. 63-89.

Berroeta, B.; Del Castillo, J.; Uyarra, E. (1999). "Nuevas pautas de intervención en materia de Innovación y Empleo: Las Estrategias Territoriales de Empleo e Innovación". *Ciudad y Territorio, Estudios Territoriales*, vol. XXXI, nº 122, pp. 757-774..

Caramés Viéitez, L. (1990). "Descentralización de la política regional". *Política Regional en la Europa de los años 90*. Ed. Ministerio de Economía y Hacienda, Madrid, pp. 489-497.

Friedman, J.; Weawer, C. (1981). *Territorio y función. La evolución de la planificación regional*. Instituto de Estudios de Administración Local, Madrid, pp. 278-309.

Fujita, M.; Krugman, P. (2003). "The new economic geography: Past, present and the future". *Papers in Regional Science*, vol. 83, nº 1, pp. 139-164.

Furió Blasco, E. (1996). *Evolución y cambio en la economía regional*. Ed. Ariel Economía, Barcelona.

Krugman, P. (1991). *Geography and Trade*. The MIT Press, Leuven University Press y Cambridge, Mass, Louvaine.

Krugman, P. (1994). *Vendiendo prosperidad*. Ed. Ariel, Barcelona.

Krugman, P. (1995). *Development, geography and economic theory*. The MIT Press, Cambridge, Massachussets.

Lozano, A; Antun, JP; Santos, C; Alarcón, R ; Guzmán, LA; Hernández, R (2008) *Propuestas de Centros Logísticos para el Valle de México*, SD-51, Series del Instituto de Ingeniería, Julio, México DF; 119 p.; ISBN 970-32-0710-3/ISBN 978-607-2-00043-8.

Lozano A., J. Antún, F. Granados, R. Hernández. R. Alarcón, F. Vargas, R. Magallanes, C. Santos (2006) "Plataformas Logísticas para la Zona Metropolitana del Valle de México". In: *Estudio Integral Metropolitano de Transporte de Carga y Medio Ambiente para el Valle de México*, Vol V, pp.1-246, Universidad Nacional Autónoma de México y Comisión Ambiental Metropolitana del Valle de México, México.

México (2006) *Mesoregiones de Planeación en México*: Centro, Noreste, Noroeste, Centro-occidente, y Sur-Sureste, Presidencia de México, Mexico

Nijkamp, P.; Poot, J. (1998). "Spatial perspectivas on new theories of economic growth". The *Annals of Regional Science*, vol. 32, nº 1, pp. 7-37

Peña Sánchez, A.R., (2006). *Las disparidades económicas intrarregionales en Andalucía*, Tesis de Doctorado, Capítulo I, páginas 15 a 109, Universidad de Cádiz, España.

Porter, M. (1997). *La ventaja competitiva*, IBM Educación, seminario internacional, México.

Porter, M., (1990). *The Competitive Advantage of Nations*, Editorial Free Press, EU.

Scott, A. (1998). *Regions and the World Economy*. Oxford University Press, Oxford.

Stöhr, W.B. (1985). *Selective selfreliance and endogenous regional development*. Ungleiche Entwicklung und Regionalpolitik in Südeuropa. Ed. Nohlen &Schultze, Studienverlag Dr. N. Brockmeyer, Bochum.

Vázquez Barquero, A. (1986). "El cambio del modelo de desarrollo regional y los nuevos procesos de difusión en España". *Estudios Territoriales*, nº 20, pp. 87-110.

Vázquez Barquero, A. (1999). *Desarrollo, redes e innovación. Lecciones sobre desarrollo endógeno*. Ed. Pirámide, Madrid.

World Bank (2007). *Connecting to Compete. Trade Logistics in the Global Economy: The logistics Performance Index and its Indicators*. The World Bank Group.