Galician Technological Platform of Logistics -Loxisga

loxisga
Plataforma Tecnolóxica Galega de Loxística

R&D+i STRATEGIC AGENDA

(English versión)

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XUNTA DE GALICIA
CONSELLERÍA DE
POLÍTICA TERRITORIAL,
OBRAS PÚBLICAS E TRANSPORTES
Dirección Xeral de Transportes

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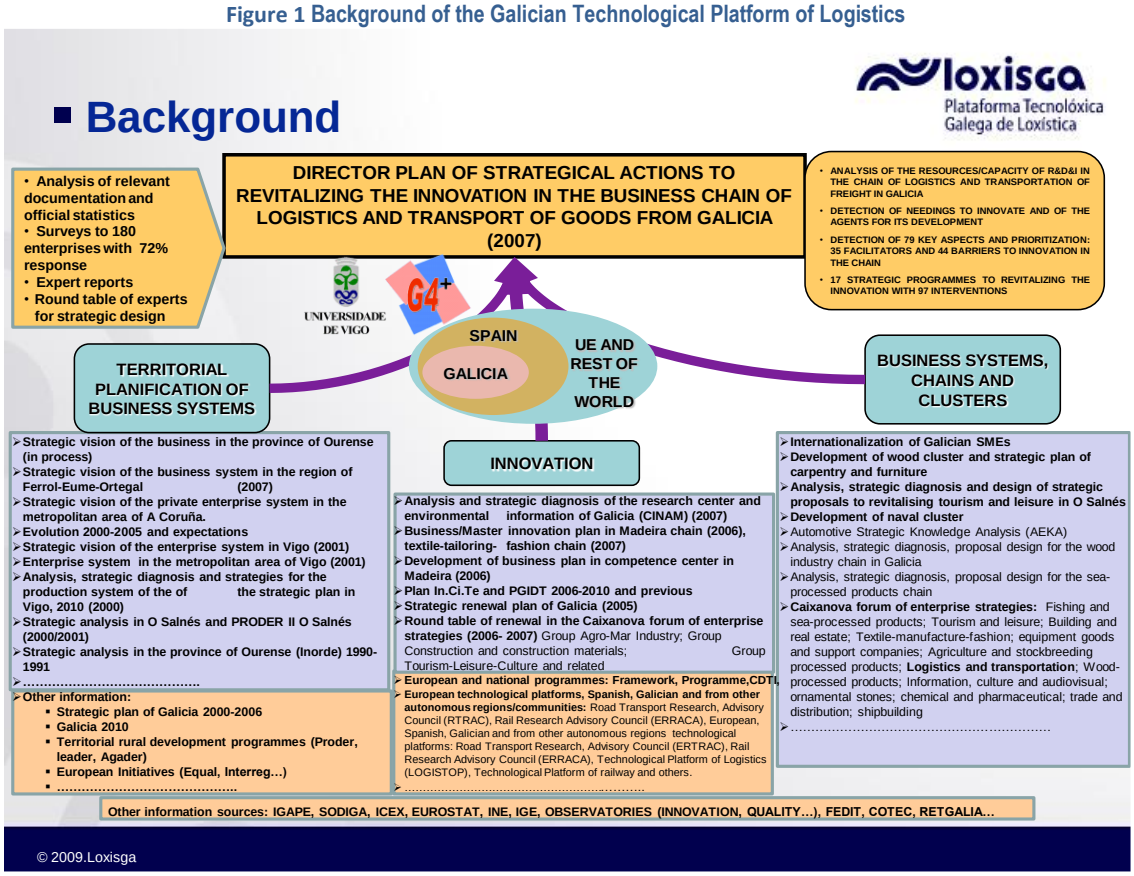
1 GALICIAN TECHNOLOGICAL PLATFORM OF LOGISTICS - LOXISGA

The Galician Technological Platform of Logistics (loxisga) is defined as the point of meeting and communication of all the agents related to business activities, in this case , to the Galician logistics sector for the development of activities of R&D+i which improve their competitive capacity.

The platform was officially **launched** on 9th October 2008 (official constitution of its Executive Committee) **with the aim of grouping entities in order to boost the competitiveness of the key sectors of the Galician economy through collaboration among the agents of the system of innovation and through the coordination of actions to be carried out by these.** These platforms incorporate all the actors of the Galician innovation system (companies, technological centres, university research groups, public research institutions, financial entities) interested in the logistics sector and led by companies.

The platform **defines and sets up the Strategic Agenda of R&D+i of the logistics sector in the field of technology, organization, strategy and marketing** with an outstanding social impact due to its closeness to the goals of growth, competitiveness and sustainability based on knowledge.

Figure 1 Background of the Galician Technological Platform of Logistics



Source: personal elaboration from González Gurriarán, J; Figueroa Dorrego, P. (2008) Plan de Dinamización da Innovación nas actividades de loxística e transporte de mercadorías de Galicia

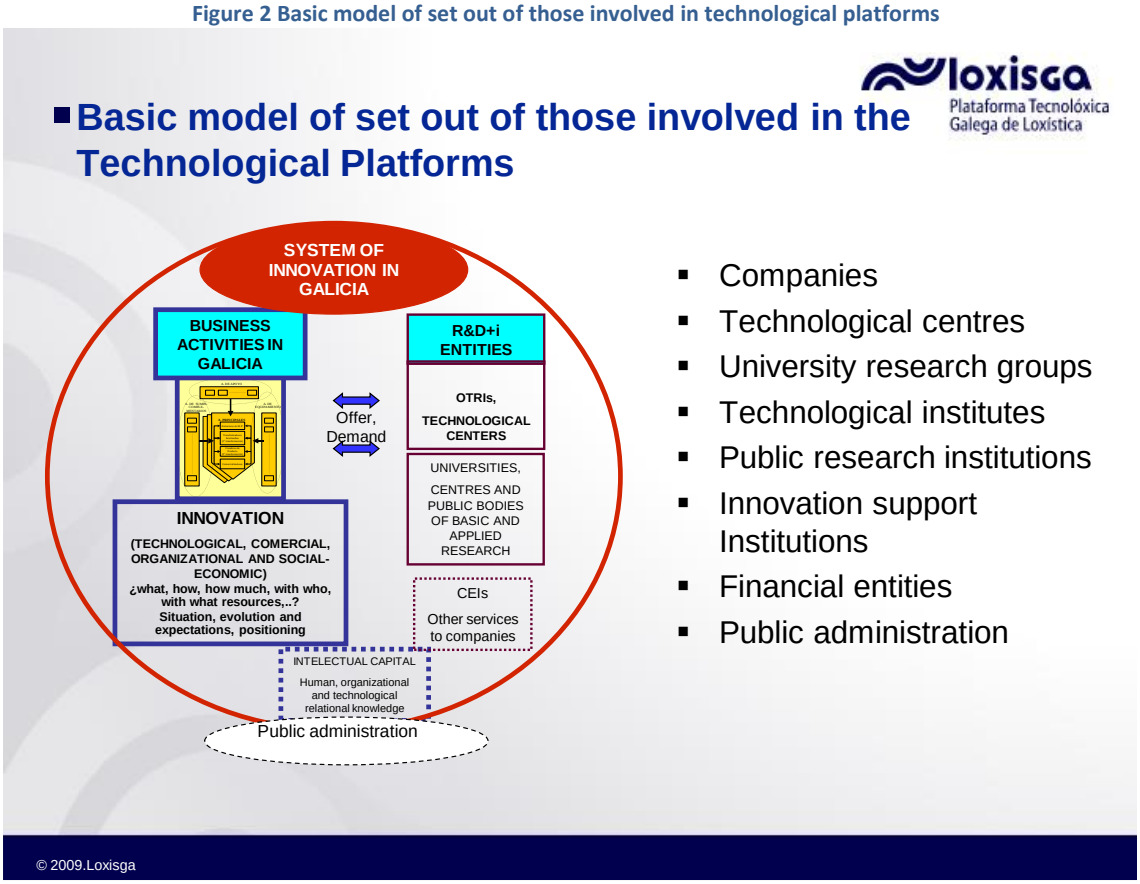
This platform has as **background** the **Plan Director de Actuacións para a Dinamización da Innovación na Cadea de Loxística e Transporte de Mercadorías de Galicia** (Plan to boost Innovation in the Logistics Chain and the Transportation of Freight in Galicia) (see Figure 1), **developed from May to December 2007** by the research team G4+ from the University of Vigo.

In this project, **over 180 companies** of the sector took part in the **survey (June to September 2007)** in the analysis of resources **and capacities of R&D+i** in the logistics chain and transportation of freight in Galicia, in **the identification of their need to innovate** and of the agents which should collaborate in the development of innovation projects. They also took part through the survey in the valuation of a group of **79 key aspects**, of which **35** act as **facilitators** of innovation in these activities, and **44** as **barriers**. Finally, in this project the **definition** of **17 strategic programmes** was reached to dynamise the innovation of these business activities in which **97 strategic performances** were designed which were given priority at a round table of experts (companies, R&D+i entities, public administration…) in **November 2007**.

As a consequence of the development of the above mentioned plan, the need to implement a formula of cooperation for the implementation of the main derived proceedings. Among these, the start-up, formalization and development of the Galician Technological Platform of Logistics was discovered. For this reason, in April 2008, a group of companies came forward to the official announcement of subsidiaries of the The Galician Research, Development and Innovation Plan (Plan In.Ci.te) for the creation of the Galician Technological Platform of Logistics.

The basic model of the agents involved in the technological platforms is shown in Figure 2, in the framework of the innovation system in Galicia.

Figure 2 Basic model of set out of those involved in technological platforms

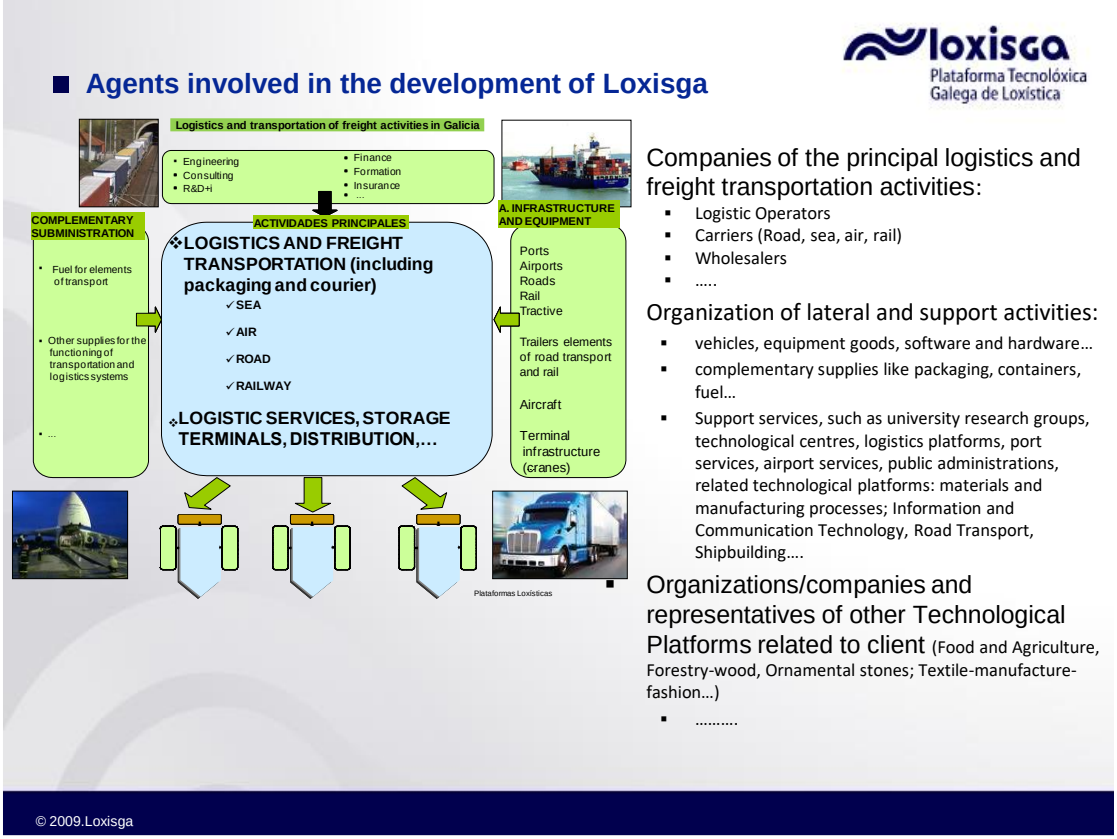


Source: González Gurriarán, J.; Figueroa Dorrego, P. (2005): Plan Estratéxico de Innovación de Galicia, 2010 (PEIGA-2010)

Two principal pillars exist: business activities in Galicia and R&D+i entities. Therefore, the technological platform aims to be a meeting point for offer and demand of research services, development and innovation.

Following this model (see Figure 3), in Loxisga, **companies of proper logistics activities and transportation of freight** (operators and logistics organizers, carriers …) **and organizations of lateral activities and support to the business chain** (vehicles, software, hardware, containers, packaging, equipment goods, maintenance, university research groups, harbour infrastructure manager, airport infracstructure…) **become involved.** Other related organizations also share their knowledge, for example other technological platforms developed in Galicia and specially related to clients or suppliers.

Figure 3 Agents involved in the development of Loxisga



Source: personal elaboration from González Gurriarán, J; Figueroa Dorrego, P. (2008): Plan de Dinamización da Innovación nas actividades de loxística e transporte de mercadorías de Galicia

Therefore, towards the end of October 2008 the tasks developed for the elaboration of the strategic research agenda of this platform began (see Figure 4). Initially, a sectorial diagnosis of R&D+i in these activities was synthesized based on their resources and capacities in response to their need to innovate. The need of these activities to innovate and the facilitators and barriers of their development were also assessed. The purpose was elaborated and the main objectives of the platform defined in the short, medium and long term which were presented to the Executive Committee in November 2008. With all this information we started to advance in the definition of Priority Areas of R&D+I and initial strategic guidelines throughout January and February 2009. The organizations involved, after thought and idea-sharing session on the guidelines and proceedings to be developed in a first work stage (March-April 2009), reached the final definition of the priorities of R&D+i for the next years (so-called Strategic Research Agenda)

Figure 4 Schedule of the principal tasks for elaboration of AEI

Schedule of the principal tasks

TASKS OF SUPPORT TO TECHNICAL SECRETARY	NOV-DEC	JAN	FEB	MAR	APR	MAY
Vision Documents						
Analysis of transport sector and the need to innovate	X	X				
Sectorial Diagnosis R&D+i: barriers and facilitators of innovation	X	X				
Mission and objectives of the Platform	X	X				
Priorities of R&D+i	X	X	X			
Strategic Research Agenda Document						
Definition of Strategic Lines, Workgroups and selection of experts	X	X			X	
Prior document for Workgroups			**X**			
Workgroups			**X**	**X**	**X**	
Draw up of Strategic Research Agenda					X	X

TASKS OF TECHNICAL SECRETARY	NOV-DEC	JAN	FEB	MAR	APR	MAY
Design of corporate image	X	X				
Design and start-up of website	X	X				
Model of organization, statutes and documents of internal functioning	X	X				
Communication, diffusion, and new membership	X	X	X	X	X	X
GENERAL ASSEMBLY AND FORMAL PRESENTATION/INTRODUCTION OF AEI						X

Source: personal elaboration

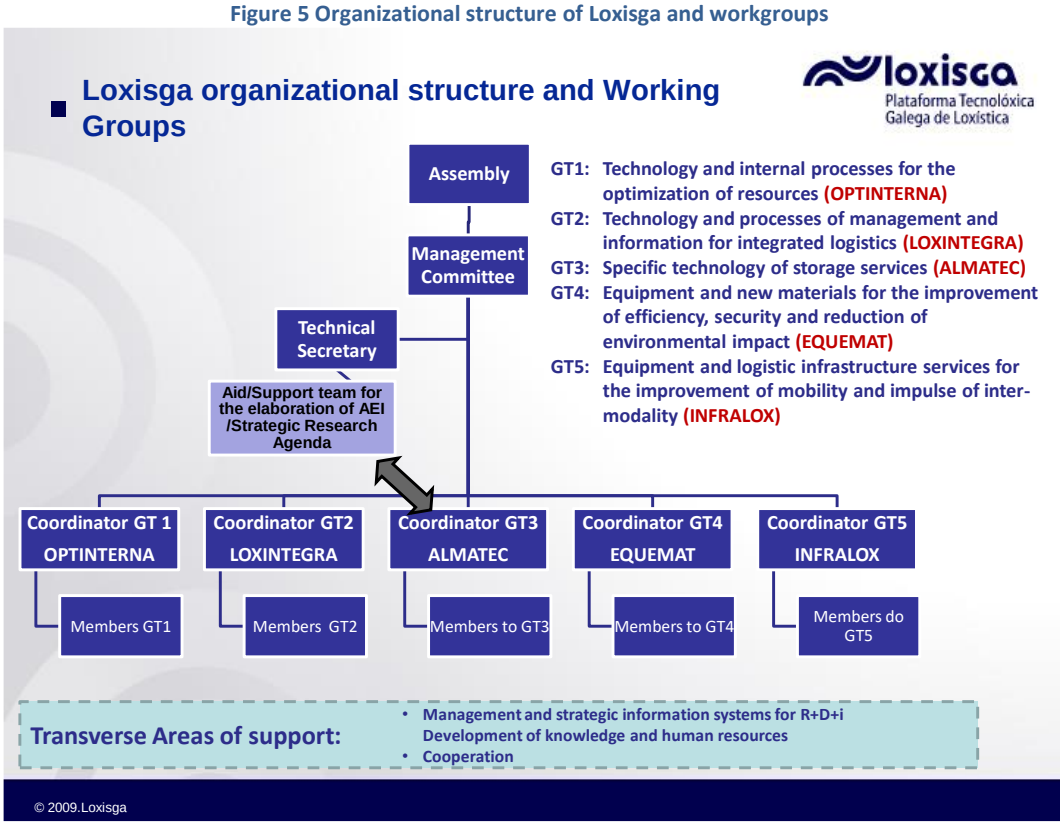
Finally, Loxisga defined **5 Priority Areas of R&D+i**, and organized its structure based on them (see Figure 5). Some **Thematic Cross-sectional Areas** of support to R&D+i activities were also contemplated as necessary. The 5 Priority Areas and 3 Transverse Areas are the following:

1. **Technology and internal processes for the optimization of resources** (lean manufacturing, six sigma, instruments for the planning of trade and/or operations…)
2. **Technology and processes of management and information for integrated logistics** (relation among logistics operators and carriers, relation of companies of logistics activity and transport with client companies, end of logistics chain processes , relation with public administrations in transport management…)
3. **Specific technology of storage services** (automated warehouse management systems, maintenance systems, classification and arrangement, manipulation of goods in warehouse/store and when loading and unloading…)
4. **Equipment and new materials for the improvement of efficiency, security and reduction of environmental impact** (vehicles, packaging, energetic efficiency, security systems….)
5. **Equipment and logistics infrastructure services for the improvement of mobility and impulse of inter-modality** (infrastructure equipment and port services, airport, and railway, equipment and logistics platform services, equipment and communication route services…)

Thematic Transverse Areas of Performance in support to R&D+i activities. Their performance is needed to offer a suitable response to the needs of the previous 5 priority Areas:

- Management and strategic information systems for R&D+i
- Development of knowledge and human resources
- Cooperation

Figure 5 Organizational structure of Loxisga and workgroups



Source: personal elaboration

2 ANALYSIS OF LOGISTICS AND TRANSPORTATION OF FREIGHT BUSINESS ACTIVITIES FROM AN INNOVATION APPROACH

2.1 The business system in Galicia as framework of the logistics and transportation of freight business activities

In this section some **illustrative data of the structure of the private business system in Galicia** are introduced, as they are the principal client activities of logistics and transportation of freight.

A) Structure of the private business system in Galicia

At a geographical level, the more than 205,000 companies censused by IGE (Galian Institute of Statistics – Instituto Galego de Estadística) in 2007 were mainly situated in the provinces of A Coruña (42%) and Pontevedra (34%). In this framework, the area in which they are found is fundamentally the so-called "Arco Atlántico", the area that goes from A Coruña-Ferrol to Vigo- O Rosal- A Guardia in Galicia. In large functional areas, according to diverse works[1] on private business systems and the IGE, **in Metropolitan Area of A Coruña 34,536 companies were located in year 2005, in Metropolitan Area of Vigo 34,667 in year 2006 (these two areas, therefore, cover more than 34% of the total number of companies in Galicia).** In the regions of Ferrol- Eume-Ortegal 13,593 were located in the same year, In Santiago and its area of influence approximately 37,000 companies (regions of Arzúa, Noia; Melide, Barbanza, A Barcala, Ordes, Santiago, O Sar, Caldas, Deza, Tabeirós- Terra de Montes), and in Pontevedra and its area of influence 19,383 companies would be located (regions of Pontevedra, O Salnés as well as the councils of Marín and Bueu).

All these areas compromise over 67% of the total number of companies in Galicia. Meanwhile, inland, the main areas of location in 2006 according to IGE would be the **area of Lugo and its area of influence** with 16,050 companies (regions of Lugo, A Ulloa, Sarria, Meira, Terra Cha and Chantada) and the **area of Ourense and its area of influence** with 5,800 companies (regions of Ourense, O Carballino, O Ribeiro and Allariz- Maceda. On the other hand, on the border area with the North of Portugal, according to IGE, there were 11,100 companies (regions of O Baixo Miño, A Paradanta, Terra de Celanova, Baixa Limia, A Limia and Verín) In this settlement of companies the influence of connectivity at an internal level among the main aspects of business activity is notable (bearing in mind, in addition, that one of the principal markets of proceeding in the companies of Galicia is precisely the inter-regional

[1] González Gurriarán, J.; Figueroa Dorrego, P.; González Loureiro, M. (2009): Visión Estratégica del Sistema Empresarial Privado de Ourense; González Gurriarán, J. e Figueroa Dorrego, P.; (2008): Visión Estratégica del Sistema Empresarial Privado de Ferrol-Eume-Ortegal; ----(2007): Visión Estratégica del Sistema Empresarial del Área Metropolitana de A Coruña; ----(2006): Visión Estratégica del Sistema Empresarial Privado del Área Metropolitana de Vigo. Evolución y expectativas 2000-2005

market of Galicia), with an effect on the logistics activities themselves and transportation of freight.

With respect to the **distribution of business activities in provinces** (see Table 1), according to official data from the IGE, in general terms, it can be stated that **the number of companies** related to **building industry and property development** (with similar relative importance in each province between 18% and 22%), as well as **activities of retailer commerce** (between 28% and 30% in the number of companies) stand out. There is also an **important number of companies with activities associated with tourism-leisure and related,** which have a special influence on the trade registered in the main tourist attraction areas and, therefore, on the transportation of freight activities by road.

Table 1 Business location in Galicia according to main branch activities by the number of companies (2007)

Note: the IGE doesn´t provide data for branches "A: agriculture, animal production, hunting and forestry" and "B: Fishing"	**Galicia**	**A Coruña**	**Lugo**	**Ourense**	**Pontevedra**
	Percentage distribution in the area	**Percentage distribution in the area**	**Percentage distribution in the area**	**Percentage distribution in the area**	**Percentage distribution in the area**
	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**
C Extract. Industries. (CA Extraction of energy products + CB extraction of other minerals except energy products	0.2%	0.1%	0.8%	0.0%	0.0%
DA Food Industry, drinks and tobacco	1.4%	1.1%	2.0%	2.5%	1.3%
DB Textile and clothing industry + DC leather industry and footware	0.9%	1.3%	0.4%	0.7%	0.8%
DD Wood and cortiza industry	0.9%	0.7%	1.0%	1.3%	0.9%
DE Paper industry; edition, graphic arts and reproduction of engraved supports	0.6%	0.7%	0.4%	0.4%	0.7%
DF Refined Petroleum and treatment of nuclear fuel + DG Chemical industry	0.1%	0.1%	0.0%	0.1%	0.1%
DH Industry of the transformation of rubber and plastic materials	0.1%	0.1%	0.1%	0.1%	0.2%
DI Industries of other non metallic mineral products	0.5%	0.4%	0.6%	0.9%	0.6%
DJ Engineering industry and manufacture of metallic products	1.4%	1.2%	1.6%	1.7%	1.4%
DK Industry of machinery construction and mechanic equipment + DL industry of material and electric equipment, electronic and optical	0.5%	0.5%	0.5%	0.5%	0.6%
DM Manufacture of transport material	0.3%	0.2%	0.2%	0.1%	0.5%
DN Diverse manufacturing industries	0.8%	0.9%	0.9%	0.9%	0.7%
E Production and distribution of electrical energy, gas and water	0.1%	0.2%	0.2%	0.2%	0.1%
F Construction + K real-estate activities and renting; business services	33.1%	34.0%	29.9%	33.3%	33.0%
G Commerce, reparation of motor vehicles, motorbikes and mopeds and personal items and of domestic use	28.3%	27.0%	29.0%	27.8%	30.1%
H Hotel business	11.0%	11.4%	11.2%	11.6%	10.4%
I Transport, storage and communication	6.7%	6.3%	8.6%	6.1%	6.7%
J Financial brokerage	1.7%	1.8%	1.6%	1.6%	1.6%
M Education + N Sanitary and veterinary activity, community service + O Other social activities and service to the community; personal servic	11.1%	12.1%	11.0%	10.1%	10.3%
TOTAL NUMBER OF COMPANIES IN THE AREA WITH RESPECT TO THE TOTAL IN GALICIA	**100% 205,906 companies**	**41.8% 86,102 companies**	**12.3% 25,376 companies**	**11.6% 23,985 companies**	**34.2% 70,443 companies**

Source: personal elaboration from data from the IGE (Instituto Galego de Estatística (IGE))

Regarding the transformation industry, the field of specialization varies according to the higher or lower diversification reached in each area by the business system. For example, in Greater A Coruña the first industrial-type activity in year 2006 based on the number of companies would be agro-industry, followed by textile-manufacture-fashion and forestry-

wood (with figures between 6.7% and 4.24% each). In the case of Metropolitan area of Vigo in year 2005 it would be fishing activity and sea-processed products and equipment goods, auxiliary industry and non specific metallic products (over 6.4% and 6.0%, respectively).

The indicator of the number of companies and their location provides an idea of the degree of dispersion of potential clients from the point of view of logistics and freight transportation. It is also necessary to mention the **inter-relation existent among the business location of client activities and the degree of development of logistics and transportation of freight activities.** In general terms, in the variable regarding the number of companies,these activities appear among the main chain activities in the main business systems in Galicia (for example, they account to 7.4% in Vigo, 6.3% in A Coruña and 6.7% in Galicia as a whole), which means there is a relevant offer of logistics and transportation services: **In Galicia, on average, the number of logistics and transport companies is situated at 69 per 1,000 companies in the business system**.

Figure 6 illustrates the estimation carried out for year 2007 regarding the importance of companies in each chain of private business activity (the so-called “private sector” is not contemplated) to the Gross Added Value and Production.

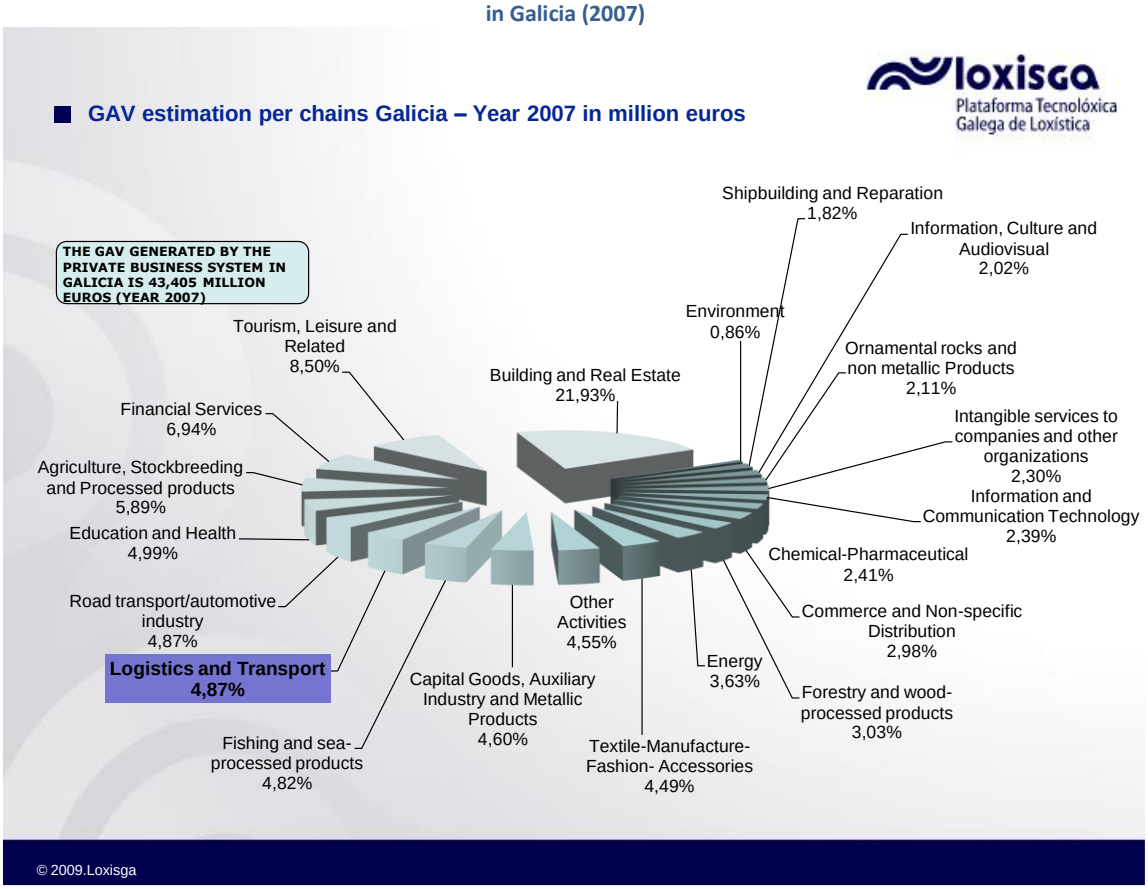
In view of the results obtained, **the GAV generated by the Building and Real Estate chain**, which was situated as the main contributor of the creation of richness in Galicia in year 2007 (almost 22%) and with significant difference to the following in order of importance (Tourism with 8.50%, Financial services with 6.94%...) **stands out**. This is an indication of the high dependency of Galicia on this activity, which is threatened by changes produced in the last years.

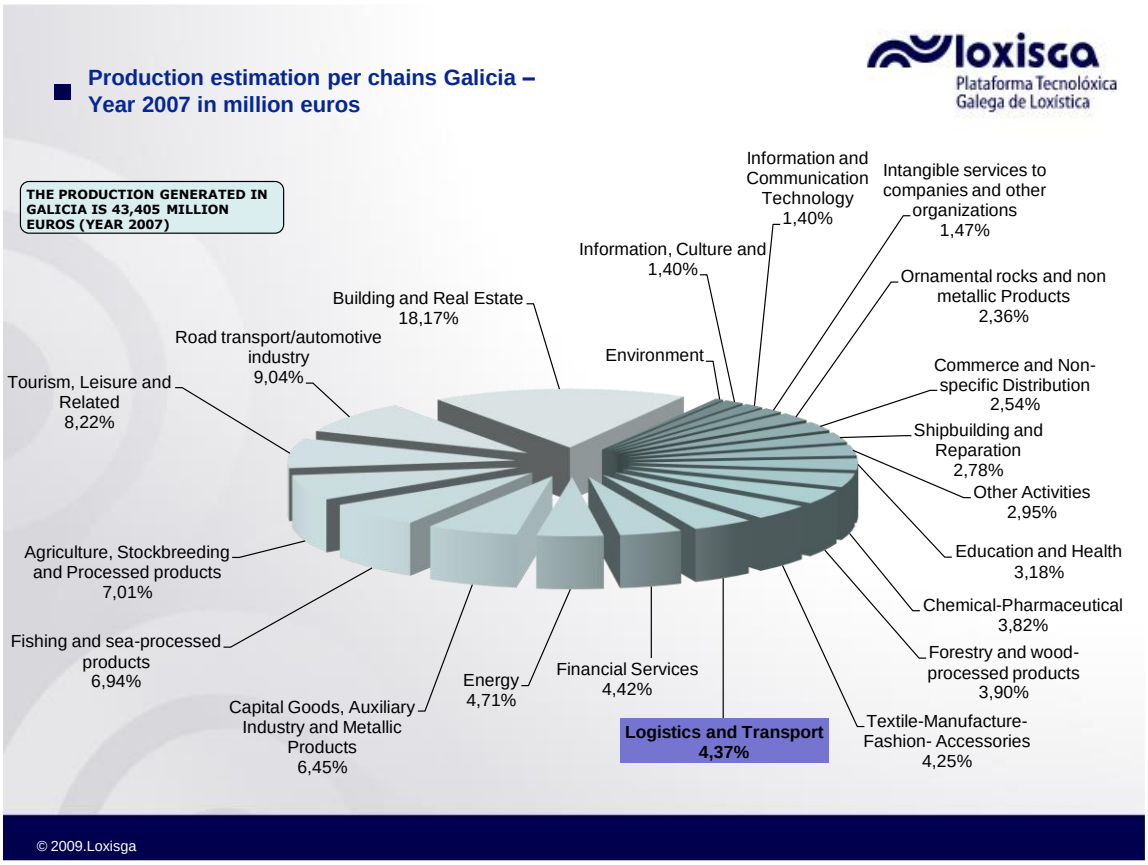
In order to see the degree of specialization in the Galician community, it is convenient to analyze how specific business chains operate and the relations with horizontal chains.

Among the **specific business chains, over the two thousand million euros** of GAV, chains related to Building and Real Estate; Tourism, Leisure and Related; Agriculture and Stockbreeding and their processed products, Road transport; Fishing and sea-processed products are found. Very close is the Textile-Manufacture-Fashion-Accesories chain. Over a thousand million euros, Forestry and wood-processed products and Chemical- Pharmaceutical chains are found.

Among the **most important horizontal chains** are Financial Services, Education and Health; **Logistics and Transport**; Equipment goods, Auxiliary Industry and Non Specific Metallic Products and Other Activities.

Figure 6. Estimation of the importance of private GAV and the production of each chain with respect to the total in Galicia (2007)





Source: González Gurriarán, J; Figueroa Dorrego, P.; González Loureiro, M. (2009): Visión Estratégica del Sistema Empresarial Privado de Ourense.

The importance in the generation of richness in activities linked to service chains can be appreciated (Financial Services, Tourism, Leisure and Related, Logistics and Transport), compared to chains of a more transforming nature such as Building and Real Estate, food and agriculture activities (Agriculture and Stockbreeding and their processed products; Fishing and Sea-processed products) and some of the activities from the Metal-Mechanic group (Road Transport, Equipment Goods). In terms of contribution to economic growth, Galicia depends excessively on the building activity, which acts as driving force which brings with it other activities. In the same way, the importance of activities connected to the food industry is stated.

B) **Evolution of transportation of freight movement in Galicia: Inter-Regional and Foreign Trade**

The structure of the private business system in Galicia limits logistics and transportation activities in this autonomous region. In Table 2 the **evolution in economic value of goods with its origin in Galicia** can be observed (Centre of economic Prediction – Centro de Predicción Económica(CEPREDE)). The **importance of the internal movement of goods in Galicia is highlighted**, representing, in year 2006, 46% in economic value over the total goods with origin in Galicia. In tons, it means more than76% over the total of inter-regional trade departing from Galicia. This indicates that goods in short distance transportation in Galicia have, in comparison, less value than goods which depart towards other regions of Spain.

Table 2. Evolution of the ECONOMIC VALUE of inter-regional trade in spain WITH DEPARTURE FROM GALICIA according to destination.

Destinatios (data in thousand euros)	2006	2002	% evolution 2002-2006
GALICIA	**13.963.15**	**9,998.11**	39.7%
CASTILLA LEÓN	**3,537.13**	**2,611.70**	35.4%
ASTURIAS	2,919.08	1,570.39	85.9%
COMUNIDAD DE MADRID	1,770.01	1,142.16	55.0%
CATALUÑA	1,626.75	1,406.37	15.7%
PAÍS VASCO	1,229.10	1,041.48	18.0%
CANARIAS	1,076.54	964.11	11.7%
ANDALUCÍA	838.04	1,253.95	-33.2%
COMUNIDAD VALENCIANA	746.33	635.29	17.5%
CASTILLA-LA MANCHA	691.10	345.69	99.9%
ARAGÓN	521.48	209.16	**149.%**
NAVARRA	450.65	78.99	**470.5%**
BALEARES	276.12	181.97	51.7%
REGIÓN DE MURCIA	202.55	186.60	8.6%
ESTREMADURA	181.43	118.56	53.0%
CANTABRIA	156.39	304.90	-48.7%
LA RIOJA	84.75	38.57	**119.7%**
CEUTA Y MELILLA	27.72	34.56	-19.8%
TOTAIS	**30,298.33**	**22,122.57**	**37.0%**

Source: personal elaboration from data from the Centro de Predicción Económica (CEPREDE)

According to proximity, the next destination in absolute figures is the community of Castilla León, which in year 2006 assumes 11.6% over the total economic value. In terms of growth, **the important increase in the area of communication Aragón-Navarra-A Rioxa** can be highlighted, which in added terms means an increase of 23% between 2002 and 2006, taking

into account that it parts from relatively low figures. The growth of the total goods with origin in Galicia in this period was 37%, whilst in Spain this volume increased by 34%.

Table 3. Evolution of the ECONOMIC VALUE of inter-regional trade in Spain, WITH DESTINATION GALICIA acording to place of origin.

Place of origin (data in thousand euros)	2006	2002	% evolution 2002-2006
GALICIA	**13,963.15**	**9,998.11**	39.7%
CATALUÑA	**1,839.87**	**1,475.93**	24.7%
COMUNIDAD DE MADRID	**1,738.23**	**1,435.40**	21.1%
CASTILLA LEÓN	**1,595.67**	**1,255.69**	27.1%
ASTURIAS	**1,285.44**	**447.09**	**187.5%**
ANDALUCÍA	975.60	754.82	29.2%
PAÍS VASCO	762.44	1,343.03	**-43.2%**
COMUNIDAD VALENCIANA	631.25	532.17	18.6%
NAVARRA	300.04	145.16	**106.7%**
CASTILLA-LA MANCHA	283.08	166.57	69.9%
ARAGÓN	246.33	236.13	4.3%
CANTABRIA	176.90	180.24	-1.9%
LA RIOJA	140.54	159.76	-12.0%
REGIÓN DE MURCIA	127.33	257.00	**-50.5%**
EXTREMADURA	75.35	34.75	**116.8%**
CANARIAS	36.60	37.05	-1.2%
BALEARES	22.55	22.22	1.5%
CEUTA Y MELILLA	0.59	0.11	438.8%
TOTAL	**24,200.95**	**18,481.23**	**30.9%**

Source: personal elaboration from data from the Centro de Predicción Económica (CEPREDE)

Regarding **the evolution of economic value of entries in Galicia** (see Table 3), the **importance of home trade in Galicia** can be noted with respect to the total entries (58%). With the rest of the autonomous communities, the most important are Cataluña (7.5% of the total), Madrid and Castilla León. The greatest growth in the areas of origin of goods with destination Galicia are from Asturias and Navarra, specially the former for its proximity (with an increase of more than 187% between 2002 and 2006). In general terms, **the economic value of inputs of goods in Galicia increased 30.9% in the period 2002-2006,** figure very similar to the percentage of increase of the corresponding value of departures from Galicia.

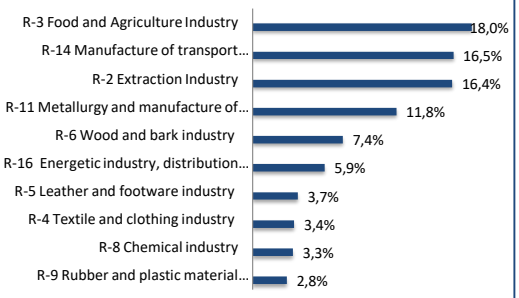
Regarding the typology of business activity, it can be observed in Figure 7 that **both the principal departures and entries of goods in Galicia have as clients or suppliers food and agriculture activity** (R-3). In the case of **supply activity** (entries of goods), we can highlight metal-mechanic activity (R14- manufacture of material and transport and R-11 metallurgy and manufacture of metallic products), which is directly linked to car industry, shipping and auxiliary industry in general. Regarding **client activity** (departure of goods) in addition to the previous R-3 (**food and agriculture industry**) and R-14 (**metal-mechanic**), extraction activities (agro cattle) are found.

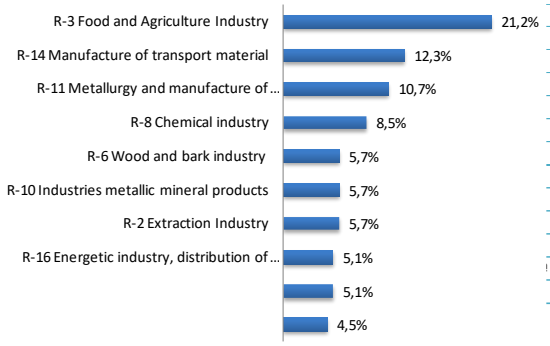
Figure 7. Principal branches of client business activity (departure of goods) and supply activity (entry of goods) for year 2006 in the 1995-2006 period

Galicia

Ranking Clients			
	Activity subsector	Mill. €	%
1ª	R-3 Food and Agriculture Industry	2.031,3	18,0%
2ª	R-14 Manufacture of transport material	1.855,4	16,5%
3ª	R-2 Extraction Industry	1.847,7	16,4%
4ª	R-11 Metallurgy and manufacture of metallic	1.333,6	11,8%
5ª	R-6 Wood and bark industry	831,2	7,4%
6ª	R-16 Energetic industry, distribution of energy, gas	660,2	5,9%
7ª	R-5 Leather and footware industry	415,8	3,7%
8ª	R-4 Textile and clothing industry	379,4	3,4%
9ª	R-8 Chemical industry	375,6	3,3%
10ª	R-9 Rubber and plastic material industry	313,3	2,8%
TOTAL INTER-REGIONAL		11.277,5	100%

Average 1995-2006





Ranking suppliers		
Activity subsector	Mill. €	%
R-3 Food and Agriculture Industry	1.686,7	21,2%
R-14 Manufacture of transport material	981,1	12,3%
R-11 Metallurgy and manufacture of metallic products	849,0	10,7%
R-8 Chemical industry	673,9	8,5%
R-6 Wood and bark industry	454,7	5,7%
R-10 Industries metallic mineral products	451,3	5,7%
R-2 Extraction Industry	438,1	5,7%
R-16 Energetic industry, distribution of energy, gas and	405,8	5,1%
R-13 Electrical equipment, electronic and optical	404,9	5,1%
R-9 Paper industry, publishing and graphic arts	355,1	4,5%
TOTAL INTER-REGIONAL	7.953,9	100%

Source: personal elaboration from data from the Centro de Predicción Económica (CEPREDE)

C) Foreign trade

Regarding **foreign trade in Galicia** (see Table 4), we can see **that both exportations and importations increased 60% in the 2003-2007 period.** In large geographical areas, what calls ones attention is that the main increase in international commerce in Galicia is produced with countries of OPEC, both in exportations (+154%) and importations (+76%). The increase of trade exchange with Latin America also stands out. In the case of the EU, it can be observed that increases in taxes of exportations and importations are maintained similar. However, it can be highlighted that in the 2003-2007 period, exportations within the Euro zone increased more than importations. In the case of candidate countries to the EU, although international trade figures are relatively low, the greatest increase in importations from those countries should be highlighted, partly derived from business location decisions in those countries. As we can see, the greatest increase of foreign trade in the case of Europe is produced in Euro Zone countries, related to the existence of a single currency in this area as a positive factor.

Table 4. Evolution of foreign trrade in Galicia 2003-2007

(thousand euros)	Exportations			Importations		
	2003	2007	% increase 2007-2003	2003	2007	% increase 2007-2003
Total	9,993	15,999	60.10%	10,248	16,577	61.80%
Eurozone	6,663	10,949	64.30%	5,165	7,849	52.00%
EU-15	7,851	11,643	48.30%	6,022	8,931	48.30%
EU-25	8,147	12,010	47.40%	6,121	9,249	51.10%
EU applicant countries	154	227	47.40%	216	320	48.40%
OECD	8,777	13,414	52.80%	7,534	11,503	52.70%
OPEC	160	408	153.80%	431	758	75.90%
MERCOSUR	86	134	54.80%	423	515	21.70%
Latin America	349	659	89.00%	1,046	1,755	67.60%

Note: the total sum of each area´s amounts does not add up to the total as some countries belong to more than one zone.

Source: personal elaboration from data from Instituto Galego de Estatística (IGE)

In Tariff episodes (see Table 24 in appendix 6.1 "Algúns datos estadísticos relevantes"), the great amount of **exportations of transport material** stands out (chapter XVII means over 46%) **and textile products** (chapter XI which is 13% of the total). These figures are clearly influenced by the existence of reference companies with productive centres in Galicia in road transport activity and clothing-textile-fashion. In the case of **importations**, **these are also dominated by transport material** (26%), **mineral products** (chapter V, 17%) as well as **common metals and their manufacture** (chapter XV, 11%) **and textile products (**11%). With this structure, **a deficit balance is finally reached, highlighting specially the stated mineral and metallic products. On the contrary, both transport material and textile products reached a positive balance in 2007.** This structure of foreign trade in Galicia has a notable influence on logistics and freight activity, as **the main clients on the international market are companies with very specific products** (transport elements, clothing and textile products) which require specific services (just in time production philosophy, reduced delivery date…)

D) **Product supply chain in Galician companies**

From the point of view of client activity, according to ICIL (Institut Catalá de Logística – Catalonian Institute of Logistics), the logistics company cost represents between 15% and 30% of the product cost, percentage which A.T Kearney (Prieto, 2006) estimates between 8% and 11% of the total value of sales (between 10% and 43% of GAV, 43% and 95% of the percentage of operative margin) depending on the productive sector (see Figure Figura 31 and Figura 32 in appendix 6.1 " Algúns datos estadísticos relevantes"), thereby the reduction of costs and the increase in the level of service quality, demands going from a fragmented vision of logistics activity, shared among different business departments with specific objectives (provisioning, production and distribution), to an integrated vision of the logistics process of strategic nature which, from a logistics management department (common objective), permits " […] integration of the key company processes from the final consumer to the first suppliers which provide the product, services and information with the aim of adding value to clients and other interested party" (Stock & Lambert, 2001). This vision, which has come to be called Supply Chain management (SCM) refers not only to the integration of internal and external logistics but also to the consideration of product return flow (their refuse) from the final consumer to

manufacturer or recuperative power (inverse logistics), in response to the growth of social sensitization with regards to the environment and sustainable development (Bañegil & al.,2001)

From the work carried out on logistics management in some of the most relevant business sectors in Galicia (Prado & al., 2009) the following conclusions can be drawn:

- Progressive generalization in search of suppliers worldwide in response to globalization, with buying logistics and supplies more orientated towards cost efficiency than service and time, in general.
- Broad implantation of production improvement programmes in factory processes and warehouses, and plant layout redesign programmes eliminating activities which do not provide value and only increase costs: Just in time (JIT), Lean, Total Quality Management (TQM)
- It wagers stock rationalization, reducing its decentralized quantity and parallel, reduction in the number of warehouses.
- Transport flow from the provisioning of suppliers to distribution go through a phase of clustering, warehousing and preparation in companies. The means of transport are generally subcontracted to specialized logistics operators and/or carriers. Scarce joint transport initiatives among groups of the provisioning chain (suppliers, clients and competitors)
- Scarce frequency of integrated logistics departments, both from the strategic and operative point of view, being more habitual an organization distributed among different departments. However, a progressive advance towards an integrator approach in the management of the provisioning chain is detected, fundamentally through internal formal and informal coordination mechanisms.
- In relation to the level of integration and support of management of the provisioning chain, scarcity still exists in external integration (suppliers, logistics operators and distributors), being higher in integration at an internal level.

2.2 Logistics and transportation of freight business activity in the context of the European Union and Spain

In this section an overall view of logistics and transportation of freights is offered in the geographical framework of the European Union and Spain as closest references.

With the objective of determining the scope of statistic data, in general the following codes CNAE-rev. 93 were taken into account, with limitations inherent to statistical disaggregation of official sources which not always have this detail available.

Table 5: CNAE codes of logistics and transportations activity

Transportation activity	600	Ground transport; transportation through piping
	601	Railway transport
	602	Other types of ground transportation
	611	Sea transport
	612	Interior route navigation transport
	621	Regular air transportation
	622	Discretionary air travel
	623	Space transportation
Connected activities	631	Manipulation and deposit of freight
	632	Other activities connected to transport
	634	Organization of transportation of freight

Source: personal elaboration from data from INE

A) WITHIN THE EU AND IN A WORLDWIDE CONTEXT

In the last years world trade among countries (exportations) has increased on average an annual 5% between 2000 and 2007, whilst production and worldwide GDP grew an annual 3% in the same period (see Table 6).

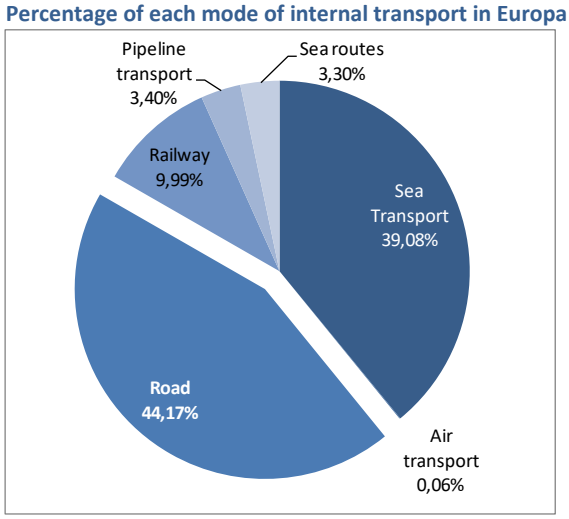
Table 6 Annual growth of economic value worldwide of some economic variables

Variable	% increase 2005	% increase 2006	% increase 2007	% average annuela increase Between 2000 and 2007
Worldwide exportations of goods	**6.5%**	**8.5%**	**6.0%**	**5.5%**
Worldwide production of goods	**3.0%**	**3.0%**	**4.0%**	**3.0%**
Worldwide GDP (in real terms)	**3.0%**	**3.5%**	**3.5%**	**3.0%**

Source: Velázquez-Gaztelu (2008) and personal elaboration from the WTO (2008)

It can be concluded therefore that **as GDP and the value of assets produced in a country increases, trade exchange with the rest of the world tends to increase to a higher extent,** stressing the effect of globalization and emphasizing **the importance of logistics and transportation of goods at an international level.**

Figure 8 Percentage of each mode of internal transport in Europa (2005)



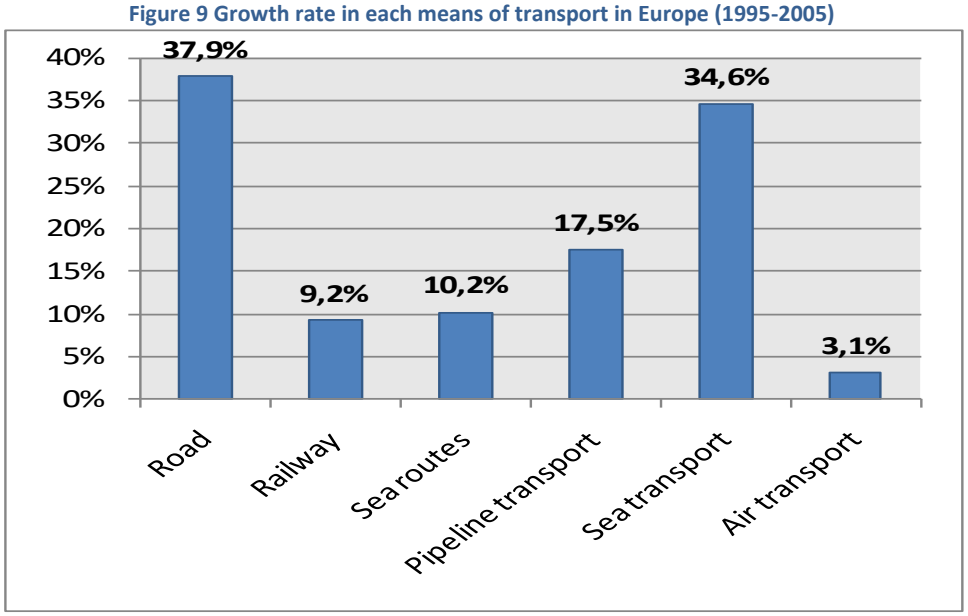
Source: personal elaboration from data from the European Commission. Eurostat, 2007

In addition to the frequency of international freight movements, there is also an increase in this trade at an internal level in countries. The European Statistics Institute (Eurostat) has defined an indicator of the quantity of internal transport in relation to GDP taking year 1995 as basis 100. This indicator is defined as the ratio between tons-kilometres of goods moved by internal transport in each country and its GDP (in fixed euros for 1995). Observing the values of this index for year 2006, it can be concluded that countries situated on the periphery of the European Union and fundamentally in the Mediterranean, show greater growth in quantity of transport in relation to the evolution of its GDP in the last years. This fact enhances the importance of logistics in the development of productive economy in the areas, specially concerning extraction, process production and marketing activities.

In relation to the type of transport used for internal movement of goods in Europe, the predominance of road transport in all Europe can be observed.

It is also important to highlight that, although goods transported by air do not appear as percentage in the graphics for their current relative low value, a notable increase in the last years has been confirmed according to Eurostat, bearing in mind that the circumstance occurs whereby the average value of a ton of transported goods by air is frequently higher than other means of transport. However, as can be seen in Figure 9, road transport and sea transport were the ones which increased at a greater scale in the 1995-2005 period, aspect, which among others, motivated a greater enhancing effect on efficient and more eco-friendly means of transport as far as the EU is concerned in its White Paper on Transportation (European Commission, 2001).

Figure 9 Growth rate in each means of transport in Europe (1995-2005)



Source: personal elaboration from data from the European Commission. Eurostat, 2007

In the EU-25 Spain occupies one of the most outstanding places as regards the contribution of transport service activity (see Table 7). As a whole, this activity in the EU-25 implies over a million companies which turn over more than a billion euros and generate value added of more than 362 thousand million, employing over 8 million workers. Germany is the principal country as to the number of people employed and value added (reaching 15% and 18%, respectively). For its part, Spain reaches 10% of the number of workers employed and 20% of the companies out of the total of the EU-25. Yet, these percentages go down to 9% in both added value and turnover.

Table 7 Principal countries in transportation activity in the EU-25

Number of employees			Number of companies			Value added			Income		
Country	thousands	%	Country	thousands	%	Country	(billion euros)	%	Country	(billion euros)	%
EU-25	8,186.3	**100%**	**EU-25**	**1,078.0**	**100%**	**EU-25**	**36.2**	**100%**	**EU-25**	**1,024.3**	**100%**
Germany	1,238.0	15%	**Spain**	**218.7**	**20%**	Germany	68.8	18%	UK	194.4	19%
France	1,125.5	14%	Italy	153.7	14%	UK	64.9	18%	Germany	166.6	16%
UK	1,091.9	13%	Poland	138.9	13%	France	54.9	15%	France	147.9	14%
Italy	935.7	11%	France	94.6	9%	Italy	41.4	11%	Italy	119.4	12%
Spain	**820.2**	**10%**	Germany	83.4	8%	**Spain**	**33.3**	**9%**	**Spain**	**88.8**	**9%**
Poland	568.8	7%	UK	64.3	6%	Netherlands	20.0	5%	Netherlands	54.2	5%
Netherlands	341.6	4%	Czech Republic	45.9	4%	Bélxica	11.5	3%	Sweden	39.2	4%
Czech Republic	277.6	3%	Hungary	35.9	3%	Dinamarca	11.2	3%	Bélxica	37.2	4%
Sweden	222.5	3%	Sweden	31.0	3%	Austria	10.5	3%	Dinamarca	33.8	3%
Hungary	212.3	3%	Portugal	25.7	3%	Sweden	10.4	3%	Austria	29.3	3%

Source: personal elaboration from data from the Eurostat. Transport Panorama 2007.

Therefore, within **the importance that Spain has in this European Union activity**, it can be observed that transport service activity in Spain has **lesser capacity to generate value** due to the **problems derived from dimension** (less average values in the value added and turnover per company regarding other countries like Germany, France or The United Kingdom).

B) WITHIN SPAIN

Table 8 illustrates the principal magnitudes of transportation of freight activity and the activity connected to transport for year 2007. Regarding the total turnover (over 76 billion euros) of the more than 154,000 companies which the INE (Spanish National Institute of Statistics – Instituto Nacional de Estadística) has economic data of, the value added implies 38% which points out the relevant capacity to generate value of this activity. The expense entry for personnel over the total turnover implies 20% which evidences the impact that they have in this kind of companies. In addition, it is necessary to point out that purchases and expenses on goods and external services imply 64% of the turnover of these activities in Spain taking into account the level of subcontracting existent in some activities.

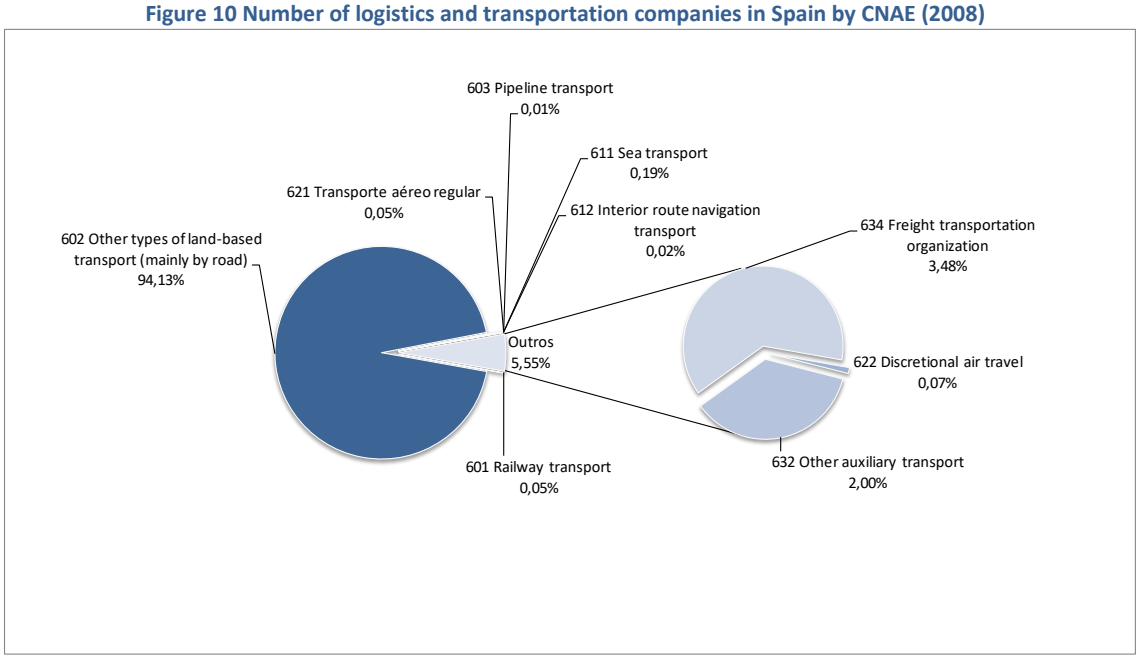
Table 8 Principal dimensions per logistics and transportations acivity branch in Spain -2007 (economic data in thousands of euros)

Principal dimensions per logistics and transportation activity branch	Freight transportation	Connected activities	Total	% over business volume
Number os companies	139,725	14,701	154,426	
Business volume (thousand euros)	**40,202,965**	**36,185,940**	**76,388,905**	100%
Production value (thousand euros)	31,894,560	21,901,888	53,796,448	70%
Value added to market prices (thousands euros)	15,961,618	13,360,302	29,321,920	38%
Personnel expenses (thousand euros)	7,767,490	7,403,423	15,170,913	20%
Purchases and goods expenses (thousand euros)	24,621,963	24,081,322	48,703,285	64%
Material investment (thousand euros)	2,193,295	7,885,212	10,078,507	
Occupied personnel on 30-09	437,562	216,773	654,335	

Source: personal elaboration from data from the INE

Regarding the distribution by type of activity in Spain (Figure 10, predominance of CNAE "62 other types of transport" is observed which implies over 94% of the number of companies. The infrastructural and geographical characteristics of Spain as well as the characteristics of client activity and movement of goods also affect the low number of companies of other means of transport different to ground or road transport. In autonomous regions, great differences do not exist in the structure by type of activity, being the percentages very similar to those referred to in Spain.

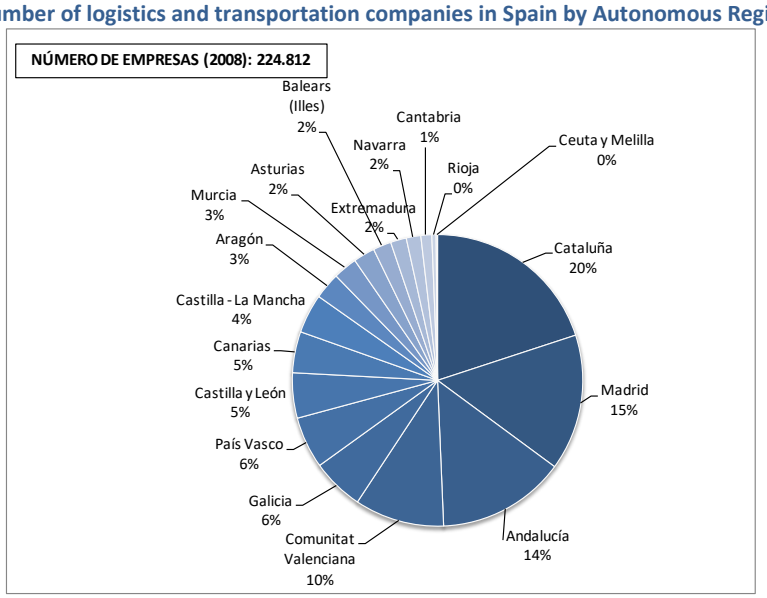
Figure 10 Number of logistics and transportation companies in Spain by CNAE (2008)



Source: personal elaboration from data from the INE

Concerning autonomous regions, Cataluña (20%), Madrid (15%) and Andalucía (14%) are where the greatest number of companies of this activity are found (see Figure 11), monopolizing 49% of the total companies in Spain. Galicia occupies the fifth position with 6% of the number of companies for year 2008.

Figure 11 Number of logistics and transportation companies in Spain by Autonomous Regions (2008)

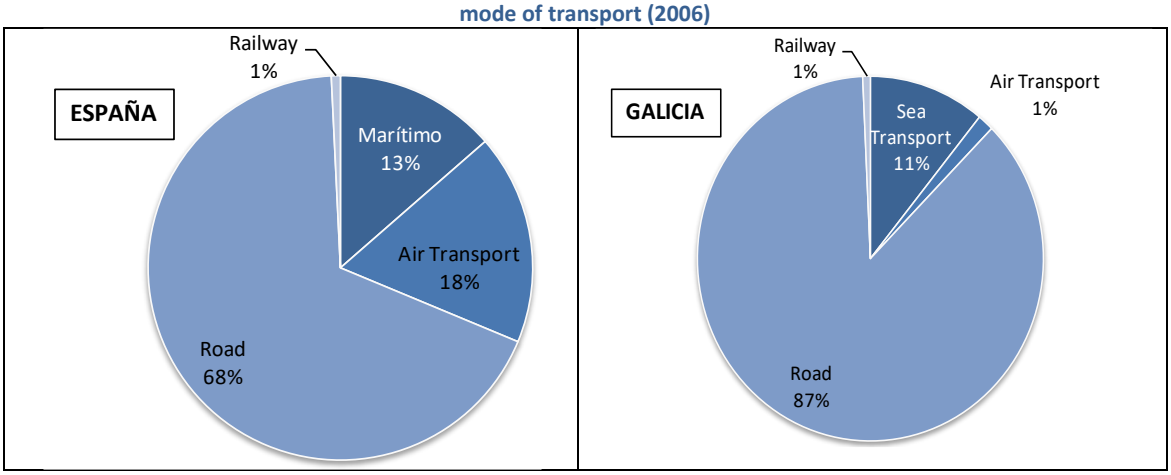


Source: personal elaboration from data from the INE

Regarding the type of transport used (see Figure 12) in internal movements of goods, predominance of road transport in Spain can be observed (68%), being much higher with respect to the average of the EU (44%) in 2006. This situation is affected by the low quantity of goods transported by railway (barely 1% in Spain), when in the EU it reaches 9,9%. The existence of goods transported by internal sea transport (due to the lack of interior navigation routes) should also be pointed out, although sea transport implies 13% against 39% in the EU. The quantity of air transport in Spain should be specially highlighted (18%) for the specificities

of the isles (Baleares and Canarias). In the case of Galicia, comparatively road transport is used to a greater extent (87%), indicating a very reduced use of rail and air transport (1% in each case).

Figure 12 Diagram Comparison of the distribution of internal transport of goods in Spain and Galicia based on mode of transport (2006)



Source: personal elaboration from data from the *Anuario 2008 INE*

To continue, the most relevant figures according to the **different modes of transport: road, sea, rail and air are offered.**

LAND-BASED FREIGHT TRANSPORT

The evolution of freight transportation made by road in Spain increased between the years 2002 and 2006 by 27% (see Table 9). Per tons transported, the main autonomous regions are **Andalucía, Cataluña and the Community of Valencia**, which also have figures similar to the average in Spain. Galicia is the seventh community regarding tons transported, representing 5.9% of the total sum of more than 2,236 million tons moved in Spain.

In the previously-cited period, it can be observed that the autonomous regions with greater increase in the amount of goods transported by road correspond to peripheral regions like Canarias, Ceuta and Melilla, and Murcia. It also calls one's attention that Galicia presents growth figures (24.1%) below the average in Spain, increasing in all cases except in communities which have a greater volume of transported goods.

Table 9 Evolution of goods made by road CC:AA. (2006)

THOUSANDS TONS	2002	2006	% INCREASE 02/06
Total	1,760,33	2,236,740	27.0%
Andalucía	287,744	391,441	36.0%
Cataluña	264,566	330,188	24.8%
Comunitat Valenciana	228,253	290,326	27.2%
Castilla y León	137,491	191,520	39.3%
Madrid	123,716	185,296	49.8%
Castilla-La Mancha	103,186	167,400	62.2%
Galicia	**106,092**	**131,616**	24.1%
País Vasco	91,565	107,887	17.8%
Aragón	76,272	101,573	33.2%
Murcia	61,417	99,675	62.3%
Asturias	60,786	72,527	19.3%
Canarias	32,100	62,808	95.7%
Estremadura	39,927	44,655	11.8%
Navarra	38,503	44,549	15.7%
Ceuta y Melilla	25,990	44,167	69.9%
Cantabria	31,402	43,664	39.0%
Balears (Illes)	32,612	41,908	28.5%
Rioja	15,971	25,549	60.0%

Source: INE. personal elaboration from data from the Anuario 2008. INE

In exchanges carried out in each autonomous region and among them (see Table 26 in annex 6.1 “Algúns datos estadísticos relevantes”), it can be seen that the greatest amount always corresponds to internal movements, being on average 84% whilst in Galicia it comes to represent 90% of the total goods with origin in this autonomous region (in total over 131 million tons). Of the more than 12 million tons which, with origin in Galicia, depart to other autonomous regions, the main destinations are Castilla-León (23%), Asturias (15%) and Madrid (15%) placing País Vasco subsequently in order of importance; all these autonomous regions reaching figures between 1 and 2 million tons. The predominance of short distances of freight transportation which depart from Galicia with destination to other autonomous regions is therefore observed, reaching low market figures like in Cataluña or the southern half of the mesa.

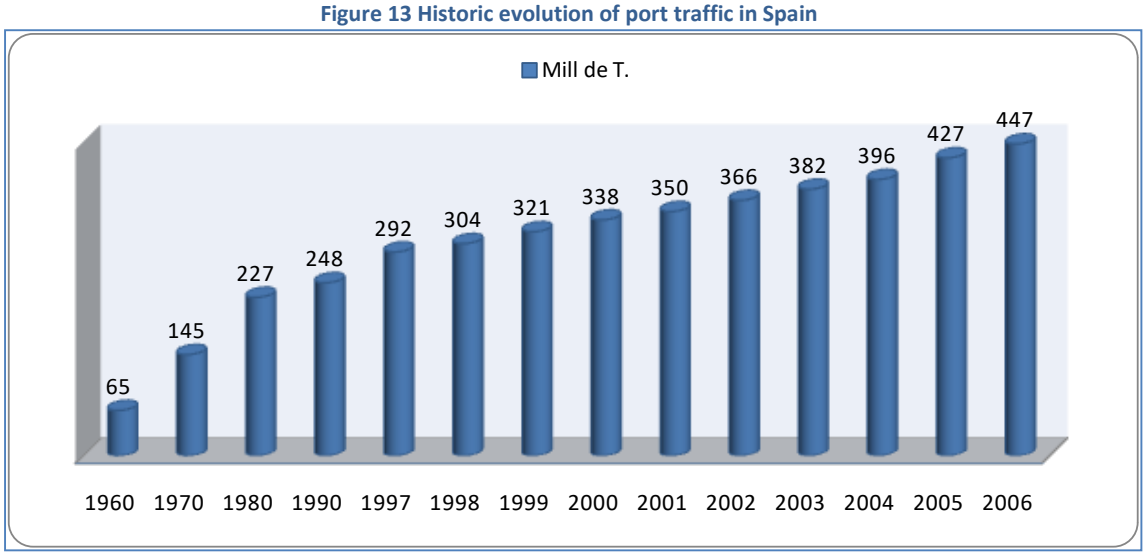
In the same way, of the goods which have as destination the autonomous region of Galicia (over 129 million tons), more than 91% have their origin in the same autonomous region. The more than 10 million remaining tons have their principal origin in Castilla-León (27%), Asturias (16%) and Madrid (12%).

Drawing up a balance of inputs and outputs, it can be observed that Galicia is, in net terms, marketer abroad as the outputs are greater than the inputs from out of these autonomous regions.

WATER FREIGHT TRANSPORT

Traditionally, the transportation of goods by sea is considered related to exportations/importations of goods. This mode of transport is used to a lesser extent for freight transportation at an internal level or for inshore sailing within Spain with the clear exception of the case of the Spanish isles (Baleares, Canarias). Its evolution (Figure 13) shows that it has increased moderately in the last years, with an annual average of 5.7% between 2001 and 2006.

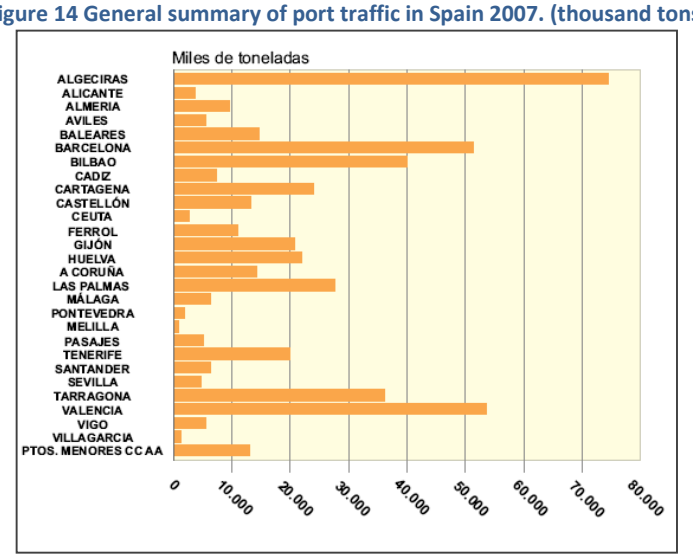
Figure 13 Historic evolution of port traffic in Spain



Source: personal elaboration from data from the Ine. Anuario estadístico (several years)

The figures of large ports dependent on State Ports (Ministerio de Fomento), point out the existence of two groups differentiated by volume of goods (see Figure 14). Only five ports in Spain go over 30 million tons: Algeciras (with more than 70 million T/year), Valencia and Barcelona (with more than 50 million T/year each), Bilbao (40 million T/year) and Tarragona (more than 35 million T/year).

Figure 14 General summary of port traffic in Spain 2007. (thousand tons)



Source: Statistical figures. Ministerio de Fomento

The five port authorities of Galicia together add up to almost 26 million tons in 2006 representing 8% of the total amount of goods by sea route in Spain (see Table 10). The comparative evolution between the global figures in Spain and Galicia indicate a more positive conduct of traffic in the large ports of Galicia. In this autonomous region, traffic originating from overseas increases 26% (2% in Spain), boarded goods increase 19% (12% in Spain), general cargo increases 16% (0.7% in Spain) are the most relevant examples (see Table 27 in appendix "Algúns datos estadísticos relevantes").

Table 10 Sea freight transportation in large ports of Galicia and Spain (thousands of Ts),

Unloaded goods	***11,369***	***9,400***	***1,222***	***2,908***	***1,087***	***25,986***	***327,974***
In bulk, liquid	6,546	1,378	0	82	384	8,390	123,029
In bulk, solid	3,757	7,598	923	632	570	13,480	101,019
General cargo	1,067	424	299	2,194	133	4,116	103,926
Loaded goods	***2,508***	***1,631***	***686***	***2,122***	***104***	***7,051***	***140,486***
In bulk, liquid	1,795	95	0	0	32	1,921	27,605
In bulk, solid	384	1,129	15	0	0	1,527	15,823
General cargo	329	408	671	2,122	72	3,603	97,058
Total unloading and loading	***13,877***	***11,039***	***1,908***	***5,030***	***1,191***	***33,045***	***468,730***

Source: personal elaboration a partir de datos do IGE

RAIL FREIGHT TRANSPORT

According to Table 11, rail freight transportation in Spain (over 24 million tons in 2006) increased 17% in the 2002-2006 period with annual 4.25% average. Of the autonomous regions, Cataluña is the greatest regarding its total weight of freight over the Spanish total, representing more than 18% of the total in Spain. Galicia is the seventh in order of importance with over 2 million tons, below regions like Andalucía, Asturias or Madrid with figures which hover around 2.6 and 2.3 million tons. Madrid is the autonomous region which

grew the most (125% between 2002 and 2006), whereas Galicia also registered a relevant increase (75% in this period). The decrease registered in transportation of goods by rail should be pointed out in two regions: A Rioja (-86%) and Castilla-La Mancha (-60%), figures which in these autonomous regions are broadly compensated with increase in road transport.

Table 11 Evolution of freight transportation by autonomous regions (2006)

Thousand tons	EVOLUTION OF GOODS TRANSPORTED BY RAIL		
	2002	2006	% 02/06
Total Spain	**21,324**	**24,941**	**17.0%**
Andalucía	2,336	2,622	12.2%
Aragón	1,332	1,367	2.6%
Asturias	2,453	2,452	0.0%
Balears (Illes)	-	-	--
Canarias	-	-	--
Cantabria	1,035	1,041	0.6%
Castilla León	2,000	1,880	-6.0%
Castilla - La Mancha	777	308	-60.4%
Cataluña	3,709	4,573	23.3%
Comunitat Valenciana	1,866	2,112	13.2%
Extremadura	57	108	89.5%
Galicia	1,171	2,050	75.1%
Madrid	1,018	2,297	125.6%
Murcia	406	460	13.3%
Navarra	135	178	31.9%
País Vasco	1,357	2,264	66.8%
Rioja	664	93	-86.0%
Ceuta y Melilla	-	-	--

Source: personal elaboration from data from the INE. Anuario 2008

In rail transport, 68% of the total goods (bout 2 million tons) with origin in Galicia also have as destination the same autonomous region. The remaining 32% has as fundamental destination (horizontal view of the Table 28 in appendix 6.1 “Algúns datos estadísticos relevantes”) Aragón (practically 10% of the total), Castilla-León (5%) and Madrid (5%). Therefore, a certain centralization on the use of this means of goods transport with origin in Galicia can be observed.

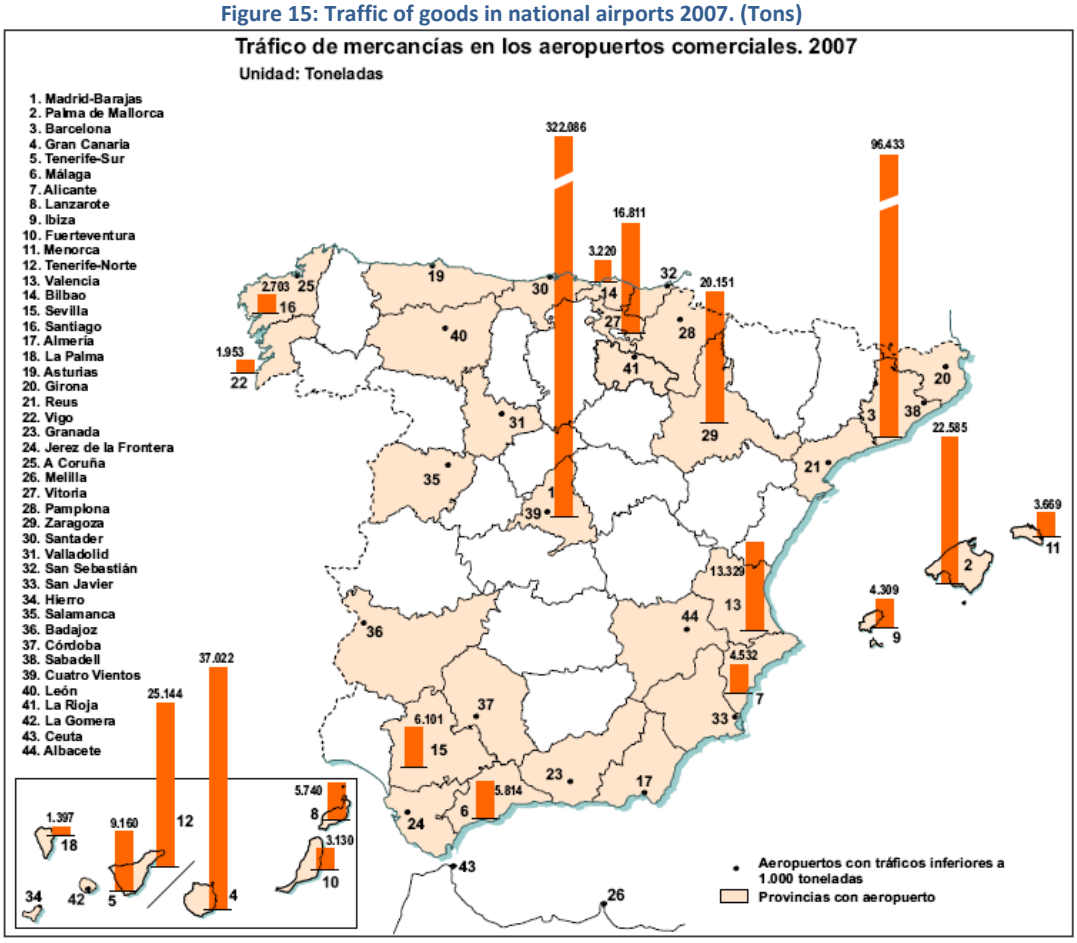
With respect to the main destination areas of the goods which are transported by rail in Galicia (vertical view of Table 28), the percentage, which the internal movement in Galicia has as principal point of origin, implies 56% over the total sum of 2.5 million tons. The rest of the goods with Galicia as its destination have as main point of origin two autonomous regions alike: Castilla-León and Madrid which each assume 32% over the total sum.

It can be observed, therefore, that by rail, with the exclusion of movements with origin or destination in the proper autonomous region of Galicia, more goods enter (1.1 million tons) than go out (650 thousand tons).

AIR FREIGHT TRANSPORT

Although the total number of tons mobilized by air is not comparable to other forms of transport, in Spain an important concentration of operations of this type in very specific commercial airports can be observed, derived from the typology of goods which are transported by this means (goods of great economic value mostly derived from foreign trade). In short, (Figure 15), Madrid-Barajas brings together more than 322 thousand tons whereas Barcelona adds a little more than 96 thousand tons. The case of the isles (Baleares and Canarias) is also evident as a logical means for goods movement. What can also be concluded by looking at the map is the disproportion in the case of airport infrastructures in Spain with some autonomous regions that scarcely count on a commercial airport and other areas where there are up to three in the case of Cataluña (Gerona, Barcelona and Sabadell) or five airports in the South of Andalucía (Jerez de la Frontera, Málaga, Sevilla, Córdoba, Granada). In Galicia, the three commercial airports barely add up to 4 thousand tons.

Figure 15: Traffic of goods in national airports 2007. (Tons)



Source: Statistical figures. Ministerio de Fomento

In Table 12, an **important drop in the volume of transported goods by air in Galicia (23% drop between 2004 and 2007) can be observed**, being much greater than the decline in the rest of Spain (3.9% decrease). In the case of Galicia, Santiago de Compostela Airport continues monopolizing the greatest volume of goods transported (55%), but with a very significant decrease in the analyzed period (45% drop). A Coruña Airport has a similar drop to Santiago with a low total volume in 2007. Vigo Airport is the only one which experiences a substantial increase (over 90% rise in three years until 2007), representing 40% of the total in

Galicia in the last period from which data is available, whilst in year 2004 it barely reached 16%.

Table 12 Evolution of main figures of air transport in Galicia and comparison to Spain (2004-2007)

		Number of aircrafts (passengers and goods)	Goods (tons)
A Coruña	2004	7,401	539
	2007(P)	12,973	291
	% var. 2004-2007	75.3%	-46.0%
Santiago	2004	19,122	4,939
	2007(P)	21,160	2,703
	% var. 2004-2007	10.7%	-45.3%
Vigo	2004	11,379	1,026
	2007(P)	16,592	1,953
	% var. 2004-2007	45.8%	90.4%
Total Galicia	2004	37,902	6,504
	2007(P)	50,725	4,947
	% var. 2004-2007	33.8%	-23.9%
Total Spain	2004	1,709,501	631,636
	2007(P)	2,082,929	607,129
	% var. 2004-2007	21.8%	-3.9%

(P) year 2007 data are provisional

Source: personal elaboration from data from IGE

2.3 Business activities of logictics and transportation of freight in Galicia: resources and abilities for R&D+i

At the **Spanish National Statistics Institute (Instituto Nacional de Estadística)** (Business directory, INE-Spain), in year 2007, 13,622 companies in Galicia related to transportation and logistics were censused in the CNAE (codes 60- Land-based transport and pipeline transport; 61.-Sea transport, inshore transport and interior navigation routes; 62.-Air transport; 63.- Activities connected to transport: travel agency activities). For these same codes, in Spain 234,971 companies were censused. This means that **Galicia represents 5.8% of the total of business in Spain related to these activities**

The **SABI database** (SABI stands for Iberian Balance Sheet Analysis System –Sistema de Análisis de Balances Ibéricos), in November 2008 has censused **27,489 logistics and goods transport companies in Spain,** from which 1,839 are located in Galicia representing **6.7% of the total**. This database contains complete economic-financial information for the total amount of the above mentioned companies. From all these companies, a sample with data for financial year 2007 was homogenized, this sample was made up of 959 companies in Galicia

and 10,801 companies in Spain. The main economic aspects for theses companies are shown in Table 13.

Table 13 Main economic aspects of logistics and transportation activities in Galicia

	TOTAL GALICIA	TOTAL SPAIN	% TOTAL GALICIA OUT OF SPAIN	AVERAGE VALUE PER COMPANY (medium-sized)
Number of companies	13,622 (ine) 1,839 (sabi)	234,971 (ine) 27,489 (sabi)	5.8% (ine) 6.7% (sabi)	---
Turnover (2007) thousand euros (Sabi)	1,872,231	30,214,842	6.2%	639.46 (Galicia) 845.57 (Spain)
GAV (2007) thousand euros (Sabi)	620,595	9,559,693	6.5%	198.99 (Galicia) 255.60 (Spain)
Estimated employment	11,621	184,992	6.3%	6 (Galicia) 7 (Spain)

Note: economic data based on economic information for financial year 2007 of 959 companies in Galicia and 10,801 companies in Spain.

Source: personal elaboratin from data from INE and SABI, 2008

Notice that, **on average, companies in Galicia are minor than in the rest of Spain,** both in average turnover, gross added value and number of employees. **Business activities in Galicia represent 6.3% of Spain.**

For the economic-financial analysis, businesses with codes CNAE[2] and codes SIC related to both logistics and freight transportation activities were selected, filtering them subsequently according to their location. Businesses related to passenger transport were also filtered. As a result, information for a total amount of 625 companies was obtained. Later, ratios required for economic-financial analysis (Table 14) were estimated and in order to be able to make a comparison, the same was made for a group of 10,799 Spanish companies.

As you can see, there are no great differences between economic indicators of companies in Galicia and companies in Spain regarding companies related to these business activities. Actually, **all the indicators used** (return on equity, return on assets, assets turnover and net operation margin) **have similar values**. In order to offer an estimated idea of the dimensions of the businesses, this table includes the values of the variables medians which act on these indicators, taking into account that the calculations of ratios were carried out by first calculating each ratio per company in order to later obtain the median of each one.

[2] CNAE codes: 6010, 6024, 6110, 6120, 6311, 6312, 6321, 6322, 6340; e códigos SIC:4011, 4212, 4213, 4222, 4225, 4226, 4231, 4411, 4422, 4463, 4469, 4712, 4723, 4789

Table 14 Comparison of the main economic-financial aspects of logistics and transport activities in Galicia and Spain.

Economic-financial aspects	GALICIA	SPAIN
Median Operating income (thousand euros)	18,49	22,31
Median Average total assets (thousand euros)	497,28	611,91
Median Revenue (thousand euros)	570,47	845,57
Median Net income (thousand euros)	8,10	11,04
Median Equity (thousand euros)	93,20	123,46
Median Return on assets (%) *(Operating income/Average total assets) x 100*	3,98%	3,99%
Median Net operation margin (%) *(Operating income/Revenue) x 100*	3,07%	2,84%
Mediana Assets turnover (nº veces) *Revenue/average total assets*	1,35	1,41
Median Return on equity (%) *(Net income/Equity) x 100*	10,72%	10,60%

Source: personal elaboration from data from ARDAN e SABI

From the analysis of these ratios, we conclude that **logistics and freight transportation business activities do not reach high values of ROA**. Meaning this that for the fulfilled investment in assets, they do not obtain a high enough operating income. This may be due to two causes: either the companies are incapable of providing value added which is worth customer-companies paying more for their services or for the services provided, the relationship of cost and price is too limited. With regard to this, it is important to outstand that transport prices have remained steady, whilst one of the factors of production (fuel), increased its price significantly in year 2007.

Bearing in mind the different volume of assets between companies in Galicia and in Spain, theses ratios show that, despite a minor investment in assets, companies in Galicia obtain higher revenues due to a better cost structure. The impact of energy cost on transportation of freight activities must be taken into account since, according to official sources (Ministerio de Industria Turismo y Comercio), Brent crude oil prices per barrel increased, between 2002 and 2006, on average 160.35% (average price in year 2002 of $25.02 a barrel up to an average of $ 65.14 a barrel in 2006 and which in 2007 rose to average $72.39 a barrel and from January to October 2008 it reached an average $103.01 a barrel).

It is also important to highlight that, taking into account that companies try to compete following differentiation general strategies, companies do not reach high net operation margins. This has an effect on their insufficient capacity to obtain a better relationship of cost and price both in Galicia and in Spain. Regarding assets rotation, they obtain positive figure (values over 1.2) , being inferior in companies in Galicia than in Spain. This points out that in the case of Galicia, companies´ capacity to reach greater activity levels throughout the year is limited, probably due to its peripherical location, which to a certain extent, limits its market possibilities.

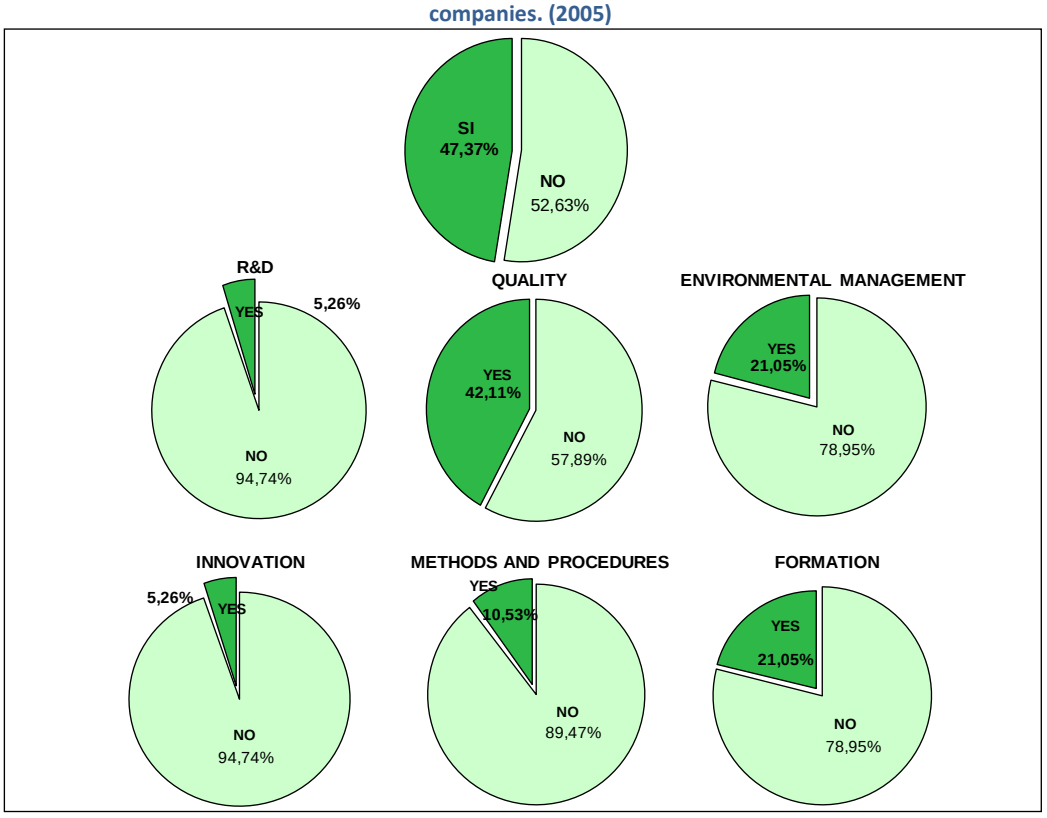
Finally, return on equity levels are relatively high, specially compared to return on assets levels. This means that companies are carrying out a good global management, being able to obtain convenient financing for investments and offering shareholders significant returns on their investments (values over 10%).

Therefore, the main problem is an insufficient offer of advanced services with high value added that permits companies to obtain a better relationship of cost and price**,** within intense competitive rivalry in which the logistics and transportation business has an important price contention and in which an optimal fixed/variable cost structure is essential for obtaining improved net operation margins.

ORGANIZED CAPITAL

With regard to organized capital, Figure 16 shows the percentage of companies that have a department or specialised functions dedicated to innovation. Notice that more than half of the companies dedicated to logistics and freight transportation activities do not have a department or specialised functions dedicated to innovation This holds their capacity for innovation down.

Figure 16: Existence of a department or specialised functions dedicated to innovation in logistics and transport companies. (2005)



Source: González Gurriarán, J. and Figueroa Dorrego, P. (2005): Plan Estratéxico de Innovación de Galicia, 2010 (PEIGA-2010)

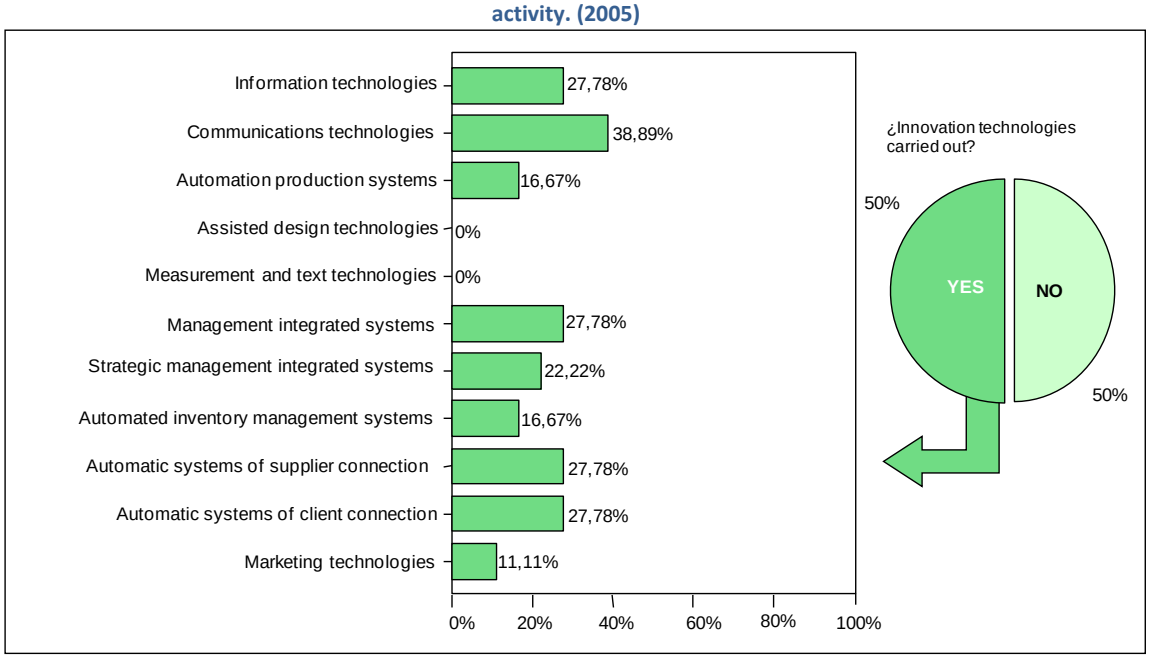
Regarding these activities, innovation is mainly linked to quality departments and, to a lesser extent, to environmental management departments and training departments. The scarce presence of methods and procedure departments and R&D+i departments is outstanding.

Figure 17 shows technology innovations in which logistics and freight transportation companies have invested in.

Half of the consulted companies confirm having executed some type of innovation technology highlighting communication technologies, integrated management systems and

automatic systems of supplier and client connection, which match their more updated technologies. In general, logistics and freight transportation companies in Galicia carry out insufficient innovation which influences their productivity and competitiveness.

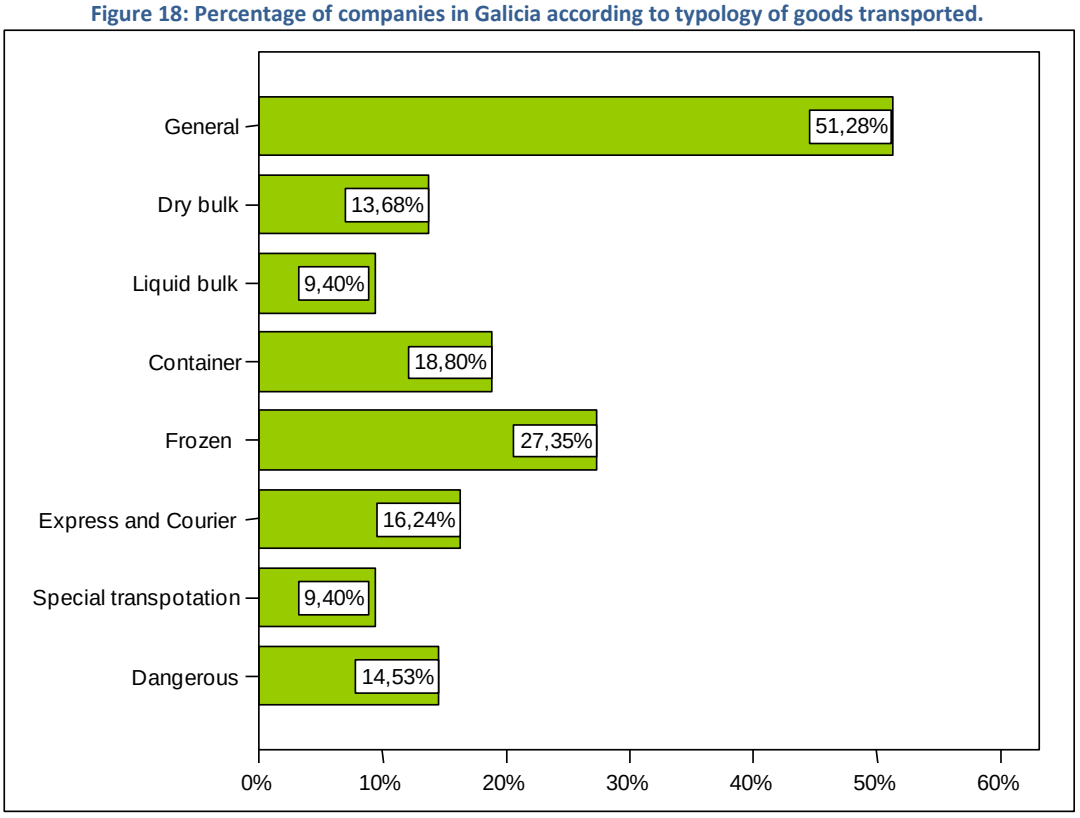
Figure 17: Technologies in which innovations were carried out by logistics and freight transportation business activity. (2005)



Source: González Gurriarán, J. and Figueroa Dorrego, P. (2005): Plan Estratéxico de Innovación de Galicia, 2010 (PEIGA-2010)

The analysis of the goods transported by the consulted companies is shown in Figure 18, taking into account the possibility of multiple-choice answers. Most of the companies transport goods in a general sense (51.28%), although the percentage of companies which transport frozen goods (27.35%) and containers (18.80%) is quiet significant.

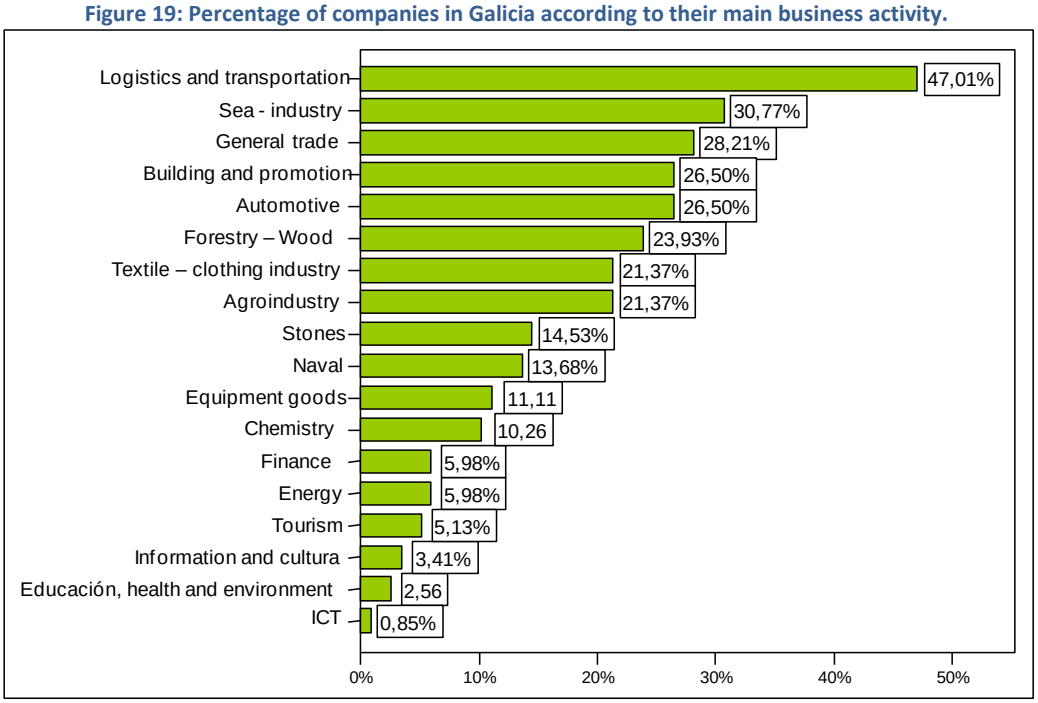
Figure 18: Percentage of companies in Galicia according to typology of goods transported.



Source: González Gurriarán, J. and Figueroa Dorrego, P. (2008): Plan de Dinamización da Innovación nas actividades de loxísica e transporte de mercadorías en Galicia -survey to businesses, September 2007-

Figure 19 shows the percentage of companies according to their main business activity bearing in mind the possibility of multiple-choice answers. The highest percentage belongs to logistics and transportation activities followed by sea industry, general trade, building and real estate or automotive activities, among others.

Figure 19: Percentage of companies in Galicia according to their main business activity.



Source: González Gurriarán, J. and Figueroa Dorrego, P. (2008): Plan de Dinamización da Innovación nas actividades de loxísica e transporte de mercadorías en Galicia, -survey to businesses, September 2007-

MAIN STRATEGIC ORIENTATIONS FOR LOGISTICS AND TRANSPORTATION ACTIVITIES.

The strategic guidelines in order to achieve competitive advantages followed by companies of logistics and transportation business activities can be drawn from González Gurriarán and Figueroa Dorrego´s works and research *"Reflexiones sobre diagnóstico estratégico, factores clave, estrategias y actuaciones de la cadena empresarial de Logística y Transporte"*, *Foro Caixanova de Estrategias Empresariales (2005) e o Plan de Dinamización da Innovación nas actividades de loxística e transporte de mercadorías de Galicia (2008).*

Competitive strategies

The importance of strategies which insist on differentiation elements (quality, customer service and, to a lesser extent, response time and product range) should be highlighted, specially, within intense competitive rivalry in which cost orientation is essential and price is a relevant and, in some cases, a decisive product/service feature. Logistics and freight transportation companies, which perform their business activity in a framework characterized by intensive **competitive rivalry and high bargaining power of customers,** have difficulties in transferring increases in costs (fuel, taxes, personnel…) to the market.

Changes in the consumption market (e-commerce, mail-order-shopping…) and in the product purchasing/production/distribution process (JIT, outsourcing warehouse management, Internationalization…) are also important. These aspects affect more complex and "sophisticated" needs with regard to logistics and freight transportation activities. In this context, companies try to gain more clients and ensure clients´ loyalty by incorporating differentiation elements and, to a certain extent, specialised elements attending to business sectors and types of goods. Innovation in order to improve internal efficiency and providing reply on clients´ needs regarding service and prices is required.

Differentiation strategic orientation is more important for logistics operators (LO), specially regarding rivalry in quality of services and response time. However, this orientation is being transferred to carriers since they operatively guarantee the service.

Growth strategies

With a global view of the activity, the priority strategy is the enlargement of current services followed by growth on current national markets. Following this strategy, with also relative importance, is the expansion of new services in new national markets strategy. The least valued strategies are growth in international markets, both current and new.

Therefore, expansion strategies are on the whole the most important ones, which imply the need for introducing improvements in order to be more efficient and be able to expand to the current national markets, mainly through current services and accompanying client companies in their expansion strategy, which is one of the most predominant stategies in all the business chains and business activities. However, the risks involved by this strategy should be taken into account due to a possible decrease in the business activity and with a

great influence on the logistics and transportation market regarding a "price struggle" and a reduction of margins.

The importance given to development of services and markets (national) and to diversification strategies by logistics and transportation companies should be highlighted. These requiere substantial incremental innovation needs oriented to differentiation in order to face complex strategies. Logistics operators tend to give relative importance to expansion to national markets (both new and current) and to international markets (both new and current) according to the internationalization process of the business system, yet less than in the previous case. Carrier companies assess these growth strategies with greater moderation, specially with regard to international markets.

Integration strategies

In general terms, carriers lack the dimension, the resources and the abilities required for introducing integration strategies. The most important integration strategy, specially regarding logistics operators, refers to forward vertical integration (downstream) trying to take on activities which used to be carried out by their clients (business of different activities). Due to the current trend to focus on "the heart of the business", these companies subcontract transportation and logistics management.

Comparatively, strategies of horizontal integration, as a response to the need of creating economies of scale in order to perform in intensive competitive rivalry, are also remarkable. Companies try to expand by being merged with or taking over competitor companies with the aim of improving reply on clients´increasing needs.

Cooperation strategies

Comparatively, according to companies in the chain, vertical cooperation strategies (suppliers and clients) are more important than horizontal cooperation strategies (competitors and complementary companies).With a global view, the most valued strategy is cooperation with clients (carriers and operators, operators and companies); this can be due to the importance of the existing mutual interrelations when providing a top-quality service to the final client. Strategies of cooperation with suppliers follow. This strategy is the most important one for logistics operators due to the outsourcing of nearly all the transport activities by specialised companies (carriers) in the different modes of transportation (road, sea, air) The importance given to strategies of cooperation with competitors and complementary companies reveals the need to create synergies and complementarities in order to provide a comprehensive response to clients´ more demanding needs.

2.4 Support services ans public administration for innovation in logistics and freight transportation business activity in Galicia

Regarding public policies to provide financing for R&D+i of transportation of freight and logistics chain projects, the EU VII Framework Programme (2007 to 2013), the VI Spanish

National Plan for R&D+I (Plan Nacional de I+D+i) (2008 to 2011), the Galician Plan for Research, Development and Innovation (In.Ci.Te, 2006 to 2010) and the developing Technology Platforms should be mentioned. In addition to these, The EU White Paper on Transport (European Commission, 2001) and the Spanish Strategic Plan for Infrastructure and Transport (PEIT – Plan Estratégico de infraestructura y Transportes) (Ministerio de Fomento, 2007)

On the **VII Framework Programme,** transport (including aeronautics) is one of ten thematic areas included in the specific Cooperation Programme (32,413 million euros) with the aim of developing safer,eco-friendlier and more intelligent pan-European transport systems. Grant-aided activities are related to Aeronautics and air transport, sustainable surface transport (rail, road and sea) and European navigation satellite support systems with a total budget which amount to 4,100 million euros.

Actions regarding logistics and transportation are dealt with in area 3 (sectorial development and technological innovation) and in the Energy and Climate Change Strategic Performance of the Spanish **VI Plan Nacional de I+D+i**. In area 3 of Development and Innovations, transport and infrastructure are included as one of the ten priority areas with the purpose of achieving an environmentally-friendly, sustainable, efficient, safe and integrated transport system. There are three grant-aided activity lines related to transport in the Energy and Climate Change Strategic Performance: energy and mitigation of Climate Change for energy production and energy efficiency, specially regarding transportation (Line 1)e mitigación do cambio climático para a produción de enerxía final e a eficiencia enerxética con especial incidencia no sector do transporte (Liña 1), Sustainable Mobility (Line 2) and other areas of Climate Change as mitigation like greenhouse emissions (Line 3).

The **Plan Galego de I+D+iT** is not organized according to areas but to technology, there is no direct reference to logistics and transportation activities, yet in the context of the innovation strategy of the Plan, essential tools such as Technological Platforms ans Strategic Performances, both of which are essential for the development of I+D SUMA programmes and critical cross-sectional technologies which are two of the six Area Programmes oriented to different technologies, are emphasized.

One of the most relevant tools for enhancing R&D+i are Technological Platforms, which are clusters of entities interested in the development of innovation projects in a particular area in order to define their “view” regarding the development of the involved technologies, covering a period from 10 to 20 years, and elaborating a Strategy Research Agenda (SRA) regarding strategic and social issues, which contribute to achieve the European goals of growth, competitiveness and sustainability, which depend, to a certain extent, on technological and research in medium and long term development. The peak impact of these platforms requires the building of networks which boost horizontal relations and coordination and cooperation policies between them and regional administrations (European Commission. DG for Research, march-2007). In Galicia, there is a Technological Platform Network (NEURONA) which comprises the 14 platforms that existed in December 2008 and the three which are undergoing their initial stage of SRA definition, stage where the logistics and transportation platform is.

Table 15 lists the main Technological Platforms regarding logistics and transportation of freight in Europe, Spain and Galicia.

Table 15 Main Technological Platforms related to logistics and transportation activities.

European Technological Platforms	
ERTRAC	European Road Transport Research Advisory Council
ACARE	Advisory Council for Aeronautics Research in Europe
ERRAC	European Rail Research Advisory Council
WATERBORNE	European Technology Platform **WATERBORNE**
Spanish Technological Platforms	
PTFE	Plataforma Tecnolóxica Ferroviaria Espanola
PTM	Plataforma Tecnolóxica Marítima
LOGISTOP	Plataforma Tecnolóxica Espanola de Loxística Integral
Galician Technological Platforms	
LOXISGA	Plataforma Tecnolóxica Galega de Loxística

Source: personal elaboration

Table 16 lists the future main areas of collaboration with the other Galician Technological Platforms, which when accomplishing this report, were already running or about to elaborate their SRA. There is a group with a **high priority,** due to the needs of R&D+i of logistics and transportation activities since they are essential agents and activities (ICT, Automotive, Shipbuilding, Materials and Manufacturing processes).

Table 16 Influence matrix of areas of collaboration betweeen Loxisga and other Galician Technological Platforms

Vindeira (ICT)	HIGH	• ICT applied to freight (smart label, sensor…) • ICT applied to processes • ICT applied to vehicles and containers • Integrated ICT and system interoperability
PT. Automoción	HIGH	• Active and passive security of occupants and freight • ICT applied to vehicles • Alternative propulsion motors and renewable energy sources (cars) • New materials applied to cars • New loading and unloading intermodal systems
PTGN (Shipbuilding)	HIGH	• Active and passive security of occupants and freight • ICT applied to vessels • Alternative propulsion motors and renewable energy sources (vessels) • New materials applied to vessels • New loading and unloading intermodal systems
GMPF 2020 (Materials and manufacturing processes)	HIGH	• Internal business logistics • New materials applied to packing and containers • Organization and management of operations • Inverse logistics
ENERXE (Energy)	Medium	• Renewable energy sources applied to vehicles (cars, vessels, aircrafts, railway…) • Energy efficiency in transportation
ENVITE (Environment)	Medium	• Inverse business logistics • Measure environmental impact of modes of transport
PT. Granito	Medium	• Client activity innovation needs (logistics and transportation of granite and transformed products) • Monitoring of granite and granite-processed products
PT. Madeira	Medium	• Client activity innovation needs (logistics and transportation of wood and transformed products • Monitoring of wood-processed products
Ptgal (Agrofeed)	Medium	• Client activity innovation needs (logistics and transportation of agrofeed products) • Food monitoring
PTXGA (Aquaculture)	Medium	• Client activity innovation needs (logistics and transportation of aquaculture products • Food monitoring
Tecnopeixe	Medium	• Client activity innovation needs (logistics and transportation of fishing products • Food monitoring
PT Forestal Galega	Medium	• Client activity innovation needs (logistics and transportation of forestry products • Monitoring of forestry products
Nanogal (Nanotechnology)	Low	• Nanotechnology applied to freight
I+ Idea (Audiovisual)	Low	• Client activity innovation needs (logistics of audiovisual productions)
Produto Gráfico e Libro Galego	Low	• Smart label printing • New materials derived from graphic arts
Biotega (biotechnology)	Low	• Logistics and transportation of foodstuffs derived from biotechnology (Genetically modified organisms…) • Biotechnology solutions applied logistics and transportation of living and dead organism.

Source: personal elaboration

Another group has **medium priority** since they are either related to innovation needs of logistics and transportation client activities (food, granite and forestal and wood products) or related to Technological Platforms considered high priority (energy and environment).

Finally, low priority in Platforms which requier long term collaboration in order to visualize a clear application of their R&D+i activities on logistics and transportation activities (nanotechnology, audiovisual, graphic arts, biotechnology).

Another relevant instrument which supports innovation are **Technological Centres** (for more information see appendix 6.2), none of which specialized in logistics and freight transportation activities exist in Galicia. In Spain there are three Technological Centres related to transportation of freight [Centre for Innovation in Transport - CENIT (Barcelona), the Centre for Transport Research - TRANSyT (Madrid) and Centre for Maintenance of Transport - CMT (Valencia)]; and three related to logistics [The Spanish Centre of Logistics – CEL (Barcelona, Madrid, Murcia and Valladolid), the Technological Centre of Integral Logistics – CTL (Santander), and the Grup de Recerca en Logística Empresarial – GREL (Barcelona)]. A summary of the main research areas of theses technological centres can be found on the appendix.

Concerning the EU White Paper on Transport (European commission, 2001), the main activity areas, which, in general terms, try to boost inter-modality, efficiency and safety, should be emphasized. As a consequence, member states have adapted these recommendations to their reality and in **Spain** this is dealt with in the **Strategic Infrastructures and Transport Plan (Plan Estratégico de Infraestructuras y Transporte - PEIT),** which regarding logistics and transportation of freight deals with:

1. Boost of inter-modality from a global point of view of infrastructures and services;
2. Integrated management of transport and infrastructures system by compliance with safety, quality and efficiency criteria;
3. Improvement of the regulatory framework and the coordination and cooperation among the different administrations;
4. Review of the tax business system bound by transportation activities in order to adapt it to the essential aims of struggling against climate change and for energy efficiency;
5. Balance of territory and access improvement;
6. Improvement of urban mobility;
7. Improvement of freight transportation and its international incorporation as Performance driving power according to the EU White Paper on Transportation which indicated the need to control the globalization of transportation, specially in the context of the enlargement of the EU;

Regarding this last aspect, PEIT points out the need of updating and integrating management and monitoring freight flows.

Concerning infrastructures, in Galicia there are 76 operative industrial estates and 46 small business activity areas which amount to 4,907 Ha, being able to increase up to 9,670 Ha if enlargement plans are carried out or new industrial estates are implemented. The space distribution of these business areas is widespread, although concentration areas on the surroundings of the main cities and the main road connections (AP-9, A-6 e a A-52) can be found, representing 73.1 % of the operative or under construction business land.

In Galicia there is a great proliferation of Transportation and Logistics Centres initiatives, in some cases linked to inter-modality in which road connections at all hierarchy levels guarantee future access.

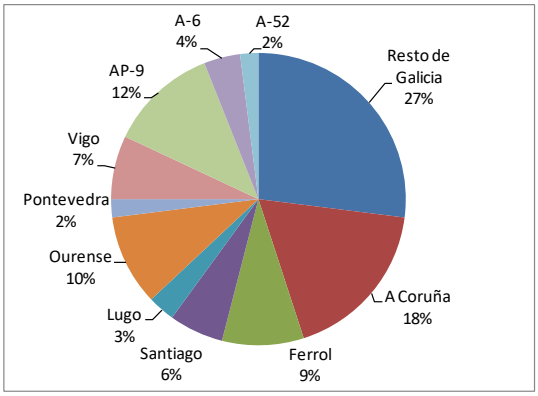
Figure 20. Business land surface in Galica

	Business land surface (Ha)					
	Operative /Under construction		In procedure / In study		Total	
A Coruña	2,431	49.50%	1,562	32.80%	3,993	41.30%
Lugo	548	11.20%	545	11.40%	1,093	11.30%
Ourense	761	15.50%	961	20.20%	1,722	17.80%
Pontevedra	1,167	23.80%	1,695	35.60%	2,862	29.60%
Galicia	4,907	100.00%	4,763	100.00%	9,670	100.00%

Source: personal elaboration from data from the Consellería de Política Territorial, Obras Públicas e Transportes. Xunta de Galicia, 2007

A research carried out by the Xunta de Galicia, (Consellería de Política Territorial, Obras Públicas e Transportes, 2007), refers to current experiences which should be taken into account in order to guarantee their accessibility and their conversion into Logistics Platforms or Transportation Centres: the Parque de actividades Económicas de Arteixo -ACTECA- (150 Ha, from the Galician Institute of Housing and Land - Instituto Galego de Vivenda e Solo (IGVS)), Parque empresarial do Río do Pozo en Narón (160 Ha), e o Parque Empresarial de Val de Rabeda –Allariz- (400Ha).

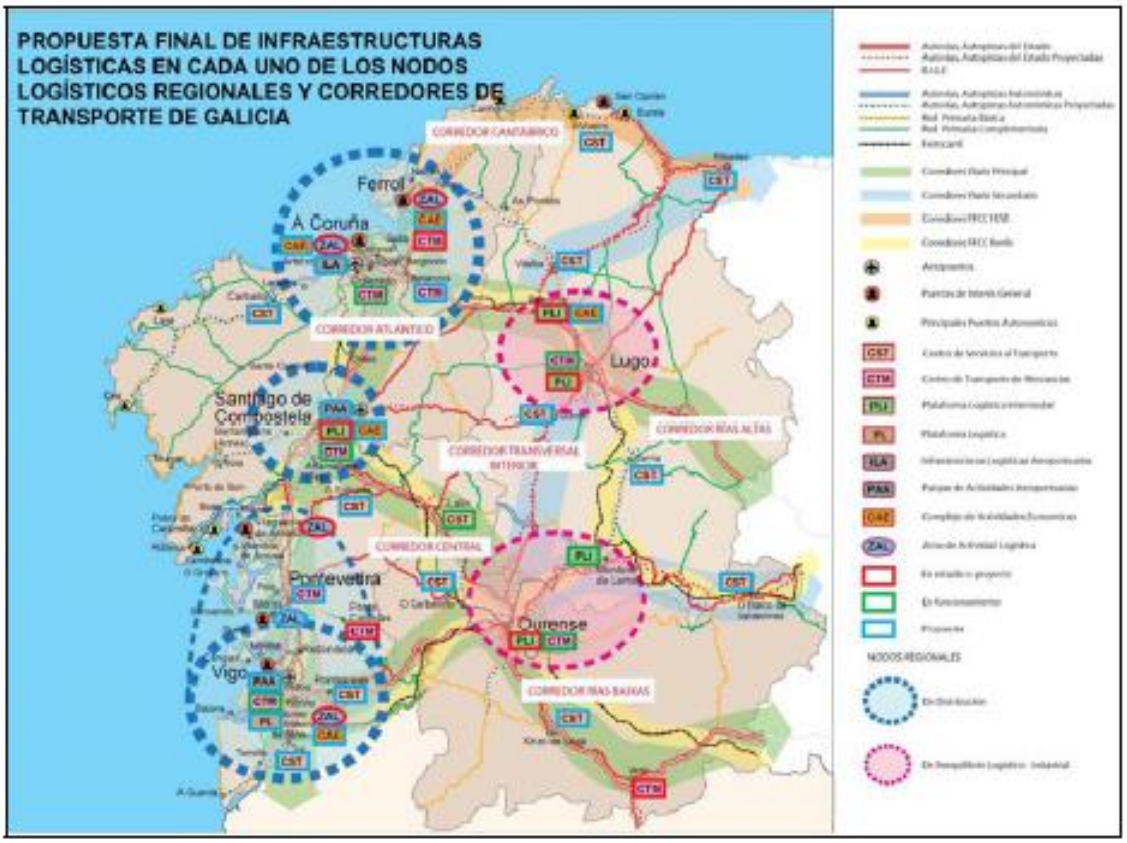
Figure 21 Percentage of operative or under construction business land according to areas of influence in cities and main road connections.



Source: personal elaboration from data from the Consellería de Política Territorial, Obras Públicas e Transportes. Xunta de Galicia, 2007

The aboved mentioned research brings foward 8 topologic proposals for LOGISTICS CENTRES in order to regroup the main existent logistics infrastructures, to which new behaviour proposals and their accessibility are incorporated. These kind of logistics centres are the following ones:Transport Service Centres (TSC), Transportation of Freight Centres (TFC), Logistics Platforms (LP), Intermodal Logistics Platforms (ILP), Parque de Actividades Aeroportuarias (PAA), Infraestruturas Loxísticas Aeroportuarias (ILA), Zona de Actividades Loxísticas (ZAL), e Complexo de Actividades Económicas (CAE).

Figure 22 Infrastuctures logistics network proposal in each Reginal Logistics tie in Galicia



Source: personal elaboration afrom data from the Consellería de Política Territorial, Obras Públicas e Transportes. Xunta de Galicia, 2007

At the three Galician universities: Univesity of Coruña (Universidad de A Coruña - UDC), University of Vigo (Universidad de Vigo - UVIGO) and University of Santiago (Universidad de Santiago - USC) there is a technological offer of research groups related to logistics and transportation activities (see Appendix 6.2).

3 MAIN INNOVATION DEVELOPMENT NEEDS OF LOGISTICS AND TRANSPORTATION BUSINESS ACTIVITY.

According to Manual de Oslo, innovations can take place in three business areas: strategic and organizative area, technological area (product/service and processes) and marketing area. Regarding this and in the case of logistics chain and transportation of freight, 48 innovation or improvement needs, either to be developed or boosted by companies from the chain (strategic, organizative and marketing area, ICT) or by supply companies of equipment goods related to other technologies (safety, inter-modality, materials, maintenance and equipment).

In this epigraph, the level of need of logistics and transportation of freight companies in the following five years is analyzed in order to carry out improvements or innovations. **Needs which can be carried out or boosted by the companies are told apart from those which are carried out by supply companies of equipment goods**. The **three examined areas** are the following:

Innovation needs	Areas
To be carried out by the logistics and freight transportation companies	Strategic, organizative and marketing
	Information technology and communication
To be carried out by supply companies of equipment goods	Other technologies: - Safety and inter-modality - Materials - Maintenance and equipment

The analysis of the innovation needs for each area is completed with information relative to agents, which according to the consulted business men/women are needed for their development. The agents taken into account were:

- Companies from the business or corporate group
- Logistics and transportation clusters
- University
- Technological centres and R&D+i entities
- Clients/suppliers (provisioning and equipment)
- Support services companies (consulting, engineering...)
- Other logistics and transportation companies

Table 17: Innovation needs by thematic areas for logistics and transportation companies in Galicia

THEMATIC AREA	CODE	IMPROVEMENTS OR INNOVATIONS
STRATEGIC, ORGANIZATIVE AND MARKETING AREA	SOMA1	Improvements/innovations in the formation programmes of human capital (in new technologies, in labour risk prevention, in quality, in environment, in marketing and commerce techniques, in languages…)
	SOMA 2	Improvements/innovations in strategic management systems and management (strategic plan, dashboard, knowledge management, innovation management, internationalization, etc.)
	SOMA 3	Improvements/innovations in advanced labour risk prevention systems and safety and hygiene at work
	SOMA 4	Improvements/innovations in advanced quality management systems
	SOMA 5	Improvements/innovations in advanced environmental management systems
	SOMA 6	Improvements/innovations in marketing, trade processes and contact with clients, CRM, trademarks, new markets...
	SOMA 7	Improvements/innovations in information systems for management (strategic monitoring, prospective and technological monitoring, geographical information system, weather information system, cartography, R&D+i subsidiaries, ERP...)
	SOMA 8	Organizational improvements/innovations (organizational structure design, cooperation among businesses, networks, franchises…)
	SOMA 9	Improvements/innovations in trade processes (assessment of suppliers, real-time connection with suppliers…)
	SOMA 10	Improvements/innovations in intellectual property (patents, copyrights, trademarks...)
INFORMATION AND COMMUNICATION TECHNOLOGY AREA	ICTA1	General communication technologies (intranet, internet, mobile phones, data networks, email, EDI...)
	ICTA 2	Telephone connection and equipment in means of transport
	ICTA 3	Global Position Systems (for example, GPS) to monitor/locate vehicles, loading/unloading destinations, container location and management, condition of roads…
	ICTA 4	Improvements in the system of digital tachometer in vehicles
	ICTA 5	Development of web sites for interaction among the different agents (clients, logistics operator, carriers…)
	ICTA 6	Systems of remittance/reception of delivery statements (scanning) and remittance by internet
	ICTA 7	Access client information systems for tracking freight.
	ICTA 8	Transport hiring and order
	ICTA 9	Freight Delivery/pickup systems with automatic information (PDA,...)
	ICTA 10	Access client information systems for access to P.O.D. (Proof of Delivery)
	ICTA 11	Development of Integral logistics management systems
	ICTA 12	Risk analysis technologies, reliability and support technologies for decision-making in case of difficulties in transportation
	ICTA 13	Access to Cargo Bags/Truck Bags on the internet, ferry reservation by internet…
	ICTA 14	Systems of turnover and automatic production of labels by clients for preparation and distribution of bulk by logistics companies (warehouse management)
	ICTA 15	Radio frequency systems for real-time warehouse management (labels EAN13, EAN128)
	ICTA 16	Instauration of bar codes for freight tracking
	ICTA 17	Improvements in in-transit temperature recording systems
OTHER TECHNOLOGY AREA (Materials)	OTAM1	More eco-friendly materials which permit subsequent recycling taking into account inflamability, toxicity and fume emission.
	OTAM 2	Advanced materials and lubricants to reduce friction loss
	OTAM 3	Lighter materials (aluminium, magnesium, composite,...) and absorbent (active), with equivalent or imporved features regarding conventional materials for means of transport.
	OTAM 4	High absorbent energy capacity and impact resistance structural materials and non aggressive coating
OTHER TECHNOLOGY AREA (Maintenance and	OTAME1	Development and implementation of expert maintenance systems
	OTAME 2	Systems of on board diagnosis (European On Board Diagnosis) and integral management of consume cycles

THEMATIC AREA	CODE	IMPROVEMENTS OR INNOVATIONS
equipment)	OTAME 3	Maintenance equipment (crane, transelevetors…)
	OTAME 4	Automatization warehouse systems (shelves, lead management software transelevators…)
	OTAME 5	Unloading systems (conveyor belts) and bulk clasification
	OTAME 6	Automated preparation order (PC, mobile sclae, car code reader…)
	OTAME 7	Refrigeration systems
OTHER TECHNOLOGY AREA (Safety and inter-modality)	OTASI1	More reliable electronic safety systems
	OTASI 2	Development of alternative propulsion systems (EV, HEV, battery-powered EV, fuel cell EV: electric vehicle, hybrid electric vehicle, battery-powered electric vehicle, fuel cell electric vehicle) to reduce consumption and pollution
	OTASI 3	Reduction of weight and volume structure, chassis, components and systems
	OTASI 4	Loading/unloading vehicle systems (pneumatic suspension for regulation of cargo height, telescopic ceiling, double floor…)
	OTASI 5	Improvement in vehicle architecture taking into account bio-mechanic and safety criteria
	OTASI 6	Development of loading/unloading automated systems in vessels and ports
	OTASI 7	Intelligent systems for freight transfer (railway)
	OTASI 8	Break-of-gauge technologies in drive axles and dead axles and overhhead line catenary technologies (railway)

Source: González Gurriarán, J. and Figueroa Dorrego, P. (2008): Plan de Dinamización da Innovación nas actividades de loxística e transporte de mercadorías de Galicia

In the case of Galicia, the priority given to improvement and innovation needs is shown in Table 18 in which three priority levels are considered: high priority, medium priority and low priority. The priority of each need was set up taking value 5 (the highest priority) and value 1 (the lowest priority). These needs, ordered from higher to lower priority, take values between 3.82 as maximum value and 2.13 as minimum value.

Table 18 Main innovation needs found in logistics and transportation of freight chain companies. Priority value given by companies in Galicia.

Nº	COD.	IMPROVEMENTS OR INNOVATIONS	PRIORITY
1	ICTA1	General communication technologies (intranet, internet, mobile phones, data networks, email, EDI...)	HIGH PRIORITY NEEDS
2	OTAM1	More eco-friendly materials which permit subsequent recycling taking into account inflamability, toxicity and fume emission.	
3	ICTA 2	Telephone connection and equipment in means of transport	
4	SOMA1	Improvements/innovations in the formation programmes of human capital (in new technologies, in labour risk prevention, in quality, in environment, in marketing and commerce techniques, in languages…)	
5	ICTA 3	Global Position Systems (for example, GPS) to monitor/locate vehicles, loading/unloading destinations, container location and management, condition of roads…	
6	ICTA 4	Improvements in the system of digital tachometer in vehicles	
7	OTAM 2	Advanced materials and lubricants to reduce friction loss	
8	OTASI1	More reliable electronic safety systems	
9	OTASI 2	Development of alternative propulsion systems (EV, HEV, battery-powered EV, fuel cell EV: electric vehicle, hybrid electric vehicle, battery-powered electric vehicle, fuel cell electric vehicle) to reduce consumption and pollution	
10	SOMA 2	Improvements/innovations in strategic management systems and management (strategic plan, dashboard, knowledge management, innovation management, internationalization, etc.)	
11	ICTA 5	Development of web sites for interaction among the different agents (clients, logistics operator, carriers…)	
12	ICTA 6	Systems of remittance/reception of delivery statements (scanning) and remittance by internet	
13	SOMA 3	Improvements/innovations in advanced labour risk prevention systems and safety and hygiene at work	
14	ICTA 7	Access client information systems for tracking freight.	
15	OTASI 3	Reduction of weight and volume structure, chassis, components and systems	
Nº	**COD.**	**MELLORAS OU INNOVACIÓNS**	**PRIORITY**
16	OTAME1	Development and implementation of expert maintenance systems	MEDIUM PRIORITY NEEDS
17	ICTA 8	Transport hiring and order	
18	OTAM 3	Lighter materials (aluminium, magnesium, composite,...) and absorbent (active), with equivalent or imporved features regarding conventional materials for means of transport.	
19	ICTA 9	Freight Delivery/pickup systems with automatic information (PDA,...)	
20	ICTA 10	Access client information systems for access to P.O.D. (Proof of Delivery)	
21	SOMA 4	Improvements/innovations in advanced quality management systems	
22	OTASI 4	Loading/unloading vehicle systems (pneumatic suspension for regulation of cargo height, telescopic ceiling, double floor…)	
23	SOMA 5	Improvements/innovations in advanced environmental management systems	
24	SOMA 6	Improvements/innovations in marketing, trade processes and contact with clients, CRM, trademarks, new markets...	
25	SOMA 7	Improvements/innovations in information systems for management (strategic monitoring, prospective and technological monitoring, geographical information system, weather information system, cartography, R&D+i subsidiaries, ERP...)	
26	SOMA 8	Organizational improvements/innovations (organizational structure design, cooperation among businesses, networks, franchises…)	
27	ICTA 11	Development of Integral logistics management systems	
28	ICTA 12	Risk analysis technologies, reliability and support technologies for decision-making in case of difficulties in transportation	
29	OTAME 2	Systems of on board diagnosis (European On Board Diagnosis) and integral managemnt of consume cycles	
30	OTASI 5	Improvement in vehicle architecture taking into account bio-mechanic and safety criteria	
31	SOMA 9	Improvements/innovations in trade processes (assessment of suppliers, real-time connection with suppliers…)	LOW PRIORITY

Nº	COD.	IMPROVEMENTS OR INNOVATIONS	PRIORITY
32	ICTA 13	Access to Cargo Bags/Truck Bags on the internet, ferry reservation by internet…	NEEDS
33	OTAM 4	High absorbent energy capacity and impact resistance structural materials and non aggressive coating	
34	OTAME 3	Maintenance equipment (crane, transelevetors…)	
35	OTAME 4	Automatization warehouse systems (shelves, lead management software transelevators…)	
36	OTAME 5	Unloading systems (conveyor belts) and bulk clasification	
37	ICTA 14	Systems of turnover and automatic production of labels by clients for preparation and distribution of bulk by logistics companies (warehouse management)	
38	OTAME 6	Automated preparation order (PC, mobile sclae, car code reader…)	
39	OTASI 6	Development of loading/unloading automated systems in vessels and ports	
40	ICTA 15	Radio frequency systems for real-time warehouse management (labels EAN13, EAN128)	
41	ICTA 16	Instauration of bar codes for freight tracking	
42	ICTA 17	Improvements in in-transit temperature recording systems	
43	OTAME 7	Refrigeration systems	
44	OTASI 7	Intelligent systems for freight transfer (railway)	
45	SOMA 10	Improvements/innovations in intellectual property (patents, copyrights, trademarks...)	
46	OTASI 8	Break-of-gauge technologies in drive axles and dead axles and overhhead line catenary technologies (railway)	

(SOMA: strategic, organizative and marketing area. ICTA: information and communication technology area. ATAM,OTAME,OTESA: other technology area – materials, maintenance and equipement, safety and inter-modality)

Source: González Gurriarán, J. and Figueroa Dorrego, P. (2008): Plan de Dinamización da Innovación nas actividades de loxística e transporte de mercadorías de Galicia

A global view, confirms that logistics and freight transportation companies are **mainly oriented to** the development of their innovation needs from an **internal prespective** (the own company or business group) and, whenever the case, in cooperation **with support services companies**. The **scarce importance given to other considered agents** reflects the existent deficit in the innovation system in order to offer support to these activities. The scarce capacity in business associations and, specially, in Universities and R&D+i entities and Technological Centres in Galicia stands out.

Table 19 Agents to develop the improvements/innovations in the strategic, organizative and marketing area

	Companies from the business or corporate group	Logistics and transport clusters	Univer-sity	Technological centres and R&D+I entities	Clients and suppliers (provisioning and equipment)	Support services companies (consulting, engineering…)	Other logistics and transportation companies	TOTAL
Improvements/innovations in the formation programmes of human capital (in new technologies, in labOur risk prevention, in quality, in environment, in marketing and commerce techniques, in languages…)	32,89%	9,87%	13,16%	7,24%	1,97%	30,92%	3,95%	100%
Improvements/innovations in strategic management systems and management (strategic plan, dashboard, knowledge management, innovation management, internationalization, etc.)	49,38%	8,02%	3,09%	6,79%	6,17%	19,14%	7,41%	100%
Improvements/innovations inadvanced labour risk prevention systems and safety and hygiene at work	29,79%	6,38%	1,42%	5,67%	3,55%	48,23%	4,96%	100%
Improvements/innovations in advanced quality management systems	32,12%	8,76%	1,46%	3,65%	5,84%	43,80%	4,38%	100%
Improvements/innovations in advanced environmental management systems	32,41%	8,97%	4,14%	7,59%	2,76%	39,31%	4,83%	100%
Improvements/innovations in marketing, trade processes and contact with clients, CRM, trademarks, new markets...	53,28%	9,02%	2,46%	4,92%	7,38%	19,67%	3,28%	100%
Improvements/innovations in information systems for management (strategic monitoring, prospective and technological monitoring, geographical information system, weather information system, cartography, R&D+i subsidiaries, ERP...)	28,77%	10,96%	6,85%	18,49%	6,85%	23,97%	4,11%	100%
Organizational improvements/innovations (organizational structure design, coorperation among businesses, networks, franchises…)	47,48%	12,23%	2,16%	5,04%	3,60%	17,27%	12,23%	100%
Improvements/innovations in trade processes (assessment of suppliers, real-time connection with suppliers…)	56,41%	5,13%	3,42%	3,42%	19,66%	9,40%	2,56%	100%
Improvements/innovations in intellectual property (patents, copyrights, trademarks...)	38,78%	9,18%	5,10%	9,18%	1,02%	33,67%	3,06%	100%

Table 20 Agents to develop the improvements/innovations in the information and communication technology area

	Companies from the business or corporate group	Logistics and transport clusters	Univer-sity	Technological centres and R&D+I entities	Clients and suppliers (provisioning and equipment)	Support services companies (consulting, engineering)	Other logistics and transportation companies	TOTAL
General communication technologies (intranet, internet, mobile phones, data networks, email, EDI...)	23,81%	3,57%	4,17%	14,88%	21,43%	26,79%	5,36%	100%
Telephone connection and equipment in means of transport	26,02%	4,07%	2,44%	11,38%	32,52%	20,33%	3,25%	100%
Global Position Systems (for example, GPS) to monitor/locate vehicles, loading/unloading destinations, container location and management, condition of roads…	23,24%	7,04%	4,23%	11,97%	26,76%	22,54%	4,23%	100%
Improvements in the system of digital tachometer in vehicles	28,44%	8,26%	4,59%	9,17%	26,61%	15,60%	7,34%	100%
Development of web sites for interaction among the different agents (clients, logistic operator, carriers…)	27,34%	6,47%	2,88%	8,63%	20,86%	29,50%	4,32%	100%
Systems of remittance/recepcion of delivery statements (scanning) and remittance by internet	41,86%	10,08%	1,55%	6,98%	17,83%	16,28%	5,43%	100%
Access client information systems for tracking freight.	40,50%	8,26%	2,48%	10,74%	19,83%	14,05%	4,13%	100%
Transport hiring and order	49,55%	12,61%	0,90%	6,31%	15,32%	7,21%	8,11%	100%
Freight Delivery/pickup systems with automatic information (PDA,...)	42,11%	7,02%	4,39%	9,65%	18,42%	14,04%	4,39%	100%
Access client information systems for access to P.O.D. (Proof of Delivery)	44,25%	5,31%	2,65%	7,08%	22,12%	15,04%	3,54%	100%
Development of Integral logistics management systems	39,64%	10,81%	3,60%	9,91%	9,91%	17,12%	9,01%	100%
Risk analysis technologies, reliability and support technologies for decision-making in case of difficulties in transportation	40,59%	13,86%	1,98%	7,92%	7,92%	20,79%	6,93%	100%
Access to Cargo Bags/Truck Bags on the internet, ferry reservation by internet…	29,31%	13,79%	3,45%	7,76%	16,38%	16,38%	12,93%	100%
Systems of turnover and automatic production of labels by clients for preparation and distribution of bulk by logistics companies (warehouse management)	45,16%	4,30%	3,23%	10,75%	15,05%	18,28%	3,23%	100%
Radio frequency systems for real-time warehouse management (labels EAN13, EAN128)	40,48%	11,90%	3,57%	8,33%	8,33%	23,81%	3,57%	100%
Instauration of bar codes for freight tracking	40,66%	6,59%	4,40%	9,89%	13,19%	21,98%	3,30%	100%
Improvements in in-transit temperature recording systems	38,37%	5,81%	1,16%	12,79%	23,26%	12,79%	5,81%	100%

Source: González Gurriarán, J. e Figueroa Dorrego, P. (2008): Plan de Dinamización da Innovación nas actividades de loxística e transporte de mercadorías de Galicia -enquisa a empresas,setembro de 2007-

4 STRATEGIC VISION OF LOXISGA: STRATEGIC CHALLENGES, PURPOSE/COMMITMENT AND OBJECTIVES

4.1 Principal strategic challenges to boost innovation in logistics and freight activities in Galicia

The present epigraph analyses the diagnosis of innovation in Logistics and Transportation of Freight activities in Galicia, taking into account the main aspects which act as facilitators and barriers to innovation in these activities, based on 11 thematic scopes:

- **Socio-cultural frame, with** *6 aspects.*
- **Market dynamics,** *with 11 aspects.*
- **Technological and structural capital,** *with 13 aspects.*
- **Human capital,** *with 9 aspects.*
- **Relational aspects,** *with 11 aspects.*
- **Normative system,** *with 7 aspects.*
- **Infrastructures and associated services,** with 22 aspects. In this case, for greater information clarity, the results were divided into five sub-sections:
  - ***Infrastructures in general,*** *with 3 aspects.*
  - ***Road Infrastructures, road network and associated services,*** *with 5 aspects.*
  - ***Ports, port infrastructures and associated services,*** *with 6 aspects.*
  - ***Railway infrastructures and associated services,*** *with 4 aspects.*
  - ***Airport infrastructures airports and associated services,*** *with 4 aspects.*

In Table 21, these 79 aspects of Strategic Diagnosis are offered, ordered based on the 11 topics mentioned.

Table 21: Aspects of Strategic Diagnosis for their assesment as Barriers or Facilitators

TOPIC	COD.	ASPECTS
SOCIO-CULTURAL FRAMEWORK	SF1	Degree of diffusion of the concept of innovation in society in the broad sense (not only associated to technology, but extended to organization, strategy, marketing,…)
	SF2	Level of social assessment of knowledge and creativity as key aspects to boost innovation
	SF3	Level of culture, rigor and respect for economic and social agents over the protection of industrial property rights (use of patents, licences, utility models,…) on behalf of companies
	SF4	Business vision, entrepreneurial spirit and attitude over risk of Galician society
	SF5	Level of development of marketing strategies to diffuse in society an innovative image of logistics and transportation companies
	SF6	Social development of internet as trade channel in companies/homes
MARKET DYNAMICS	MD1	Level of incidence of free circulation of people, freight, capital and access to technology
	MD2	Geographical location of Galicia and accessibility to new international trade markets
	MD3	Degree of development of inter-modal freight transportation systems
	MD4	Level of competence of similar innovative logistics and transportation services
	MD5	Level of assessment and acceptance of innovations on behalf of clients and suppliers
	MD6	Level of innovation development in logistics and transportation activities as basic element to obtain sustainable competitive advantages over competence
	MD7	Potential to increase value added of logistics and transportation services as from innovation
	MD8	Degree of incidence of the reduced dimension of a great number of companies which develop logistics and transportation activities in Galicia
	MD9	Level of incidence of presence in the Galician group of innovative logistics and transportation companies with relative importance in all these activities
	MD10	Degree of presence of logistics and transportation companies in Galicia on foreign markets and their orientation towards internationalization
	MD11	Quality of service of Galician companies of the transportation and logistics chain in a global competitive framework
TECHNOLOGICAL AND STRUCTURAL CAPITAL	TC1	Level of existence of R&D+I departments, annual plans or specific budgets aimed at innovation in logistics and transport companies
	TC2	Degree of adjustment and flexibility of organizational structure to develop and promote the innovative capacity in the whole organization
	TC3	Degree of cultural orientation towards innovation in logistics and transportation companies which favour anticipation to changes in the environment and adjustment to the needs requested
	TC4	Degree of application of strategic vision in logistics and transportation business
	TC5	Degree of application of innovation in processes (costs reduction, productivity and flexibility increase,...)
	TC6	Degree of technological modernization to increase productivity, boost specialization/diversity of activities or favour subcontracting
	TC7	Degree of development of tools and systems which improve internal communication and favour innovation/brainstorming
	TC8	Degree of development of tools and information management technologies (electronic invoicing,...) and technologies applied to goods vehicle (GPS, GSM systems, on board computer,...)
	TC9	Degree of development of innovation processes in total quality management from origin to destination of logistics and transportation activities
	TC10	Degree of development of innovative systems in prevention of labour risks in transportation and logistics chain activities in Galicia
	TC11	Level of development of applied innovation and environmental management (use and value of by-products and generated refuge, reduction of pollutant emissions,...) to favour sustainable development of the environment in transportation and logistics chain activities in Galicia
	TC12	Level of existence in companies of tools/resources necessary to boost innovation and its protection (models of utility, patents, licenses,...) on behalf of companies of the transportation and logistics chain
	TC13	Degree of financial capacity of companies of the transportation and logistics chain in Galicia for the development of innovation

TOPIC	COD.	ASPECTS
HUMAN CAPITAL	HC1	Degree of capacitation and compromise of managerial level to boost innovation (consideration of the importance of results in the medium and long term
	HC2	Degree of formation and qualification of operative personnel in logistics and transportation activities
	HC3	Degree of development of multi-disciplined teams and team-work capacity to boost innovation in companies
	HC4	Degree of initiative and human resources dynamism in logistics and transportation activities
	HC5	Degree of development of selection processes for personnel who value adequately the capacities/abilities orientated towards innovation
	HC6	Level of assessment of creative and innovative abilities for motivation and implication of human capital with innovation (incentives and acknowledgement of creative/innovative attitude,...)
	HC7	Degree of development of formation programmes orientated towards innovation and use of new technologies to facilitate human resource learning
	HC8	Level of current technical-scientific capacity of R&D+I entity personnel (universities, technological centres,...) on logistics and transportation topics and orientation on the same in relation to development of innovation applicable in this field
	HC9	Level of qualification of public entities personnel with competence in logistics and transportation to facilitate innovation in companies of this business activity
RELATIONAL ASPECTS	RA1	Degree of realization of activities to analyse positioning on the market facing competence (Benchmarking)
	RA2	Degree of participation in cooperation agreements with other companies in order to boost innovation (clients, suppliers and competitors)
	RA3	Level of involvement of the financial system (banks, savings banks, reciprocal guarantee societies, capital risk society,...) to back up the development of entrepreneur/innovative projects of logistics and transportation companies
	RA4	Level of existence and diffusion of innovative activities among logistics and transportation companies in Galicia: innovation prizes, presentation of innovative products, improved practice,...
	RA5	Level of presence on the Galician market of ICT companies with capacity to develop specific computer applications adapted to the need of logistics and transportation companies
	RA6	Level of presence on the Galician market of advanced support service companies (consulting, engineering,...) with the capacity to develop specific solutions adapted to the needs of logistics and transportation companies
	RA7	Degree of dynamization of innovation and successful experience transfer on behalf of logistics and transportation associations
	RA8	Degree of interrelationship among logistics and transportation companies, universities and technological centres for the creation of networks and stable cooperation structures orientated towards innovation which favour transfer of knowledge, technology and results
	RA9	Global image which companies of the transportation and logistics chain have of R&D+I entities (universities, technological centres,...) in Galicia
	RA10	The degree of response of R&D+I entities (universities, technological centres,...) in Galicia to the needs of technological innovation of companies of the transportation and logistics chain in Galicia
	RA11	The degree of response of R&D+I entities (universities, technological centres,...) in Galicia to the needs of innovation in strategy, organization and commercialization of companies of the transportation and logistics chain in Galicia
NORMATIVE SYSTEM	NS1	Level of incidence of the specific normative framework, and existent diversity depending on the country (working hours, axle cargo, gauge,...), on the innovative capacity of transportation and logistics companies
	NS2	Level of diversity of current regulation in different countries with respect to working hours, freight and heights (gauge)
	NS3	Level of incidence of normative framework on fiscal, financial, labour, international trade aspects,... on the innovative capacity of the business
	NS4	Level of bureaucracy and paperwork in granting and management of subsidies for innovation
	NS5	Level of current support on behalf of public administrations (European, State, regional and local) in relation to the development of innovation in companies of the transportation and logistics chain
	NS6	Level of adjustment of educational system to the needs of companies in the field of innovation (vocational training, universities,...)
	NS7	Level of use of programs and subsidies to R&D+I specifically for activities related to logistics and transportation

TEMÁTICA	CÓD.	ASPECTOS
INFRASTRUCTURES IN GENERAL	INF1	Degree of development of telecommunication infrastructures (internet access, broadband, mobile telephone range, GPS follow-up...)
	INF2	Degree of development in Galicia of business site, logistics platforms, dry ports, logistics and central freight exchange parks with basic services(petrol stations, hotels, cafeterias...)
	INF3	Degree of development of road-port-rail-airport connections in Galicia in order to favour inter-modality
ROAD INFRASTRUCTURES, ROAD NETWORK AND ASSOCIATED SERVICES	RD1	Situation of Galician road network in connection with plateau, with the North (Transcantábrica) and Portugal
	RD2	Situation of internal Galician road connection network, ring roads to city centres, and access to industrial estates, ports and airports
	RD3	Condition of road surface ,route, signposting, pavements and security system for Galician roads network
	RD4	Level of existence of tolls on motorway network
	RD5	Level of existence of truck parking lots patrolled by security in Galicia
PORTS, PORT INFRASTRUCTURES AND ASSOCIATED SERVICES	POR1	Level of interrelation and complementarity of Galician ports with respect to innovation boost in companies of logistics and transportation
	POR2	Degree of integration/connection of Galician ports in the system of short distance sea transport (Short Sea Shipping) and of motorways of the sea
	POR3	Degree of development of port infrastructures in Galicia (mooring, loading and unloading areas and specialized and differentiated storage, specialized equipment...)
	POR4	Level of development of services to vessels/ships (navigation assistance, trailers, mooring/cast off, supplies, security and protection...)
	POR5	Level of development of freight services (loading and unloading, storage, processing, inspection, security and protection, scheduling...)
	POR6	Degree of quality of services in Galician ports ("single window", scheduling, rates...)
RAILWAY INFRASTRUCTURES AND ASSOCIATED SERVICES	RAIL1	Current condition of rail network for freight transportation (coexistence of passenger/freight routes and surburban train network/general network, freight terminals, length of stations and emergency exits/side-tracks, auxiliary lines in main axles, ring roads to big cities, maximum height...)
	RAIL2	Degree of integration/connection of current rail network to the European rail freight network
	RAIL3	Level of traffic management and availability/assignment of rail network lines, rail terminal management
	RAIL4	Level of access to licenses, traction, driving personnel, homologated formation centres and maintenance of on wheel material on behalf of logistics operators
AIRPORT INFRASTRUCTURES AND ASSOCIATED SERVICES	AIR1	Current condition of airport infrastructures in Galicia for freight transportation (infrastructures for the aircraft movement, buildings and facilities, hub airports, vehicle access and parking areas, airport service, road and rail access...)
	AIR2	Level of interrelation and complementarity of Galician airports for freight transportation
	AIR3	Level of connection of Galician airports to the national and international freight transportation network
	AIR4	Level of service quality (security, fluency, efficiency and economy) in the airports in Galicia (taxes, inspection,...)

Source: González Gurriarán, J. and Figueroa Dorrego, P. (2008): Plan de Dinamización da Innovación nas actividades de loxística e transporte de mercadorías de Galicia

To continue, from the assessment carried out based on businessmen/women consulted on each of the 79 aspects, **35** that act as **Facilitators** to innovation in these activities were selected (value superior to 3). In the following tables, they are ordered from higher to lower intensity of facilitator, taking value 5 as very facilitator and 3 as more neutral.

Table 22 Identification of 35 facilitators of innovation in logistics and transportation activities in Galicia

TOPIC	CODE	FACILITATOR ASPECTS	Average
MARKET DYNAMICS	MD1	Level of incidence of free circulation of people, freight, capital and access to technology	3.83
CAPITAL TECNOLÓXICO E ESTRUTURAL	TC8	Degree of development of tools and information management technologies (electronic invoicing,...) and technologies applied to goods vehicle (GPS, GSM systems, on board computer,...)	3.55
MARKET DYNAMICS	MD6	Level of innovation development in logistics and transportation activities as basic element to obtain sustainable competitive advantages over competence	3.48
MARKET DYNAMICS	MD5	Level of assessment and acceptance of innovations on behalf of clients and suppliers	3.45
SOCIO-CULTURAL FRAMEWORK	SF6	Social development of internet as trade channel in companies/homes	3.44
HUMAN CAPITAL	HC2	Degree of formation and qualification of operative personnel in logistics and transportation activities	3.39
TECHNOLOGICAL AND STRUCTURAL CAPITAL	TC5	Degree of application of innovation in processes (costs reduction, productivity and flexibility increase,...)	3.39
INFRAESTRUTURAS EN XERAL	INF1	Degree of application of innovation in processes (costs reduction, productivity and flexibility increase,...)	3.39
MARKET DYNAMICS	MD11	Quality of service of Galician companies of the transportation and logistics chain in a global competitive framework	3.38
MARKET DYNAMICS	MD7	Potential to increase value added of logistics and transportation services as from innovation	3.37
TECHNOLOGICAL AND STRUCTURAL CAPITAL	TC6	Degree of technological modernization to increase productivity, boost specialization/diversity of activities or favour subcontracting	3.36
HUMAN CAPITAL	HC1	Degree of capacitation and compromise of managerial level to boost innovation (consideration of the importance of results in the medium and long term	3.35
HUMAN CAPITAL	HC3	Degree of development of multi-disciplined teams and team-work capacity to boost innovation in companies	3.34
TECHNOLOGICAL AND STRUCTURAL CAPITAL	TC7	Degree of development of tools and systems which improve internal communication and favour innovation/brainstorming	3.32
SOCIO-CULTURAL FRAMEWORK	SF5	Level of development of marketing strategies to diffuse in society an innovative image of logistics and transportation companies	3.29
TECHNOLOGICAL AND STRUCTURAL CAPITAL	TC9	Degree of development of innovative systems in prevention of labour risks in transportation and logistics chain activities in Galicia	3.29
HUMAN CAPITAL	HC4	Degree of initiative and human resources dynamism in logistics and transportation activities	3.28
TECHNOLOGICAL AND STRUCTURAL CAPITAL	TC10	Degree of development of innovative systems in prevention of labour risks in transportation and logistics chain activities in Galicia	3.26
HUMAN CAPITAL	HC5	Degree of development of selection processes for personnel who value adequately the capacities/abilities orientated towards innovation	3.25
		AVERAGE 35 FACILITATORS	**3.25**

TOPIC	CODE	FACILITATOR ASPECTS	Average
HUMAN CAPITAL	HC7	Degree of development of formation programmes orientated towards innovation and use of new technologies to facilitate human resource learning	3.23
SOCIO-CULTURAL FRAMEWORK	SF1	Degree of diffusion of the concept of innovation in society in the broad sense (not only associated to technology, but extended to organization, strategy, marketing,…)	3.20
SOCIO-CULTURAL FRAMEWORK	SF4	Business vision, entrepreneurial spirit and attitude over risk of Galician society	3.20
SOCIO-CULTURAL FRAMEWORK	SF2	Level of social assessment of knowledge and creativity as key aspects to boost innovation	3.16
MARKET DYNAMICS	MD10	Degree of presence of logistics and transportation companies in Galicia on foreign markets and their orientation towards internationalization	3.13
TECHNOLOGICAL AND STRUCTURAL CAPITAL	TC4	Degree of presence of logistics and transportation companies in Galicia on foreign markets and their orientation towards internationalization	3.12
RELATIONAL ASPECTS	RA5	Level of presence on the Galician market of ICT companies with capacity to develop specific computer applications adapted to the need of logistics and transportation companies	3.08
HUMAN CAPITAL	HC6	Level of assessment of creative and innovative abilities for motivation and implication of human capital with innovation (incentives and acknowledgement of creative/innovative attitude,...)	3.07
MARKET DYNAMICS	MD4	Level of competence of similar innovative logistics and transportation services	3.06
TECHNOLOGICAL AND STRUCTURAL CAPITAL	TC3	Degree of cultural orientation towards innovation in logistics and transportation companies which favour anticipation to changes in the environment and adjustment to the needs requested	3.04
RELATIONAL ASPECTS	RA3	Level of involvement of the financial system (banks, savings banks, reciprocal guarantee societies, capital risk society,...) to back up the development of entrepreneur/innovative projects of logistics and transportation companies	3.04
RELATIONAL ASPECTS	RA2	Degree of participation in cooperation agreements with other companies in order to boost innovation (clients, suppliers and competitors)	3.03
HUMAN CAPITAL	HC8	Level of current technical-scientific capacity of R&D+I entity personnel (universities, technological centres,...) on logistics and transportation topics and orientation on the same in relation to development of innovation applicable in this field	3.02
MARKET DYNAMICS	MD9	Level of incidence of presence in the Galician group of innovative logistics and transportation companies with relative importance in all these activities	3.02
TECHNOLOGICAL AND STRUCTURAL CAPITAL	TC11	Level of development of applied innovation and environmental management (use and value of by-products and generated refuge, reduction of pollutant emissions,...) to favour sustainable development of the environment in transportation and logistics chain activities in Galicia	3.02

TOPIC	CODE	FACILITATOR ASPECTS	Average
RELATIONAL ASPECTS	RA6	Level of presence on the Galician market of advanced support service companies (consulting, engineering,...) with the capacity to develop specific solutions adapted to the needs of logistics and transportation companies	3.01

Source: González Gurriarán, J. and Figueroa Dorrego, P. (2008): Plan de Dinamización da Innovación nas actividades de loxística e transporte de mercadorías de Galicia

As can be appreciated its **intensity** can be graded as **intermediate,** since the average of these aspects is 3.25 over a maximum of 5, with nineteen of them placed over the average and with a maximum value of 3.83. On the contrary, most aspects which are assessed under the average, are mostly considered in terms of neutrality. Therefore, it can later be asserted that a relevant nucleus of aspects exist which facilitate and promote innovation even though they do not perform in a very intense manner.

When analysing topic areas, a group of aspects related to **market dynamics** which are assessed as the greatest facilitators of innovation (eight out of eleven aspects are set as facilitators). Among them, the **level of incidence of free circulation of people, freight, capital and access to technology** should be highlighted (MD1), which, in addition, is considered the principal facilitator. Nevertheless, it seems that this environment feature is not being made good use of by most companies of these activities, bearing in mind their limitations for expansion in foreign trade.

Another two aspects of this topic make reference to strategic aspects for companies of these activities: vision of **innovation** as the **basic element to obtain sustainable competitive advantages** (MD6) and the level of **assessment and acceptance of innovations on behalf of clients/suppliers** (MD5). However, by looking at data regarding the need for innovation by businessmen/women consulted, it can be seen that **the culture of innovation has still not been extended to a high percentage of companies.** Orientation to innovation development in companies of these activities, are in many cases **motivated by clients** in the value chain and in other cases by **suppliers,** specially regarding vehicles (automotive industry, shipbuilding, information and communication technology applied to transport...).

Regarding **technological and structural capital,** it can be observed that the principal facilitators correspond to this topic group (nine out of ten aspects are facilitators). Among them, those that are more orientated to serve as support in the development of the need for technological innovation stand out as are **tools and information management technologies applied to vehicles** (TC8). Also those which facilitate **innovation in processes** which improve critical **management** aspects (costs, productivity, flexibility, response capacity…) and those related to **strategies** of diversification, specialization and subcontracting **being developed,** among others (TC6 and TC5, respectively).

The following thematic area of importance in facilitators is the **socio-cultural framework** (five out of six aspects are facilitators), although only two have an impact above average. **On the one hand, social development of internet and e-commerce** (SF6), with an importance which has greatly increased in the last years and which entails an important challenge for the future both for companies of these activities and client companies. This promotes innovation in organization and commercialization, specially related to freight

management and its location and control through information and communication technology. **On the other hand,** the **need to develop strategies of marketing to diffuse in society the image of innovative activities** (SF5), up to now with little boost, important. Precisely, one of the main restraints in client companies which explain the low development of e-commerce among Galician companies, are the difficulties of logistics management in shipment and according to comments made by some companies consulted, the low level of service at competitive rates on behalf of packaging and courier companies. AS a consequence, strategies of marketing could represent a relevant element of assistance which facilitates improvement in the positioning of logistics and transportation companies in this emerging sector.

In reference to **human capital**, the effect of facilitators in this topic group is situated on the whole in levels similar to the previous (eight out of nine aspects are facilitators). Three aspects specially stand out as facilitators. The first of these makes reference to the **degree of formation and qualification of operative personnel in logistics and transportation activities** (HC2), which implies an essential element for the development of innovation required by companies. It should be taken into account that most of these innovations are related to applied information and communication technologies. Secondly, **the degree of capacitation and compromise of managerial level** is also relevant (HC1), aspect especially important in a structure of small and medium-sized companies, where involvement of top management is fundamental in cultural orientation regarding innovation. Thirdly, the **degree of development of multi-disciplined teams and team-work capacity** (HC3), as link between levels and functions in companies for optimization of innovation processes.

Regarding **relational aspects**, what calls one's attention is that only four of the eleven aspects of this topic are situated among the facilitators. In addition, these four aspects have values close to neutrality (values between 3.08 and 3.01), which clearly indicates that interrelations in the innovation system are not acting as sufficient support for companies of these activities. Specially concerning R&D+I entities, since none of them situated themselves among facilitators. The scarce support which can be observed in this field makes reference to interrelation among companies. This way, the **presence of ICT companies on the Galician market** with capacity to develop the innovation required in this sense by logistics and transportation companies (RA5), the level **of involvement of the financial system** (RA3), the degree **of participation in cooperation agreements** with other companies (RA2) and the level of presence of on the Galician market of **advanced suppor service companies** (RA6). All these estimations in connection with their neutrality, have an effect on the need for greater development in such a way that it facilitates dynamism of innovation in these activities.

Finally, what calls one's attention is that only one aspect of **infrastructures and associated services** was situated among the facilitators: the **Degree of development of telecommunication infrastructures** (INF1). In addition, the businessmen/women rated it as an extremely relevant facilitator among the first eight assessed. This assessment is specially important taking into account that the main need to innovate requires this infrastructure for its correct functioning (related to ICT applications and software).

To continue, from the assessment carried out by the businessmen/women consulted on each of the 79 aspects, **44** which act as **Barriers** to innovation of these activities were

selected and ordered (value less than 3). In the following tables, they are ordered from greater to lesser intensity of the barrier considering value 1 as great barrier and 3 as more neutral.

Table 23 Identification of 44 barriers to innovation in logistics and transportation activities in Galicia

CODE	TOPIC	BARRIERS	Averg
RD4	ROADS	Level of existence of tolls on motorway network	1.86
NS4	NORMATIVE SYSTEM	Level of bureaucracy and paperwork in granting and management of subsidies for innovation	2.01
NS5	NORMATIVE SYSTEM	Level of current assistance on behalf of public administrations (European, State, regional and local) in relation to the development of innovation in companies of the transportation and logistics chain	2.07
RAIL1	RAILWAY	Current condition of rail network for freight transportation (coexistence of passenger/freight routes and suburban train network/general network, freight terminals, length of stations and emergency exits/side-tracks, auxiliary lines in main axles, ring roads to big cities, maximum heights...).	2.09
RAIL2	RAILWAY	Degree of integration/connection of current rail network to the European rail freight network	2.13
RAIL3	RAILWAY	Level of traffic management and availability/assignment of rail network lines, rail terminal management	2.15
RD5	ROADS	Level of existence of truck parking lots patrolled by security in Galicia	2.18
NS2	NORMATIVE SYSTEM	Level of diversity of current regulation in different countries with respect to working hours, freight and heights (gauge)	2.25
NS1	NORMATIVE SYSTEM	Level of incidence of the specific normative framework, and existent diversity depending on the country (working hours, (horarios de traballo, cargo axles, gauge...)	2.29
NS3	NORMATIVE SYSTEM	Level of incidence of normative framework on fiscal, financial, labour, international trade aspects,... on the innovative capacity of the business	2.31
RD3	ROADS	Condition of road surface ,route, signposting, pavements and security system for Galician roads network	2.34
AIR3	AIR TRANSPORT	Level of connection of Galician airports to the national and international freight transportation network	2.38
AIR2	AIR TRANSPORT	Level of interrelation and complementarity of Galician airports for freight transportation	2.39
AIR1	AIR TRANSPORT	Current condition of airport infrastructures in Galicia for freight transportation (infrastructures for the aircraft movement, buildings and facilities, hub airports, vehicle access and parking areas, airport service, road and rail access...)	2.43
NS6	NORMATIVE SYSTEM	Level of adjustment of educational system to the needs of companies in the field of innovation (vocational training, universities,...)	2.45
NS7	NORMATIVE SYSTEM	Level of use of programs and subsidies to R&D+I specifically for activities related to logistics and transportation	2.46
MD8	MARKET DYNAMICS	Degree of incidence of the reduced dimension of a great number of companies which develop logistics and transportation activities in Galicia	2.48
RD2	ROADS	Situation of internal Galician road connection network, ring roads to city centres, and access to industrial estates, ports and airports	2.48
RAIL4	RAILWAY	Level of access to licenses, traction, driving personnel, homologated formation centres and maintenance of on wheel material on behalf of logistics operators	2.50
AIR4	AIR TRANSPORT	Level of service quality (security, fluency, efficiency and economy) in the airports in Galicia (taxes, inspection,...)	2.50
INF3	GENERAL INFRASTRUCTURE	Degree of development of road-port-rail-airport connections in Galicia in order to favour inter-modality	2.51
		AVERAGE 44 BARRIERS	**2.55**

CODE	TOPIC	BARRIERS	Averg
POR1	PORTS	Level of interrelation and complementarity of Galician ports with respect to innovation boost in companies of logistics and transportation	**2.59**
MD2	MARKET DYNAMICS	Geographical location of Galicia and accessibility to new international trade markets	**2.59**
POR6	PORTS	Degree of quality of services in Galician ports ("single window", scheduling, rates,...)	**2.59**
RA9	RELATIONAL ASPECTS	Global image which companies of the transportation and logistics chain have of R&D+I entities (universities, technological centres,...) in Galicia	**2.62**
RA11	RELATIONAL ASPECTS	The degree of response of R&D+I entities (universities, technological centres,...) in Galicia to the needs of innovation in strategy, organization and commercialization of companies of the transportation and logistics chain in Galicia	**2.64**
POR2	PORTOS	Degree of integration/connection of Galician ports in the system of short distance sea transport (Short Sea Shipping) and of motorways of the sea	**2.65**
RA10	RELATIONAL ASPECTS	The degree of response of R&D+I entities (universities, technological centres,...) in Galicia to the needs of technological innovation of companies of the transportation and logistics chain in	**2.70**
RA4	RELATIONAL ASPECTS	Level of existence and diffusion of innovative activities among logistics and transportation companies in Galicia: innovation prizes, presentation of innovative products, improved practice,…	**2.70**
RA8	RELATIONAL ASPECTS	Degree of interrelationship among logistics and transportation companies, universities and technological centres for the creation of networks and stable cooperation structures orientated towards innovation which favour transfer of knowledge, technology and results	**2.72**
POR3	PORTS	Degree of development of port infrastructures in Galicia (mooring, loading and unloading areas and specialized and differentiated storage, specialized equipment,...)	**2.72**
POR5	PORTS	Level of development of freight services (loading and unloading, storage, processing, inspection, security and protection, scheduling,...)	**2.73**
HC9	HUMAN CAPITAL	Level of qualification of public entities personnel with competence in logistics and transportation to facilitate innovation in companies of this business activity	**2.80**
INF2	GENERAL INFRASTRUCTURE	Degree of development in Galicia of business site, logistics platforms, dry ports, logistics and central freight exchange parks with basic services(petrol stations, hotels, cafeterias,...)	**2.82**
TC1	TECHNOLOGICAL AND STRUCTURAL CAPITAL	Level of existence of R&D+I departments, annual plans or specific budgets aimed at innovation in logistics and transport companies	**2.82**
RD1	ROADS	Situation of Galician road network in connection with plateau, with the North (TransCantábrica) and Portugal	**2.85**
SF3	SOCIO-CULTURAL FRAMEWORK	Level of culture, rigor and respect for economic and social agents over the protection of industrial property rights (use of patents, licences, utility models,…) on behalf of companies	**2.85**
TC13	TECHNOLOGICAL AND STRUCTURAL CAPITAL	Degree of financial capacity of companies of the transportation and logistics chain in Galicia for the development of innovation	**2.86**
POR4	PORTS	Level of development of services to vessels/ships (navigation assistance, trailers, mooring/cast off, supplies, security and protection,...)	**2.90**
TC12	CAPITAL TECNOLÓXICO E ESTRUTURAL	Level of existence in companies of tools/resources necessary to boost innovation and its protection (models of utility, patents, licenses,...) on behalf of companies of the transportation and logistics chain	**2.90**
TC2	CAPITAL TECNOLÓXICO E ESTRUTURAL	Degree of adjustment and flexibility of organizational structure to develop and promote the innovative capacity in the whole organization	**2.94**

CODE	TOPIC	BARRIERS	Averg
MD3	MARKET DYNAMICS	Degree of development of inter-modal freight transportation systems	**2.95**
RA7	RELATIONAL ASPECTS	Degree of dynamization of innovation and successful experience transfer on behalf of logistics and transportation associations	**2.95**
RA1	RELATIONAL ASPECTS	Degree of attainment of activities to analyse positioning on the market facing competence (Benchmarking)	**2.95**

Source: González Gurriarán, J. and Figueroa Dorrego, P. (2008): Plan de Dinamización da Innovación nas actividades de loxística e transporte de mercadorías de Galicia

The set of 44 aspects assessed as barriers (average 2.55) have greater intensity in their condition than the 35 aspects considered as facilitators (which have a consideration close to neutral with an average of 3.25). Certain balance exists between the number of aspects that are situated below and above the barrier average (21 and 23, respectively). Nevertheless, the minimum value obtained is 1.86 (minimum of 1) and eighteen are the aspects situated with value under 2.50. This data illustrates the intensity with which these innovation hold backs act in logistics and freight transportation companies in Galicia.

More frequently and very significantly that **almost all aspects related to some type of infrastructure are among the principal barriers.** It should be pointed out that, in many of these cases, the aspects do not directly entail hold back of innovation but a **barrier to the general development of these activities.** Therefore, they have a negative effect on global company competitiveness which **limits** the possibility of **appointing more resources** to the development of **innovation strategies.**

The principal barriers originate from **insufficient railway development and related services** in Galicia for freight transportation, as three of the four aspects of this topic are situated among the first six barriers in intensity: the **Current condition of the network** (RAIL1), the insufficient **degree of integration/connection with the European network** (RAIL2) and the low **Level of assistance offered by current traffic and terminal management** (RAIL3). In fact, these aspects **particularly affect the slow development of inter-modality** demanded by European strategies in the White Paper on Transportation, limiting competitiveness in client business activities situated in Galicia and **holding back contribution to sustainability** on behalf of freight transportation activities in Galicia. This implies the pertinent need to improve and innovate.

Another two infrastructures which slow down greater development of logistics and transportation in Galicia are those regarding **roads and communication routes** in general (RD4,RD5,RD3,RD2) and those related to **air transport** (AIR3, AIR2, AIR1). In fact, four of the five aspects related to **roads,** appear among those with greater intensity below average. Specially linked to demands made by transport companies (tolls, parking lots patrolled by security, condition of road surface , signposting, ring roads and access to industrial estates) for improvement in their activity. Regarding **Air transport**, the barriers focus on **low level of service and competitive rates** for logistics and freight transportation activities which implies hold back of the development of innovations associated to this mode of transport (agility, time of response, control of freight transportation conditions…).

It should also be specially pointed out that the seven aspects of the **normative system** area are situated among the **first** sixteen **barriers in intensity**. On the one hand,

businessmen/women consider that **sufficient support on behalf of public politics does not exist** in the development of innovation in these activities (SN5). In addition, they consider the **level of current bureaucracy to be elevated,** specially in small companies (NS4). On the other hand, they also consider that **incidence of the normative framework in general, implies a relevant restriction** of innovation development: **normative diversity** in different countries (NS1 and NS2), **the tax and labour framework** also implies an important restriction (NS3) as many times they do not perceive clearly the correct application of taxes collected on relevant improvements in communication infrastructures in their areas of performance.

The global assessment of barriers regarding **ports,** highlights this topic area as the **barriers which have less incidence.** Without reaching the consideration of facilitator, the six aspects are situated over the barrier average (2.5) and therefore, as values close to neutrality. In any case ,among the values with greater intensity of barrier, the **level of interrelation and complementarity of Galician ports** regarding the impulse of innovation in logistics and transportation companies (POR1). In this sense, the businessmen/women consulted consider that a coordinated policy from the managers of these infrastructures is not being developed without perceiving a clear investing effort based on port innovation (information and communication technologies, advanced company services, modernizations and technological updating…). On the other hand, with the **same level of relative barrier,** the incidence of **degree of quality of services in Galician ports regarding innovation development** (POR6) is set. This implies a need for relative improvement bearing in mind the significant importance of this mode of transport in freight logistics. This aspect is particularly relevant for companies of these activities as in many cases, the orientation towards quality of service and customer service/time of response is to a certain extent restricted by the systems and information received from port managers. In the case of technological innovation, on some occasions, it is necessary for the port manager to adopt the same technological solution. As for information systems, the need to also integrate port systems into information management on behalf of the companies should also be taken into account as well as interoperability among the diverse systems used by companies, which could imply a certain hold back to innovation.

In this general framework of barriers, it is important to point out that one of the principal barriers in the opinion of businessmen/women is the **incidence of the reduced dimension of a great number of companies**, regarding **market dynamics** (MD8). This implies less capacity to make good use of the facilitators in order to develop innovation. Also in this aspect, **the geographical location of Galicia** is emphasized as a relevant barrier (MD2) taking into account the incidence of current condition of the main communication infrastructures previously commented.

Within **intellectual capital** in the innovation system, the **relational** aspects receive global consideration of relative intensity as barrier (seven of the eleven aspects are situated over the barrier average). What specially stands out is that among the relational aspects assessed with greater intensity as barrier, those related to R&D+i company-entity interrelation (RA11, RA10, RA8) can be found. At large, companies of these activities have **few relationships with these entities** (universities, technological centres…), generally due to the fact that they consider they **do not have a special need to develop innovations in collaboration with them.** This low degree of orientation to go through **existent R&D+i entities** in Galicia could be

motivated because these entities **are not responding adequately to innovation needs** in these logistics and freight transportation activities, **without the existence of research groups or centres** in this area. This implies an extremely relevant restriction taking into account **the scarce financial capacity** manifested by the companies consulted (TC13), which request greater support from innovation support services (companies, universities, technological centres…). On the other hand, it can also be seen that **R&D+i entities in Galicia specialized** in the area of innovation in logistics and freight transportation **do not exist**.

With respect to relational aspects, it is also important to mention the **insufficient degree of dynamization of innovation from** logistics and transportation **business associations** (RA7). The fact that its assessment is situated at neutral levels, indicates that it is not acting as an innovation motivating instrument. In this sense, it is a particularly important relational element since it is a weak link with the remaining innovation system agents when covering the innovation needs of companies.

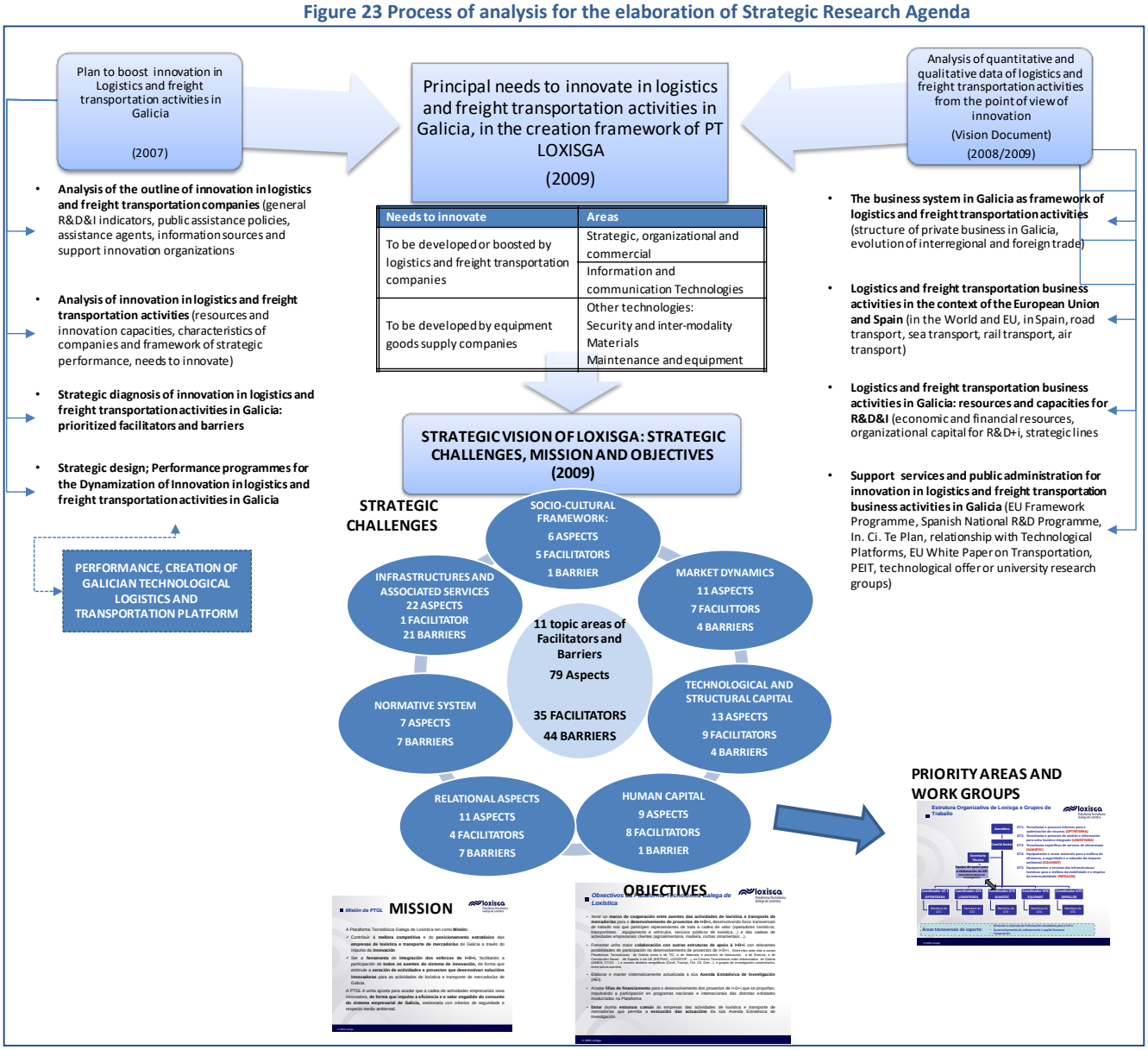
Another relational aspect with values close to neutrality and which therefore does not have a positive effect on the development of innovations is the **insufficient degree of realization of activities to analyse positioning on the market facing competence**, from both the strategic and technological point of view (RA1). Taking into account the scarce financial capacity of companies, it seems necessary to set up this type of activities through cooperation. As an example, Technological Platforms which are being set up both in the EU and Spain and Galicia as instrument of coordination of public support and of elements of cooperation between companies and R&D+i entities can be seen. In this sense, it is necessary to develop competitive intelligence cooperation performances aimed at strategic and technological monitoring in this framework of limited individual resources of companies.

With respect to **structural capital,** what also stands out is the level of relative barrier which some fundamental aspects have for the optimum development of innovations. In this way, the **low level of existence of R&D+i departments in companies** should be pointed out or, in its case, functions which assume this responsible (TC1). Therefore, as this organizational unit does not exist, neither are annual plans or specific budgets for innovation provided, turning out to be a barrier of certain intensity. On the other hand, **there also does not seem to be sufficient degree of adjustment to organizational structure** to develop and promote the innovative capacity in the whole organization (TC2). Although simple structures can be counted on with few organizational levels in most companies, they are basically functional structures, barely orientated to process or service and therefore they have a low level of awareness of innovation development.

4.2 Mission and objectives

Taking into account the analysis of logistics and freight transportation activities carried out as well as the need for innovation and the facilitators and barriers which perform, the process was developed for the elaboration of Loxisga Strategic Research Agenda which, previously, had determined its mission and objectives as well as the priority R&D+i areas for the setup of its work groups.

Figure 23 Process of analysis for the elaboration of Strategic Research Agenda



Source: personal elaboration

In this way, the Galician Technological Platform of logistics (Loxisga) brings forward as **mission:**

- ✓ To contribute to **competitive improvement** and **strategic positioning** of **logistics and freight transportation companies** in Galicia through an **innovation** boost
- ✓ To be the **integration tool of R&D+i efforts,** facilitating the participation of **all the agents of the innovation system** in such a way that it stimulates the **creation of activities and projects which develop innovative solutions** for logistics and freight transportation activities in Galicia.

Loxisga is a wager to succeed in the chain of business activities being innovative, **in such a way that it boosts efficiency and value added of the whole business system in Galicia,** negotiating with security criteria and consideration to the environment.

In this way, its **objectives** are:

- To create a **framework of cooperation among logistics and freight transportation agents** for the **development of R&D+i projects,** developing cross-section work forums in which representatives of the whole chain of value (logistics operators, carriers, equipment and vehicles, public logistics services…) and chains of client business activities (food and agriculture, wood, ornamental stones…) participate.
- To promote greater **collaboration with other structures of assistance to R&D+i** with relevant possibilities of participation in the development of R&D+i projects. Among them, other Technological Platforms in Galicia should be named like the ICT, Production materials and processes, Energy, Shipbuilding… in Spain and the EU (ERTRAC, LOGISTOP…), the most connected Technological Centres in Galicia (AIMEN, CTAG...), and in other geographical areas (Cenit, Transyt, Cel, Ctl, Grel...) and university research groups, among other agents.
- To create and maintain systematically updated its **Strategic Research Agenda** (SRA).
- To obtain **financing Lines** for the development of the R&D+i projects brought forward, encouraging participation in national and international programmes of the different entities involved in the Platform.
- **To grant** logistics and freight transportation activity companies a **common structure** which permits the **carrying out of the performances** of its Strategic Research Agenda.

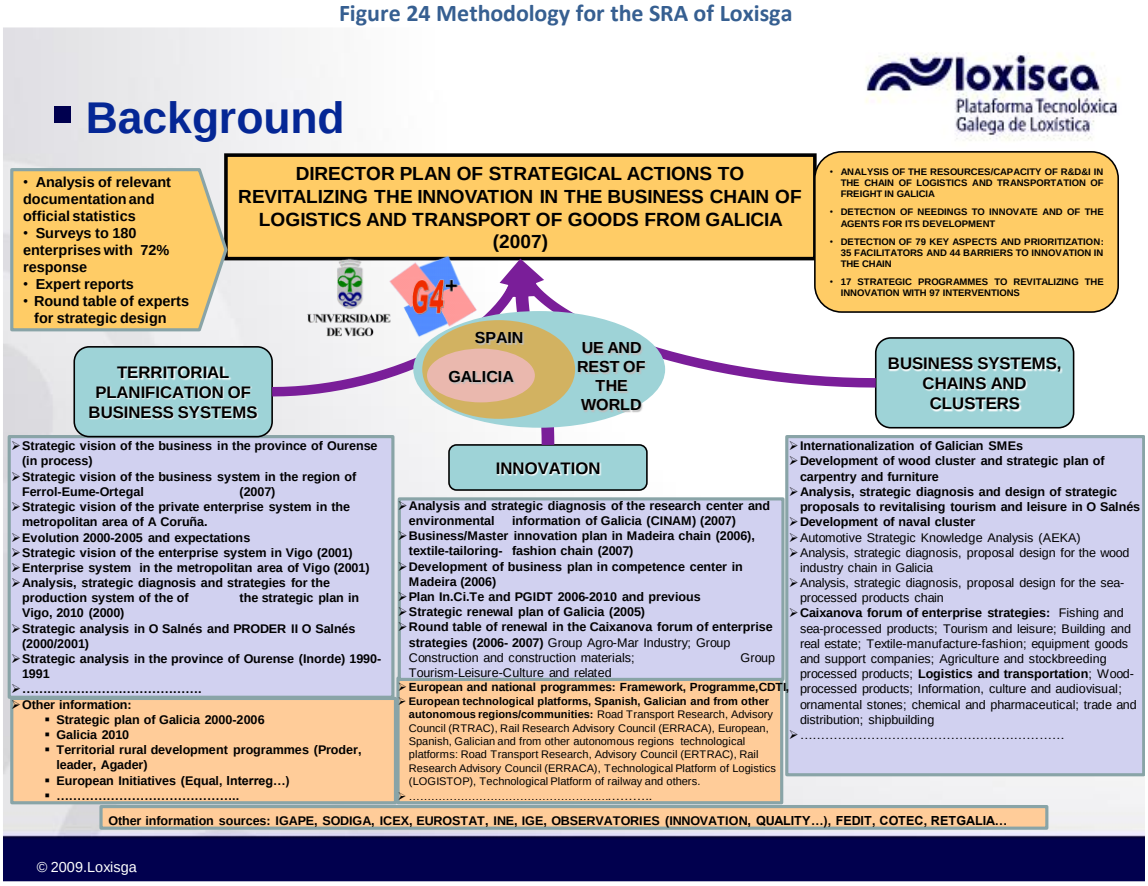
The Technological Platform of Logistics will develop a participatory process for the creation of its research priorities which will be gathered in the document named Strategic Research Agenda.

5 STRATEGIC R&D+I AGENDA

5.1 Methodology for Strategic R&D+i Agenda design (SRA)

For the **identification of priority R&D+i areas of Loxisga** as well as **for the design of Strategic Lines**, a **consulting process and optimization of works** already developed on logistics and freight transportation was followed. Among them, the "Plan de Dinamización da Innovación nas actividades de Loxística e Transporte de Mercadorías de Galicia" (González Gurriarán, J. and Figueroa Dorrego, P., 2008), developed by the technical team of University of Vigo stands out, or the works developed by Observatory for Industrial Technology Foresight (Observatorio de Prospectiva Tecnológica e Industrial-OPTI (2001)). The methodological process followed can be seen in schematic form in figure 24.

Figure 24 Methodology for the SRA of Loxisga



Source: personal elaboration

In the elaboration process of this Agenda, a **sectorial diagnosis of R&D+i in these activities** was initially synthesized, to at a later time offer response to their needs for innovation. The **need to innovate** in these activities was also assessed, as were the **35 facilitators and 44 barriers to their development** (see epigraph 4.1 Principal strategic challenges for the dynamization of innovation in logistics and freight transportation business activities in Galicia). Later on, the **Mission** was elaborated and the main **Objectives** of the Patform were defined with a temporary horizon in the short, medium and long term, all of

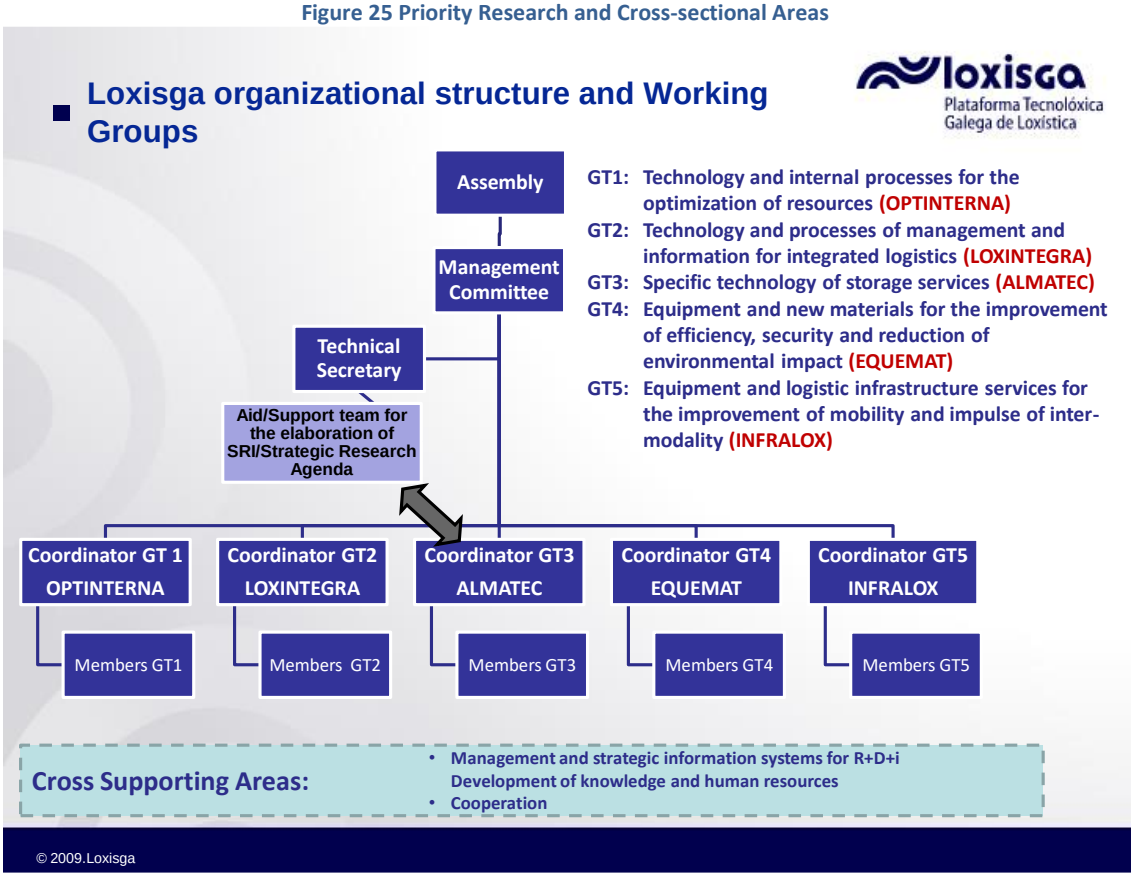
which was presented to the Executive Committee in November 2008. With all this information, advances were made in the **definition of the 5 R&D+i priority areas** and initial strategic lines in January and February 2009.

Finally, the organizations involved, after careful consideration and sharing of the lines and performances to be developed in a first work stage (March-April 2009), reached the **final definition of R&D+i priorities** for the next years (named Strategic Research Agenda), which is introduced in the following epigraphs. These priorities are expressed in **21 Strategic Lines** which were matter of **colloquium and assessment in a plenary session** of the members of the Work Groups which took place on 28th May 2009. In this session, the members **assessed both priority and urgency** of each of the Strategic Lines. The results of this assessment can be seen in epigraph "5.3 Assessment of priority and urgency of the Strategic Lines of the Agenda". This information implies an **important starting point** in this creation stage of the Technological Platform of Logistics in order to develop necessary actions for its future consolidation.

5.2 Priority R&D+i Areas and Strategic Lines

Loxisga defined **5 R&D+i Priority Areas,** and organized its structure based on them (see figure 25). Some **Thematic Cross-sectional Areas** of support to R&D&I activities were also contemplated as necessary. The 5 Priority Areas and 3 Cross-sectional areas are the following:

Figure 25 Priority Research and Cross-sectional Areas



Source: personal elaboration

1. **Technologies and internal processes for the optimization of resources** (lean manufacturing, six sigma, instruments for the planning of trade and/or operations…);
2. **Technologies and processes of management and information for integrated logistics** (relation among logistic operators and carriers, relation of companies of logistic activity and transport with client companies, end of logistics chain processes , relation with public administrations in transport management…)
3. **Specific technologies of storage services** (automated warehouse management systems, maintenance systems, classification and arrangement, manipulation of goods in warehouse/store and when loading and unloading…)
4. **Equipment and new materials for the improvement of efficiency, security and reduction of environmental impact** (vehicles, packaging, energetic efficiency, security systems,….)
5. **Equipment and logistic infrastructure services for the improvement of mobility and impulse of inter-modality** (infrastructure equipment and port services, airport, and railway, equipment and logistic platform services, equipment and communication route services…)

- **Thematic Cross-sectional Areas** of support to R&D+I activities. Their performance is required to offer an appropriate response to the needs of the previous 5 Priority Areas. The cross-sectional areas of support to innovation looked at are 3:

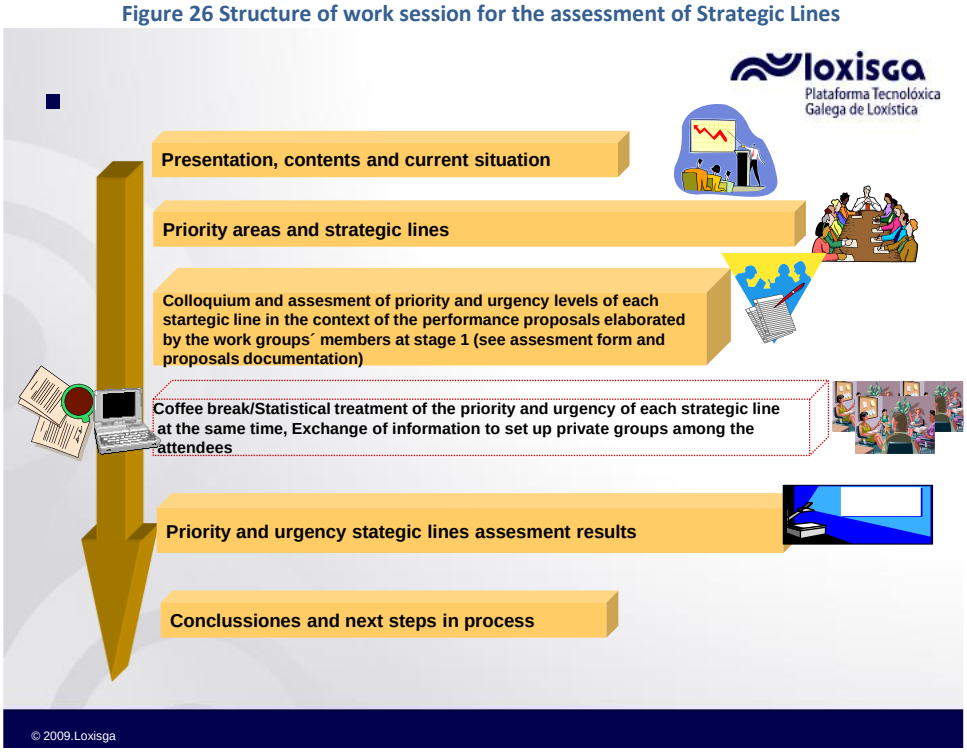
    - **Management and strategic information systems for R&D+i**, as are the development of strategic monitoring services or technological monitoring in a transversal manner for the group of specific activities (logistics operators, carriers, warehouse managers, port infrastructures managers...)

    - **Cooperation.** Although R&D+i projects to be developed in Priority Areas are considered to be co-operative in themselves, in this area, they incorporate actions/performances about general sensitization in companies, about inter-corporate cooperation, the development of performance in cooperation with other Technological platforms (both at an international level and in the rest of Spain) or performances which imply combined exploitation regarding the market of the results obtained in the Priority Areas.

    - **Development of knowledge and human capital,** incorporating the performances concerning formation and capacitation of human capital in new technologies which are aimed to be established in cooperative projects derived from R&D+i Priority Areas as well as other performances which imply improvement of human resources competences, paying special attention to the performance in the management of innovation processes in companies.

For the priority assessment of the strategic lines, a plenary session was held with the members of the above mentioned 5 workgroups. The **structure of this session,** held on 28th May 2009, is set in Figure 26, which registered the **assistance of 28 experts** (over 82% assistance). At the beginning of the session, the technical group presented **the Priority Areas and the Strategic Lines** brought forward from all the information obtained in the process. Then, a brief discussion was held in which each **entity which put forward some cooperative project** in the first work stage of the groups, **synthesized their idea.** These project proposals served to **illustrate the Strategic Lines,** represented in the internal document available to Loxisga members, named "Ideas de proxectos colaborativos enviados polos membros dos Grupos de Traballo".

Figure 26 Structure of work session for the assessment of Strategic Lines



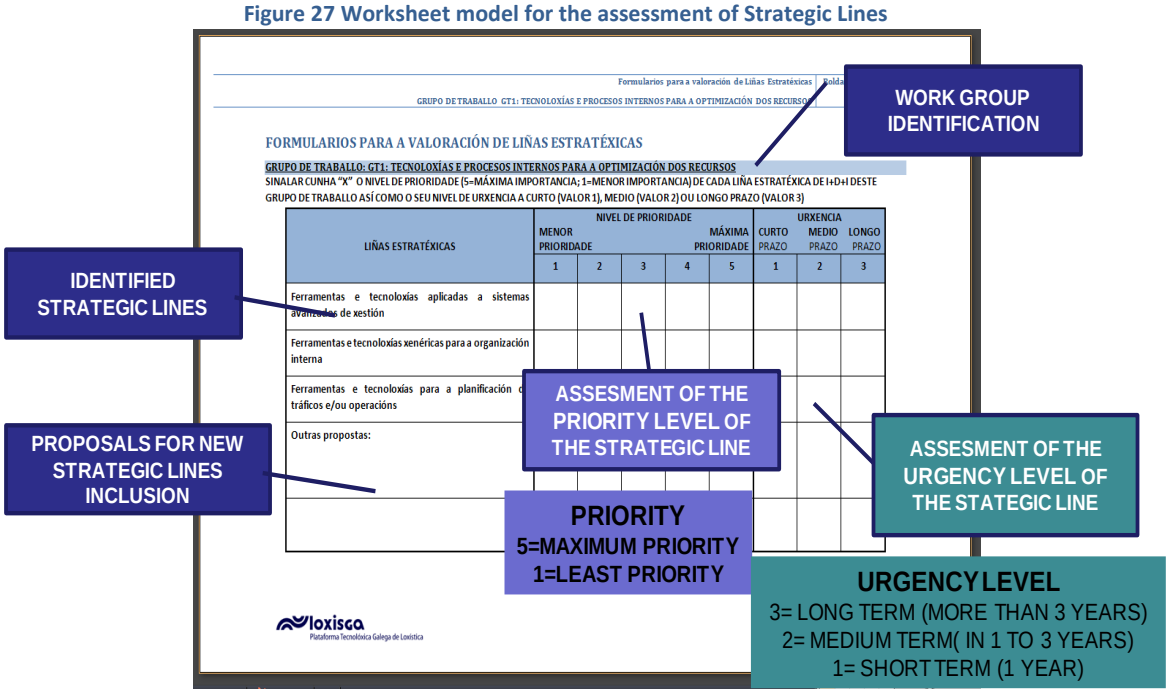
Source: personal elaboration

Precisely in the numerous interventions made by the members in the plenary work session, what greatly stands out is the utility of **Technological Platforms** as **a meeting point between the needs for innovation in companies and the offer of technological services which technological centres and university research groups put at the disposal of companies.** In fact, as a result of the interventions, clear areas of collaboration for the development of combined projects were elaborated.

Later, the members **assessed each of the Strategic Lines in terms of priority and urgency**, based on the expected work sheet (see Figure 27). Each expert had to assess the priority of each Line, granting values from 5 (maximum priority) to 1 (minimum priority). In addition, they should also assess the urgency to develop the Strategic Line with numerical values of 1 (short term), 2 (medium term) and 3 (long term). The results of these assessments are included in the following epigraph 5.3.

The important details obtained from the drawing up of the Strategic lines were incorporated as reference performances in the information included in epigraph “5.4 Records of Strategic Lines and some reference performances”.

Figure 27 Worksheet model for the assessment of Strategic Lines



Source: personal elaboration

In the development of stage 1 of the work groups carried out between 9th March and 30th April 2009, a total of 34 organizations took part (22 companies, 3 technological centres and 9 university research groups). 35 proposal ideas for cooperative projects were obtained, with the following detail:

- In WG1 on **technologies and internal processes** for the optimization of resources, **9** proposals were obtained.
- In WG2 on technologies and processes of **management and information** for integrated logistics, **10** project ideas were put forward.
- In WG3 about Specific technologies of **storage services**, **5** project proposals
- In WG4 about **equipment and new materials** for the improvement of efficiency, security and reduction of environmental impact, **5** project proposals.
- And in WG5 about equipment and **logistic infrastructure** services for the improvement of mobility and impulse of inter-modality, **6** project proposals were obtained.

These proposals are gathered in a Loxisga internal document named "Ideas de propostas de proxectos colaborativos enviados polos membros dos grupos de traballo".

The following Table 24 gathers in a structural manner the 21 defined Strategic Lines fitted into the 5 Priority Areas which were matter of discussion and assessment.

Table 24 Strategic Lines and R&D+i Priority Areas of Loxisga

PRIOITY AREA	STRATEGIC LINES	
WG1. TECHNOLOGIES AND INTERNAL PROCESSES FOR THE OPTIMIZATION OF RESOURCES	**SL1.1**	**Instruments and technologies applied to advanced management systems**
	SL1.2	**Instruments and generic technologies for internal organization**
	SL1.3	**Instruments and technologies for traffic and/or operations planning**
WG2. TECHNOLOGIES AND PROCESSES OF MANAGEMENT AND INFORMATION FOR INTEGRATED LOGISTICS	**SL2.1**	**Safety and monitoring in the logistics chain**
	SL2.2	**Information and Communication Technologies for the creation of value in logistics and transportation services**
	SL2.3	**Standards for the exchange of information among agents of the logistics and transportation activity chain**
	SL2.4	**Systems for integral logistics analysis of risks and difficulties regarding transport**
	SL2.5	**Shipping management**
	SL2.6	**Inverse Logistics**
WG3. SPECIFIC TECHNOLOGIES OF STORAGE SERVICES	**SL3.1**	**Technologies and systems for the reception, location and physical management of freight**
	SL3.2	**Technologies and systems for the capture and/ or reception of orders**
	SL3.3	**Technologies and systems for the preparation of orders and manipulation of freight**
	SL3.4	**Technologies and systems for stock control**
WG4. EQUIPMENT AND NEW MATERIALS FOR THE IMPROVEMENT OF EFFICIENCY, SAFETY AND REDUCTION OF ENVIRONMENTAL IMPACT	**SL4.1**	**Information exchange systems between transport elements and agents of logistics-client activities**
	SL4.2	**Equipment, systems and technologies in transport elements**
	SL4.3	**Systems and technologies of packaging and industrial containers**
WG5. EQUIPMENT AND LOGISTIC INFRASTRUCTURE SERVICES FOR THE IMPROVEMENT OF MOBILITY AND IMPULSE OF INTERMODALITY	**SL5.1**	**Information and Communication Technology equipment in infrastructures and public logistics services**
	SL5.2	**Innovations regarding simplified administration concerning transportation activities**
	SL5.3	**Intelligent systems for freight transfer**
	SL5.4	**Public infrastructures and equipment related to logistics of "last kilometre"**
	SL5.5	**Advanced statistics methods for transport and infrastructure planning**

Source: personal elaboration

5.3 Assessment of priority and Urgency of Agenda Strategic Lines

In Table 25 the final results of the assessment of priority and urgency of the 21 Strategic Lines are specified. This listing is ordered from greater to lesser priority, incorporating also in the columns on the right-hand side the order and value of urgency.

The **high level of priority** obtained from the group of 21 defined Strategic Lines (3.69 over a maximum of 5). The amplitude of the range of values is reduced which in addition verifies the relevant level of priority of the group, with a maximum value of 4.19 and a minimum of 3.00. These evaluations **verify** that in the **course of the process, the relevant aspects for the impulse of R&D+i in logistics and transportation activities** have been identified.

Among the **principal Strategic Lines** in terms of **priority**, the **first eleven** stand out with **values equivalent or superior to 3.85.** These eleven lines try to develop R&D+i projects on aspects like **the application of new information and communication technologies** on various processes of the logistics chain of value (**SL1.3**- traffic planning, **SL4.1**- Information exchange systems between transport elements and agents, **SL3.1**- Reception services, location and physical management of freight, **SL3.4**- Stock control, **SL2.1**- Safety and monitoring in the logistics chain). The **lines** related to the **public administration area** (**SL5.2**- **Administrative simplification in** transport paperwork) and in **the proper transport elements and shipping management (SL4.2, Sl2.5).**

Regarding **urgency,** it can be observed that the temporary period in which these innovations should be achieved is in the **short and medium term** (average of 1.75, being 1=short term and 2= medium term). None of the strategic lines, in the opinion of the attendants, should be developed in the long term, reason why it can be said that the important need to obtain cooperative innovative solutions exists, in a relatively short period of time. The **lowest value of urgency is 1.42** (intermediate value between short and medium term) and the **highest is 2.20** (being 3= long term). A **correspondence between values of urgency and priority** can also be appreciated, with the existence of some minor significant changes in the order. In this sense, the only thing left to mention is that the Strategic Line about "Standards for the exchange of information among agents of the logistics and transportation activity chain" (SL2.3) is considered among those with most priority. However, the solutions expected are considered more in the medium term. This evaluation can be explained by the **important need to share information** among all the agents involved and the need to carry out adequate adaptations to the specific characteristics of each business activity which will bring about a greater period of development.

Table 25 Assessment of priority and urgency of Strategic Lines

Cod	STRATEGIC LINES	5=maximum priority 1=least priority		1=short term 2= medium term 3= long term	
		Order prior.	PRIORITY VALUE	Order urg.	URGENCY VALUE
SL1.3	Instruments and technologies for traffic and/or operations planning	1	4.19	3	1.48
SL4.1	Information exchange systems between transport elements and agents of logistics-client activities	2	4.11	1	1.42
SL3.1	Technologies and systems for the reception, location and physical management of freight	3	4.05	4	1.57
SL5.2	Innovations regarding simplified administration concerning transportation activities	4	4.00	2	1.45
SL4.2	Equipment, systems and technologies in transport elements	5	4.00	6	1.60
SL2.2	Information and Communication Technologies for the creation of value in logistics and transportation services	6	3.91	8	1.64
SL2.1	Safety and monitoring in the logistics chain	7	3.86	5	1.57
SL2.3	Standards for the exchange of information among agents of the logistics and transportation activity chain	8	3.86	13	1.77
SL3.4	Technologies and systems for stock control	9	3.85	7	1.60
SL2.5	Shipping management	10	3.85	10	1.68
SL3.2	Technologies and systems for the capture and/ or reception of orders	11	3.80	11	1.70
SL4.3	Systems and technologies of packaging and industrial containers	12	3.79	15	1.89
SL1.1	Instruments and technologies applied to advanced management systems	13	3.71	14	1.86
SL3.3	Technologies and systems for the preparation of orders and manipulation of freight	14	3.55	9	1.65
SL1.2	Instruments and generic technologies for internal organization	15	3.52	12	1.71
SL5.3	Intelligent systems for freight transfer	16	3.43	17	2.00
SL2.4	Systems for integral logistics analysis of risks and difficulties regarding transport	17	3.37	18	2.00
SL5.1	Information and Communication Technology equipment in infrastructures and public logistics services	18	3.32	16	1.89
SL5.4	Public infrastructures and equipment related to logistics of “last kilometre”	19	3.20	19	2.00
SL5.5	Métodos estatísticos avanzados para o planeamento do transporte e das infrastructures	20	3.05	20	2.00
SL2.6	Inverse Logistics	21	3.00	21	2.20
		Priority average	**3.69**	**Urgency average**	**1.75**

Source: personal elaboration

From the previous assessment, in Figure 28 a map which permits the visualization of correspondence between both values is represented. In this way it is possible to synthesize two large groups of Strategic Lines (see heavy lines in Table 24):

A) One group of Strategic Lines, with **high priority** and an urgency need to be developed in the **short term.** All these lines have priority above the general average (3.69) and with urgency in an even shorter term (all with values under the 1.75 average, with the exception of Line SL2.3 which, with a value of 1.77 is closer to the average).

B) Another group with **a high priority too,** although less than the previous group and with a need to be developed so as to obtain **results in the medium term.** In this case, in the map, they are situated with inferior priority values or very close to the average or with urgency values in a longer period than average.

As can be observed, the Strategic lines gathered in designated **group A, correspond with the first Lines ordered according to priority,** which once again indicates the correlation existent in the assessment scale of the level of priority and urgency. The first two **(SL1.3 and SL4.1)** are quite interrelated making reference to innovations in the areas of traffic planning and/or operations and in information exchange systems between transport elements and agents, ideas closely linked to **integration of information and communication technologies in logistics services** (Strategic Lines SL2.2 and SL2.3). Therefore, ther are related to **the integration of systems in the supply chain,** with an important orientation to clients.

Within this integration of the supply chain, innovations in **reception, location and physical freight management are located among the most priority and urgent innovations (SL3.1)** and **in simplified paperwork** (SL5.2) related to transportation activities and also oriented to optimize the time-to-market, specially at the end of the logistics chain. It also involves the idea of **improving efficiency in the global process of freight management,** focusing on **warehouse management** (referred to in SL3.1 as well as in **SL3.4** and **SL3.2**). topics associated to **safety and monitoring** in the logistics chain also have a high priority and urgency level (SL2.1).

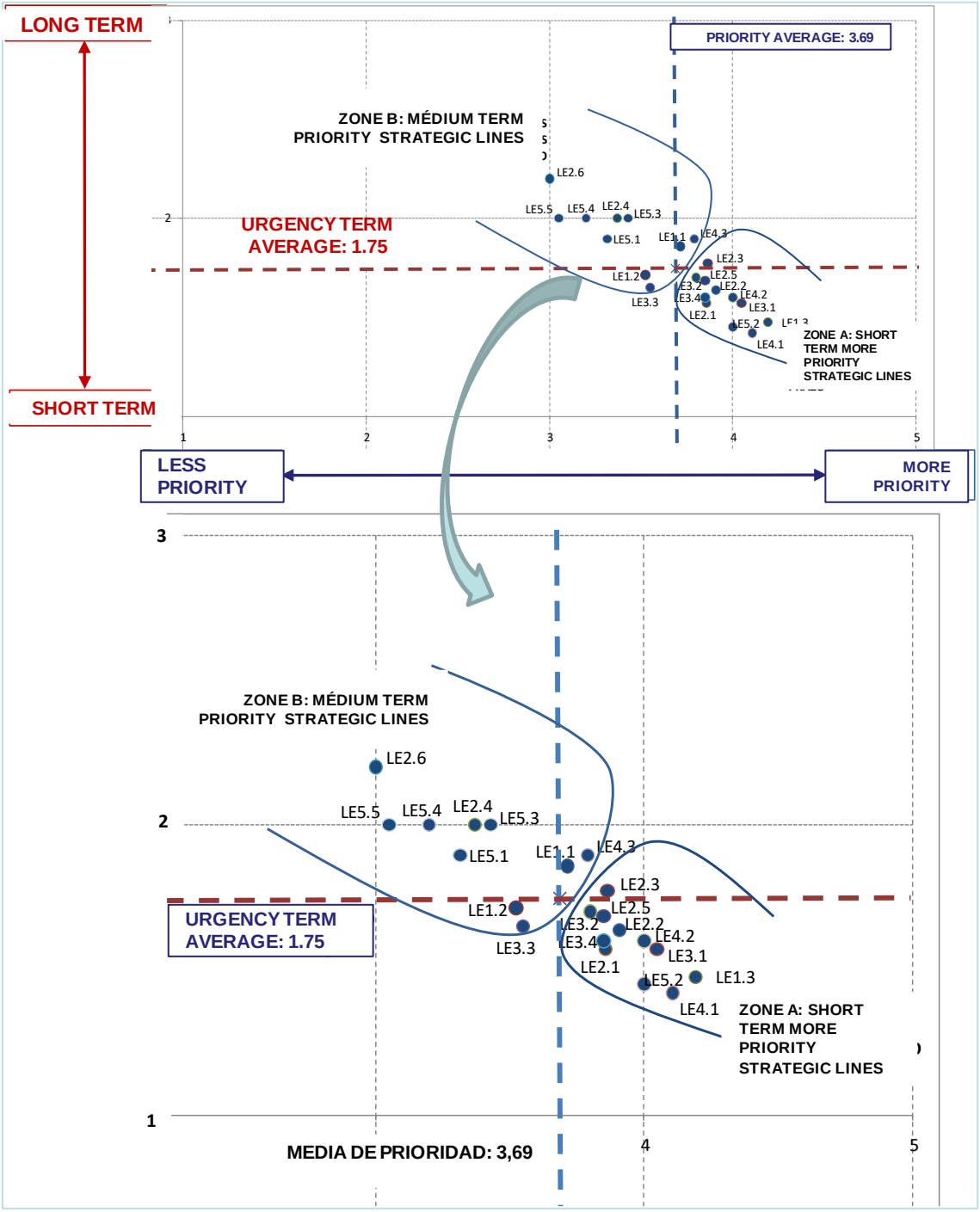
In the case of **designated group B**, it can be observed that most data is found in the top right hand quadrant which is formed from assessment averages of both dimensions, (with priority values lower than the global average and with an urgency term higher than the

average). There are **four cases which can be found in areas close to the above mentioned quadrant**.

On the one hand, there are **two** Strategic Lines which **reach values slightly over the priority average (SL4.3 and SL1.1) but** their **urgency** term is **superior to the average.** These Lines refer to systems and technologies of **industrial packaging and containers** and to tools and technologies applied to **advanced management systems** (quality, environment, risk prevention…). This can be explained in terms of the need to develop improvements with results in the medium term, through research and testing, specially in the container systems widely used in inter-modal transport. These innovations have important repercussions for relevant agents, so the period of time necessary is longer.

On the other hand, **another two Strategic Lines** were assessed with an **urgency level lower than the average, but priority values below average (SL3.3 and SL1.2)**. They refer to technologies and systems for **the preparation of orders and freight manipulation** (packaging and labelling systems, radio frequency location systems and Radio Frequency IDentification, (RFID), Optical Character Recognition (OCR)…) in which obtaining innovation result for their application in these business activities is quite urgent, specially because this type of innovations **should be carried out by the whole supply chain,** starting from the manufacturing companies of the products to be transported (logistics and transportation client activities). It also refers to **general internal organization technologies**, such as *lean manufacturing* or six-sigma, which as in the previous case, imply relevant changes which should be implemented in the short term in expectancy of positive in the medium term.

Figure 28 Perceptual map of the asessment of priority and urgency of the Strategic Lines



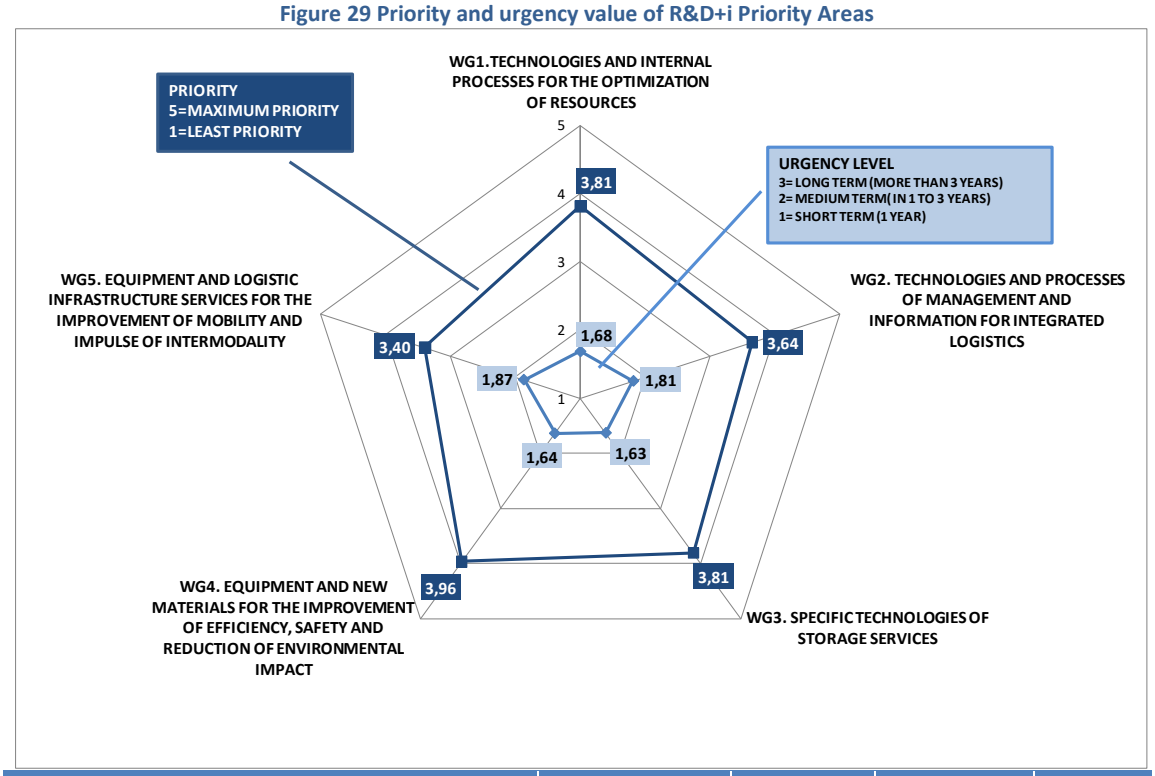
Source: personal elaboration

Finally, Figure 29 represents in a schematic way the average assessment of priority and urgency in the 5 R&D+I Priority Areas. These assessments take into account the average values of all the Strategic Lines included in that Area, therefore it has and influence in the number of Strategic Lines and the distribution of values among them. In terms of priority, the Area related to **equipment and new materials for the improvement of efficiency, safety and reduction of environmental impact** (WG4) reaches the maximum value (3.96). in this area both information exchange systems between transport elements and agents and necessary innovations in the transport elements are found in addition to systems of industrial packaging

and containers. These three Lines can be found among those with higher priority in the list. Regarding their urgency, keeping up with its priority, the innovations should be developed in a shorter term, appearing in the assessment scale in second position.

With the same priority value, **specific technologies of storage services** (WG3) and **technologies and internal processes for the optimizarion of resources** (WG1)areas follow. The first one reached the urgency value in a shorter term, whilst the second one reached in-between values.

Figure 29 Priority and urgency value of R&D+i Priority Areas



PRIORITY AREAS OF R&D+i	PRIORITY VALUE 5=more priority 1=less priority	ORDER OF PRIORITY Nº	URGENCY VALUE 1=short term 2=medium term 3=long term	ORDER OF URGENCY Nº
WG4 EQUIPMENT AND NEW MATERIALS FOR THE IMPROVEMENT OF EFFICIENCY, SECURITY AND REDUCTION OF ENVIRONMENTAL IMPACT	3.96	1	1.64	2
WG3 SPECIFIC TECHNOLOGIES OF STORAGE SERVICES	3.81	2	1.63	1
WG1. TECHNOLOGIES AND INTERNAL PROCESSES FOR THE OPTIMIZATION OF RESOURCES	3.81	3	1.68	3
WG2. TECHNOLOGIES AND PROCESSES OF MANAGEMENT AND INFORMATION FOR INTEGRATED LOGISTICS	3.64	4	1.81	4
WG5 EQUIPMENT AND LOGISTIC INFRASTRUCTURE SERVICES FOR THE IMPROVEMENT OF MOBILITY AND IMPULSE OF INTERMODALITY	3.40	5	1.87	5

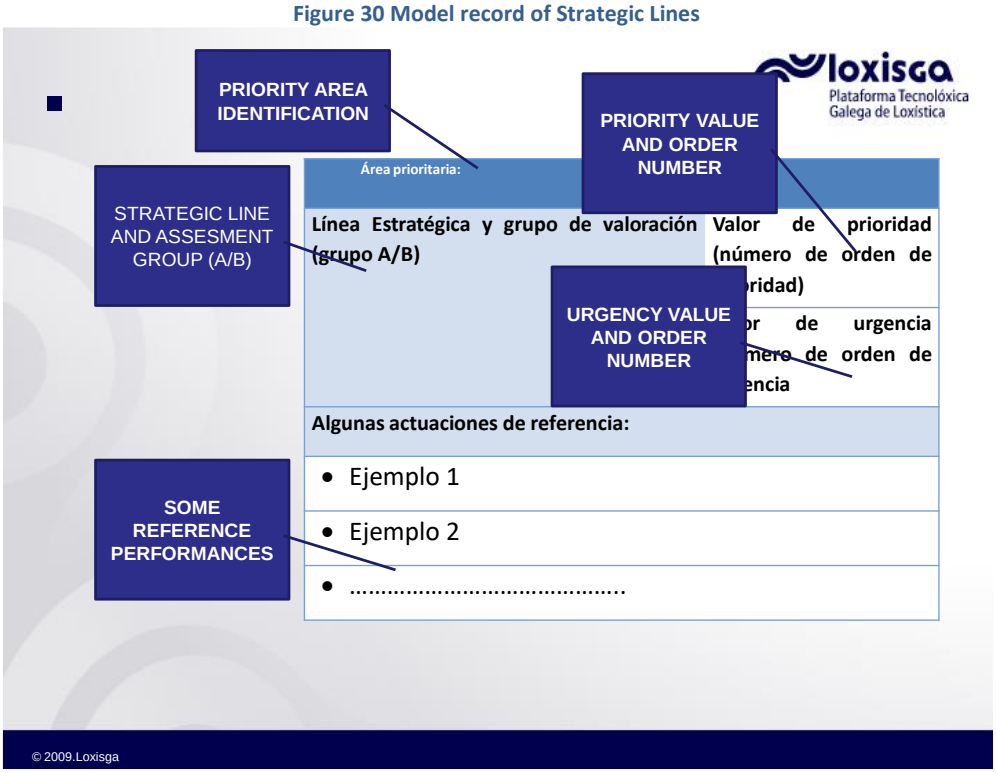
Source: personal elaboration

With in-between values of both urgency and priority, the **technologies and processes of management and information for integrated logistics** (WG2)are found. Finally, the **equipment and logistics infrastructure services for the improvement of mobility and impulse of intermodality** (WG5) area is situated as the one with lowest priority and with urgency in the medium term, since they are innovations to be developed mainly by public administrations and organizations (3.40 average).

5.4 Records of Strategic Lines and some reference performances

To follow, **records of Strategic Lines with some reference performances** (see model in Figure 30) are specified. These actions shows the type of projects looked at in each Line. This information is an important starting point in this first stage of creation of the Technological Platform of Logistics in order to develop the necessary performances for its consolidation in the future. It should be highlighted that the methodology designed in this process for the acquisition of project proposals will allow the update of the Strategic Agenda on the future. This could vary both in priority and urgency values as performances are being developed or as a consequence of changes which have taken place within the companies context and the Technological Platform.

Figure 30 Model record of Strategic Lines



Source: personal elaboration

When the Strategic Line belongs to **designated group A**, it will be **shaded red,** whilst when belonging to **group B**, it will be **blue**. **These records are ordered according to R&D+i Priotity Area and within these, according to their priority and urgency value** (the most priority and urgent first. Reference performances are based on the innovations needs found in the elaboration process of the Agenda, as well as on the project proposal ideas in the work groups.

On the other hand, a synthesized record of the so-called **Support Cross-sectional Areas**, with a **different format** to the previous one. In this case, the record includes **some example ideas** indicating in **the right hand side column the cross-sectional area it refers to.** The performances could be connected to more than one area.

RECORDS OF STRATEGIC LINES AND SOME REFERENCE PERFORMANCES

Priority area:
WG1. TECHNOLOGIES AND INTERNAL PROCESSES FOR THE OPTIMIZATION OF RESOURCES

STRATEGIC LINES IN ORDER OF PRIORITY

Code	STRATEGIC LINES	5=maximum priority 1=least priority		1=short term 2=medium term 3=long term	
		Order prior.	PRIOITY VALUE	Order urg.	URGENCY VALUE
SL1.3	Instruments and technologies for traffic and/or operations planning	**1**	**4.19**	**3**	**1.48**
SL1.1	Instruments and technologies applied to advanced management systems	**13**	**3.71**	**14**	**1.86**
SL1.2	Instruments and generic technologies for internal organization	**15**	**3.52**	**12**	**1.71**

Priority area: WG1. TECHNOLOGIES AND INTERNAL PROCESSES FOR THE OPTIMIZATION OF RESOURCES	
Strategic Line **SL1.3 INSTRUMENTS AND TECHNOLOGIES FOR TRAFFIC AND/OR OPERATIONS PLANNING** **(assessment group A)**	**Priority value (order of priority number): 4.19 (1)** **Urgency value (order of urgency number): 1.48 (3)**
Some reference performances:	
• Innovations in materials requirement planning systems(MRP) and in enterprise resource planning systems (ERP) and in external and internal environmental resources management systems *(*ERM).	
• Innovations in information and communication technologies for dynamics simulation of routes in terms of diverse information (traffic condition, location...).	
• ……	

Priority area: WG1. TECHNOLOGIES AND INTERNAL PROCESSES FOR THE OPTIMIZATION OF RESOURCES	
Strategic Line **SL1.1 INSTRUMENTS AND TECHNOLOGIES APPLIED TO ADVANCED MANAGEMENT SYSTEMS** **(assessment group B)**	**Priority value (order of priority number): 3.71 (13)** **Urgency value (order of urgency number): 1.86 (14)**
Some reference performances:	
• Innovations/improvements in management information systems for decision making. Special attention to its development in collaboration with expert research groups on instruments and systems applied to decision making, applying assessment techniques of investments, intangibles and real options.	
• Innovations/improvements in environmental management systems and risk prevention, emphasizing optimization of resources in these tasks.	
• Innovations/improvements in quality management systems, paying special attention to its integration in business management systems for decision making.	
• ……	

Priority area: WG1. TECHNOLOGIES AND INTERNAL PROCESSES FOR THE OPTIMIZATION OF RESOURCES	
Strategic Line **SL1.2 INSTRUMENTS AND GENERIC TECHNOLOGIES FOR INTERNAL ORGANIZATION** **(assessment group B)**	**Priority value (order of priority number): 3.52 (15)** **Urgency value (order of urgency number): 1.71 (12)**
Some reference performances:	
• Innovations regarding the implementation of *lean manufacturing* management systems: management philosophy focused on the reduction of forms of "waste" (over-production, waiting time, transportation and unnecessary movements, over-processing, inventory, defects).	
• Innovations regarding the implementation of *six sigma* management systems: process improvement methodology based on the elimination of defects or failures in the delivery of products or services to clients.	
• Innovations regarding the implementation of *just in time* production systems in client companies taking into account the effects on the supply chain and transportation.	
• Innovations for the implementation of systems for the integral planning of the supply chain, including operations from design stage to after-sale service, trying to minimize *time to market*.	
• ……	

Priority area:
WG2. TECHNOLOGIES AND PROCESSES OF MANAGEMENT AND INFORMATION FOR INTEGRATED LOGISTICS

Code	STRATEGIC LINES	5=maximum priority 1=least priority		1=short term 2=medium term 3=long term	
		Order prior.	PRIORITY VALUE	Order urg..	URGENCY VALUE
SL2.2	Information and Communication Technologies for the creation of value in logistics and transportation services	**6**	**3.91**	**8**	**1.64**
SL2.1	Safety and monitoring in the logistics chain	**7**	**3.86**	**5**	**1.57**
SL2.3	Standards for the exchange of information among agents of the logistics and transportation activity chain	**8**	**3.86**	**13**	**1.77**
SL2.5	Shipping management	**10**	**3.85**	**10**	**1.68**
SL2.4	Systems for integral logistics analysis of risks and difficulties regarding transport	**17**	**3.37**	**18**	**2.00**
SL2.6	Inverse logistics	**21**	**3.00**	**21**	**2.20**

Priority area: WG2. TECHNOLOGIES AND PROCESSES OF MANAGEMENT AND INFORMATION FOR INTEGRATED LOGISTICS	
Strategic line **SL2.2 INFORMATION AND COMMUNICATION TECHNOLOGIES FOR THE CREATION OF VALUE IN LOGISTICS AND TRANSPORTATION SERVICES** **(assessment group A)**	**Priority value (order of priority number): 3.91 (6)** **Urgency value (order of urgency number): 1.64 (8)**
Some reference performances:	
• Innovations which facilitate the use of global position systems (GPS, in the near future the European Galileo System), focusing on mobile communication systems (PDA, smart phoned and derivative software), which enable, among others, the downloading of digital tacometre data and real-time data viewing.	
• Innovations and implementations of Customer Relationship Management (CRM), emphasizing its inclusion in ERP systems.	
• Innovations in the application of systems and techniques of artificial intelligence, optical character recognition (OCR) and ICT solutions in assigned areas.	
• ……	

Priority area: WG2. TECHNOLOGIES AND PROCESSES OF MANAGEMENT AND INFORMATION FOR INTEGRATED LOGISTICS	
Strategic line **SL2.1 SAFETY AND MONITORING IN THE LOGISTICS CHAIN** **(assessment group A)**	**Priority value (order of priority number): 3.86 (7)** **Urgency value (order of urgency number): 1.57 (5)**
Some reference performances:	
• Innovations in the application of intelligent systems for tracking and monitoring remittance, paying special attention to their adjustment to the specific feature of each client sector (textile, automotive, food, distribution...).	
• Innovations in technologies which facilitate the fulfilment of the transport contract.	
• Innovation in design and implementation of business intelligence solutions of widespread use for the optimization of cost, traffic, consumption...	
• ……	

Priority area: WG2. TECHNOLOGIES AND PROCESSES OF MANAGEMENT AND INFORMATION FOR INTEGRATED LOGISTICS	
SL2.3 STANDARDS FOR THE EXCHANGE OF INFORMATION AMONG AGENTS OF THE LOGISTICS AND TRANSPORTATION ACTIVITY CHAIN	**Priority value (order of priority number): 3.86 (8)** **Urgency value (order of urgency number): 1.77 (13)**
Some reference performances:	
• Innovations which facilitate the standardization of electronic data interchange (EDI), reducing associated costs due to displacement or errors in data transition among all the agents which intervene in transportation.	
• Innovations which facilitate the integration and interoperability of systems and the improvement of internet access to clients and suppliers, for example through Extensible Mark-up Language (XML), focusing on their integration in each companies' ERP.	
• ……	

Priority area: WG2. TECHNOLOGIES AND PROCESSES OF MANAGEMENT AND INFORMATION FOR INTEGRATED LOGISTICS	
Strategic line) **SL2.5 SHIPPING MANAGEMENT** **(assessment group A)**	**Priority value (order of priority number): 3.85 (10)** **Urgency value (order of urgency number): 1.68 (10)**
Some reference performances:	
• Innovations in the application of instruments for dynamics management of routes and vehicles in terms of traffic information and diverse indicators (deadline, freight characteristics, traffic condition, geographical location…).	
• Innovations in the application of linear programming models applied to transportation: routes, costs, optimization of operative variables. Emphasis on the development of an intelligence system which facilitates the research of improvements in logistics routes, for example frozen fish…	
• ……	

Priority area: WG2. TECHNOLOGIES AND PROCESSES OF MANAGEMENT AND INFORMATION FOR INTEGRATED LOGISTICS	
Strategic Line **SL2.4 SYSTEMS FOR INTEGRAL LOGISTICS ANALYSIS OF RISKS AND DIFFICULTIES REGARDING TRANSPORT**	**Priority value (order of priority number): 3.37 (17)** **Urgency value (order of urgency number): 2.00 (18)**
Some reference performances:	
• Innovations in the application of incidence simulation tools for improvement of logistics management and reduction of costs due to incidences.	
• Innovations in the application of techniques of multivariate statistical analysis of background incidence.	
• ……	

Priority area: WG2. TECHNOLOGIES AND PROCESSES OF MANAGEMENT AND INFORMATION FOR INTEGRATED LOGISTICS	
Strategic line **SL2.6 INVERSE LOGISTICS** **(assessment group B)**	**Priority value (order of priority number): 3.00 (21)** **Urgency value (order or urgency number): 2.20 (21)**
Some reference performances:	
• Innovations in the automatization and optimization of Authorised Collection Centres (CRC).	
• Innovations in the application of systems of out-of use materials monitoring.	
• ……	

Priority area:
WG 3 SPECIFIC TECHNOLOGIES OF STORAGE SERVICES

Code	STRATEGIC LINES	5=maximum priority 1=least priority		1=short term 2=medium term 3=long term	
		Order prior.	PRIORITY VALUE	Order urg.	URGENCY VALUE
SL3.1	Technologies and systems for the reception, location and physical management of freight	**3**	**4.05**	**4**	**1.57**
SL3.4	Technologies and systems for stock control	**9**	**3.85**	**7**	**1.60**
SL3.2	Technologies and systems for the capture and/ or reception of orders	**11**	**3.80**	**11**	**1.70**
SL3.3	Technologies and systems for the preparation of orders and manipulation of freight	**14**	**3.55**	**9**	**1.65**

Priority area: WG3 SPECIFIC TECHNOLOGIES OF STORAGE SERVICES	
Strategic Line **SL3.1 TECHNOLOGIES AND SYSTEMS FOR THE RECEPTION, LOCATION AND PHYSICAL MANAGEMENT OF FREIGHT** **(assessment group A)**	**Priority value (order of priority number): 4.05 (3)** **Urgency value (order of urgency number): 1.57 (4)**
Some reference performances:	
• Innovations in the automated systems of freight reception.	
• Innovations in the automated systems of freight location.	
• Innovations which facilitate the implementation of electronic signature, electronic proof of delivery and electronic invoice.	
• ……	

Priority area: WG3 SPECIFIC TECHNOLOGIES OF STORAGE SERVICES	
Strategic Line **SL3.4 TECHNOLOGIES AND SYSTEMS FOR STOCK CONTROL** **(assessment group A)**	**Priority value (order of priority number): 3.85 (9)** **Urgency value (order of urgency number): 1.60 (7)**
Some reference performances:	
• Innovations in management systems of input, output and inventory (PDA, smart phones and derivative software, wifi, Ultra Wide Band.	
• Innovations in labels which permit incorporation through RFID of sensors for freight control (humidity, temperature, pressure, freshness indicators…).	
• ……	

Priority area: WG3 SPECIFIC TECHNOLOGIES OF STORAGE SERVICES	
Strategic Line **SL3.2 TECHNOLOGIES AND SYSTEMS FOR THE CAPTURE AND/ OR RECEPTION OF ORDERS** **(assessment group A)**	**Priority value (order of priority number): 3.80 (11)** **Urgency value (order of urgency number): 1.70 (11)**
Some reference performances:	
• Innovations in automated systems of capture/reception of orders.	
• Innovations in voice recognition and mobile transmission systems to facilitate capture and reception of orders.	
• ……	

Priority area: WG3 SPECIFIC TECHNOLOGIES OF STORAGE SERVICES	
Strategic Line **SL3.3 TECHNOLOGIES AND SYSTEMS FOR THE PREPARATION OF ORDERS AND MANIPULATION OF FREIGHT** **(assessment group B)**	**Priority value (order of priority number): 3.55 (14)** **Urgency value (order of urgency number): 1.65 (9)**
Some reference performances:	
• Innovations in the automated systems of packaging and labelling which reduce preparation time and remittance of order.	
• Innovations in systems of radio frequency location - RF, Radio Frequency Identification systems – RFID, wifi and establishment of electronic product code (EPC).	
• Optical character recognition systems- OCR in freight and labels.	
• Innovations in automated cargo handling systems which make use of automatic identification, for example platforms which permit automatic regulation of empty spaces or reorganization according to content size.	
• ……	

Priority area:
WG4. EQUIPMENT AND NEW MATERIALS FOR THE IMPROVEMENT OF EFFICIENCY, SAFETY AND REDUCTION OF ENVIRONMENTAL IMPACT

Code	STRATEGIC LINES	5=maximum priority 1=least priority		1=short term 2=medium term 3=long term	
		Order prior.	PRIORITY VALUE	Order urg.	URGENCY VALUE
SL4.1	Information exchange systems between transport elements and agents of logistics-client activities	**2**	**4.11**	**1**	**1.42**
SL4.2	Equipment, systems and technologies in transport elements	**5**	**4.00**	**6**	**1.60**
SL4.3	Systems and technologies of packaging and industrial containers	**12**	**3.79**	**15**	**1.89**

Priority area: WG4. EQUIPMENT AND NEW MATERIALS FOR THE IMPROVEMENT OF EFFICIENCY, SAFETY AND REDUCTION OF ENVIRONMENTAL IMPACT	
Strategic Line **SL4.1 INFORMATION EXCHANGE SYSTEMS BETWEEN TRANSPORT ELEMENTS AND AGENTS OF LOGISTICS-CLIENT ACTIVITIES** **(assessment group A)**	**Priority value (order of priority number): 4.11 (2)** **Urgency value (order of urgency number): 1.42 (1)**
Some reference performances:	
• Innovations in information exchange systems among road vehicles and company headquarters.	
• Innovations in maritime information exchange systems.	
• Innovations in the integration of information systems among all agents (services such as European Platform for Maritime Data Exchange between Member States' maritime authorities European Platform for Maritime Data Exchange between Member States' maritime authorities –SafeSeaNet–, Long range identification and tracking – LRIT, Automatic Identification system – AIS)	
•	

Priority area: WG4. EQUIPMENT AND NEW MATERIALS FOR THE IMPROVEMENT OF EFFICIENCY, SAFETY AND REDUCTION OF ENVIRONMENTAL IMPACT	
Strategic Line **SL4.2 EQUIPMENT, SYSTEMS AND TECHNOLOGIES IN TRANSPORT ELEMENTS** **(assessment group A)**	**Priority value (order of priority number): 4.00 (5)** **Urgency value (order of urgency number): 1.60 (6)**
Some reference performances:	
• Innovations which facilitate the application of Advanced Driver Assistance System (ADAS) and in voice recognition systems in vehicles.	
• Innovations which improve systems of active and passive safety.	
• Innovations in more efficient propulsion systems and recovery energy systems in transport elements, focus on energy assessment of electric and hybrid vehicles on Galician roads.	
• Innovations in monitoring freight systems and anti-theft systems.	
• Innovations in diagnosis and preventive maintenance systems.	
• Innovations in structural materials which involve the optimization of weight and safety.	
• ……	

Priority area: WG4. EQUIPMENT AND NEW MATERIALS FOR THE IMPROVEMENT OF EFFICIENCY, SAFETY AND REDUCTION OF ENVIRONMENTAL IMPACT	
Strategic Line **SL4.3 SYSTEMS AND TECHNOLOGIES OF PACKAGING AND INDUSTRIAL CONTAINERS** **(assessment group B)**	**Priority value (order of priority number): 3.79 (12)** **Urgency value (order of urgency number): 1.89 (15)**
Some reference performances:	
• Innovations in eco-friendly packaging materials and containers, more resistant and lighter with anti-theft systems for the protection of cargo and with special attention to cargo needs, designing tools for its manipulation.	
• Innovations in the standardization of universal systems of reusable industrial containers according to client sectors. Emphasis on container maintenance and washing systems.	
• Innovations in packaging and smart containers, with sensors which facilitate information regarding the cargo status and carry out suitable measures for the optimization and well-being of freight. Focus on a system of sensor which register the maximum efforts undergone during transportation.	
• Innovations which permit the optimization and standardization of the size of industrial packaging and containers for inter-modality.	
• ……	

Priority area:
WG5. EQUIPMENT AND LOGISTIC INFRASTRUCTURE SERVICES FOR THE IMPROVEMENT OF MOBILITY AND IMPULSE OF INTERMODALITY

Code	STRATEGIC LINES	5=maximum priority 1=least priority		1=short term 2=medium term 3=long term	
		Order prior.	PRIORITY VALUE	Order urg.	URGENCY VALUE
SL5.2	Innovations regarding simplified administration concerning transportation activities	**4**	**4.00**	**2**	**1.45**
SL5.3	Intelligent systems for freight transfer	**16**	**3.43**	**17**	**2.00**
SL5.1	Information and Communication Technology equipment in infrastructures and public logistics services	**18**	**3.32**	**16**	**1.89**
SL5.4	Public infrastructures and equipment related to logistics of "last kilometre"	**19**	**3.20**	**19**	**2.00**
SL5.5	Advanced statistics methods for transport and infrastructure planning	**20**	**3.05**	**20**	**2.00**

Priority area: WG5. EQUIPMENT AND LOGISTIC INFRASTRUCTURE SERVICES FOR THE IMPROVEMENT OF MOBILITY AND IMPULSE OF INTERMODALITY	
Strategic Line **SL5.2 INNOVATIONS REGARDING SIMPLIFIED ADMINISTRATION CONCERNING TRANSPORTATION ACTIVITIES (assessment group A)**	**Priority value (order of priority number): 4.00 (4)** **Urgency value (order of urgency number): 1.45 (2)**
Some reference performances:	
• Innovations which facilitate the implementation of single window in all national and international modes of transport in order to facilitate simplified paperwork regarding a single transport document for all modes of transport.	
• Develop innovations which permit the legislative unification of maximum measures for all modes of transport (maximum gross weight, dimensions…).	
• ……	

Priority area: WG5. EQUIPMENT AND LOGISTIC INFRASTRUCTURE SERVICES FOR THE IMPROVEMENT OF MOBILITY AND IMPULSE OF INTERMODALITY	
Strategic Line **SL5.3 INTELLIGENT SYSTEMS FOR FREIGHT TRANSFER** **(assessment group B)**	**Priority value (order of priority number): 3.43 (16)** **Urgency value (order of urgency number): 2.00 (17)**
Some reference performances:	
• Innovations in the implementation of automated systems of container transformation for change of mode of transport, with the possibility of creating logistics platforms which incorporate the use of rail, air, road and sea transport. Assess the possibility of implementing a ferry network in Galicia for both passengers and freight.	
• Innovations in automated assistance systems of bulk loading/unloading through artificial vision or remote control.	
• ……	

Priority area: WG5. EQUIPMENT AND LOGISTIC INFRASTRUCTURE SERVICES FOR THE IMPROVEMENT OF MOBILITY AND IMPULSE OF INTERMODALITY	
Strategic Line **SL5.1INFORMATION AND COMMUNICATION TECHNOLOGY EQUIPMENT IN INFRASTRUCTURES AND PUBLIC LOGISTICS SERVICES** **(assessment group B)**	**Priority value (order of priority number): 3.32 (18)** **Urgency value (order of urgency number): 1.89 (16)**
Some reference performances:	
• Innovations in the implementation of a technological platform which connects ports in Galicia in order to facilitate electronic information exchange among diverse agents (electronic fleet and management systems	
• Innovations in the implementation of signposting, traffic control, information and communication between road networks and transport elements, as are Advanced Driver Assistance System (ADAS), computer-controlled systems and expert systems for traffic control, as are new vessel traffic management and information system (VTMIS), telematics applications for freight (rail) (TAF), European Rail Traffic Management System (ERMTS)	
• Innovations in the improvement of control and safety of freight in-transit 8ports, logistics platforms...	
• ……	

Priority area: WG5. EQUIPMENT AND LOGISTIC INFRASTRUCTURE SERVICES FOR THE IMPROVEMENT OF MOBILITY AND IMPULSE OF INTERMODALITY	
Strategic Line **SL5.4 PUBLIC INFRASTRUCTURES AND EQUIPMENT RELATED TO LOGISTICS OF "LAST KILOMETRE"** **(assessment group B)**	**Priority value (order of priority number): 3.20 (19)** **Urgency value (order of urgency number): 2.00 (19)**
Some reference performances:	
• Develop studies to facilitate the implementation of multi-usage lanes in urban areas.	
• Develop studies on alternative systems for the development of urban distribution centres and small urban freight transportation taking into account the features of urban and inter-urban areas in Galicia (urban micro-logistics tools).	
• ……	

Priority area: WG5. EQUIPMENT AND LOGISTIC INFRASTRUCTURE SERVICES FOR THE IMPROVEMENT OF MOBILITY AND IMPULSE OF INTERMODALITY	
Strategic Line **SL5.5 ADVANCED STATISTICS METHODS FOR TRANSPORT AND INFRASTRUCTURE PLANNING** **(assessment group B)**	**Priority value (order of priority number): 3.05 (20)** **Urgency value (order of urgency number): 2.00 (20)**
Some reference performances:	
• R&D+i projects regarding models and systems for traffic foresight and the analysis of freight mobility.	
• Innovations in the implementation of traffic incidents simulation tools in infrastructures and journey time so that transport sustainability and is improved and environmental impact reduced.	
• ……	

SUPPORT CROSS-SECTIONAL AREAS
MANAGEMENT AND STRATEGIC INFORMATION SYSTEMS FOR R&D+i
COOPERATION
DEVELPMENT OF KNOWLEDGE AND HUMAN CAPITAL

Example ideas provided by Work Groups.

EXAMPLE REFERENCE PERFORMANCES	CROSS-SECTIONAL TRANSVERSE AREAS
Development of systems of strategic monitoring and technological monitoring for logistics and freight transportation activities in collaborations with R&D+i entities which have developed similar systems.	• **MANAGEMENT AND STRATEGIC INFORMATION SYSTEMS FOR R&D+i** • **COOPERATION**
Consolidation of the Galician Technological Platform of Logistics developing the defined projects and updating its R6D+i Strategic Agenda.	• **COOPERATION**
Participation in other Technological Platforms to detect innovations needs in client activities in the logistics and transportation area.	• **MANAGEMENT AND STRATEGIC INFORMATION SYSTEMS FOR R&D+i COOPERATION**
Development of collaboration networks among companies with the ain to look for foreign collaborators and/or create common trade networks.	• **COOPERATION**
Formation, coordination and start-up of the implementation of tools in search of improvements in information systems for decision making, quality management and Just in Time production system...	• **DEVELOPMENT OF KNOWLEDGE AND HUMAN CAPITAL**
Formation, coordination and start-up of innovations and improvements in the management of information technologies and systems for decision-making. Decision support system (DSS) investment assessment in IS/IT, Electronic Data Interchange (EDI), Telecommuting and e-work.	• **MANAGEMENT AND STRATEGIC INFORMATION SYSTEMS FOR R&D+i COOPERATION**
Formation, coordination and start-up of assessment of investment, intangibles and real options in support of decision making.	• **MANAGEMENT AND STRATEGIC INFORMATION SYSTEMS FOR R&D+i** • **COOPERATION**
……	

NOTE: These support cross-sectional areas include the necessary and horizontal performances which facilitate the optimal development of the innovations explained in the previously defined R&D+i Priority Areas. Examples of these are performances regarding the formation of human capital for the implementation of innovations or the development of sensibilization actions or of cooperation among various agents which involve an optimal usage of the innovations put forward in the Priority Areas (trade networks..).

6 ANNEXES

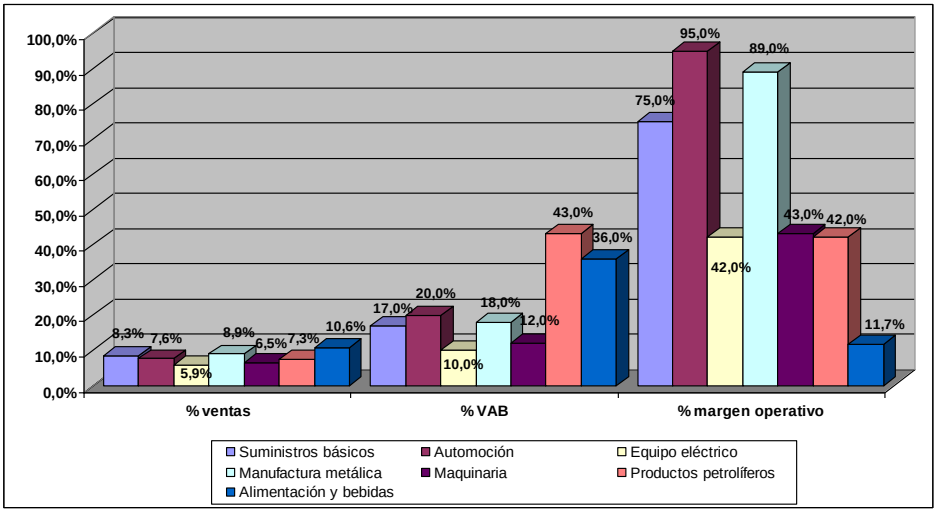
6.1 Some relevant statistics

Táboa 25. Datos do Comercio exterior de Galicia para o 2007 por capítulos arancelarios do TARIC

Comercio exterior de GALICIA, 2007 (MILES DE EUROS)	Expor-tación	Impor-tación	balanza
TOTAL	15.999,85	16.577,96	-578,11
I. ANIMAIS VIVOS E PRODUTOS DO REINO ANIMAL	1.296,98	1.604,52	-307,54
II. PRODUTOS DO REINO VEXETAL	78,42	254,63	-176,21
III. GRAXAS E ACEITES ANIMAIS OU VEXETAIS; PRODUTOS DO SEU DESDOBRAMENTO; GRAXAS ALIMENTICIAS ELABORADAS; CERAS DE ORIXE ANIMAL OU VEXETAL	27,34	25,42	1,92
IV. PRODUTOS DAS INDUSTRIAS ALIMENTICIAS; BEBIDAS, LÍQUIDOS ALCOHÓLICOS E VINAGRE; TABACO E SUCEDÁNEOS DO TABACO ELABORADOS	548,60	385,19	163,41
V. PRODUTOS MINERAIS	492,31	2.877,42	-2.385,10
VI. PRODUTOS DAS INDUSTRIAS QUÍMICAS OU DAS INDUSTRIAS CONEXAS	472,51	751,86	-279,35
VII. MATERIAS PLÁSTICAS E MANUFACTURAS DESTAS MATERIAS; CAUCHO E MANUFACTURAS DE CAUCHO	143,17	319,90	-176,72
VIII. PELES, COIROS, PELETERÍA E MANUFACTURAS DESTAS MATERIAS; ARTIGOS DE GUARNICIONERÍA OU DE TALABARTERÍA, ARTIGOS DE VIAXE, BOLSOS DE MAN E CONTINENTES SEMELLANTES; MANUFACTURAS DE TRIPA	84,39	61,87	22,52
IX. MADEIRA, CARBÓN VEXETAL E MANUFACTURAS DE MADEIRA; CORTIZA E MANUFACTURAS DE CORTIZA; MANUFACTURAS DE ESPARTERÍA OU DE CESTERÍA	360,96	436,31	-75,35
X. PASTAS DE MADEIRA OU DOUTRAS MATERIAS FIBROSAS CELULÓSICAS; REFUGALLO E DESPERDICIOS DE PAPEL OU CARTÓN; PAPEL E AS SÚAS APLICACIÓNS	325,44	184,63	140,81
XI. MATERIAS TÉXTILES E AS SÚAS MANUFACTURAS	2.179,44	1.832,75	346,70
XII. CALZADO; SOMBREIRERÍA, PARAUGAS, ANTUCAS, BASTÓNS, LÁTEGOS, FUSTAS E AS SÚAS PARTES; PLUMAS PREPARADAS E ARTIGOS DE PLUMAS; FLORES ARTIFICIAIS; MANUFACTURAS DE CABELO	205,62	45,28	160,34
XIII. MANUFACTURAS DE PEDRA, XESO, CEMENTO, AMIANTO, MICA OU MATERIAS ANÁLOGAS; PRODUTOS CERÁMICOS; VIDRO E MANUFACTURAS DE VIDRO	366,53	142,94	223,59
XIV. PERLAS FINAS OU CULTIVADAS, PEDRAS PRECIOSAS E SEMIPRECIOSAS OU SEMELLANTES, METAIS PRECIOSOS, CHAPADOS DE METAIS PRECIOSOS E MANUFACTURAS DESTAS MATERIAS; XOIERÍA DE FANTASÍA; MOEDAS	6,41	12,23	-5,82
XV. METAIS COMÚNS E MANUFACTURAS DESTES METAIS	706,13	1.858,69	-1.152,55
XVI. MÁQUINAS E APARELLOS, MATERIAL ELÉCTRICO E AS SÚAS PARTES; APARELLOS PARA A GRAVACIÓN OU A REPRODUCIÓN DE SON, APARELLOS PARA A GRAVACIÓN OU A REPRODUCIÓN DE IMAXES E SON EN TELEVISIÓN, E AS PARTES E ACCESORIOS DESTES APARELLOS	1.007,32	1.069,26	-61,94
XVII. MATERIAL DE TRANSPORTE	7.402,42	4.359,68	3.042,74
XVIII. INSTRUMENTOS E APARELLOS DE ÓPTICA, FOTOGRAFÍA OU CINEMATOGRAFÍA, DE MEDIDA, DE CONTROL OU DE PRECISIÓN; INSTRUMENTOS E APARELLOS MÉDICO-CIRÚRXICOS; RELOXERÍA; INSTRUMENTOS DE MÚSICA; PARTES E ACCESORIOS DESTES INSTRUMENTOS OU APARELLOS	14,78	55,11	-40,32
XIX. ARMAS E MUNICIÓNS, AS SÚAS PARTES E ACCESORIOS	0,68	0,55	0,14
XX. MERCADORÍAS E PRODUTOS DIVERSOS	126,14	227,15	-101,01
XXI. OBXECTOS DE ARTE, DE COLECCIÓN OU DE ANTIGÜIDADE	0,19	3,49	-3,31
N.C. NON CLASIFICADOS	154,03	69,09	84,94

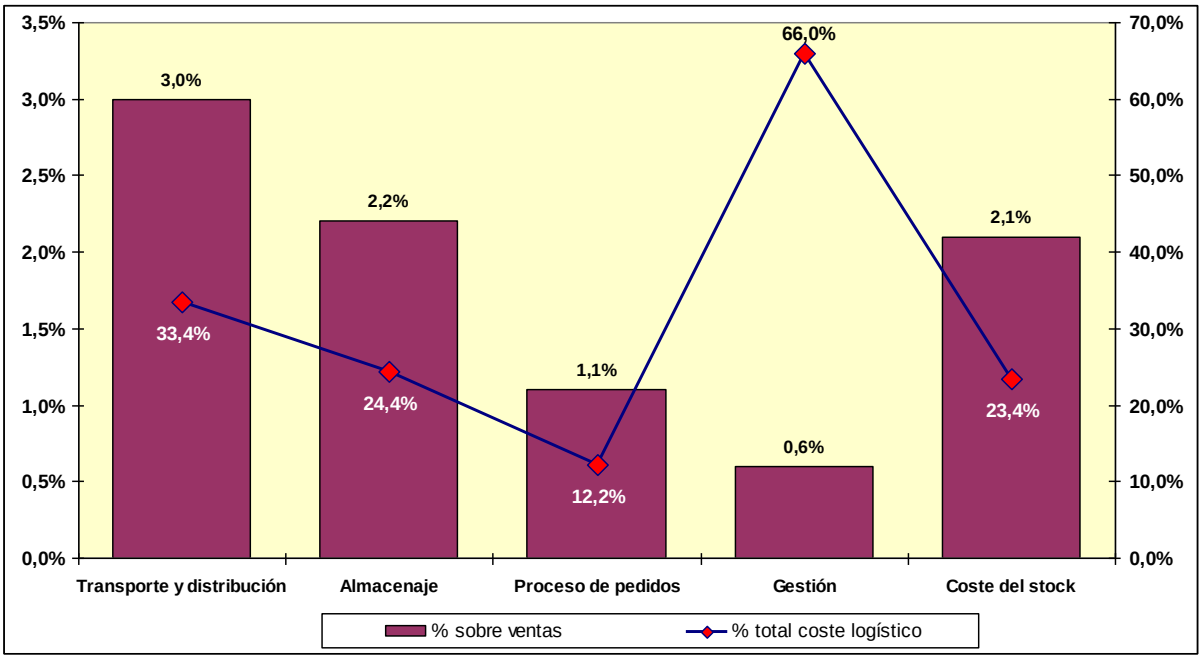
Fonte: Instituto Galego de Estatística (IGE)

Figura 31 Peso da loxística no sistema produtivo por sectores industriais en Europa



Fonte: elaboración propia a partir de datos de ATK

Figura 32 Composición de custes loxísticos en 24 sectores industriais europeos



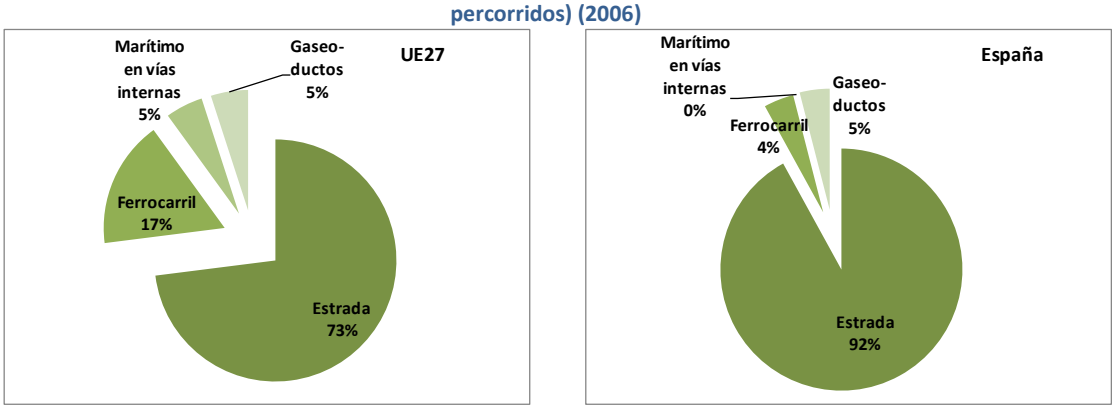
Fonte: elaboración propia a partir de datos do European Logistics Consultants

Táboa 26 .Custe laboral, produtividade e rendibilidade en servizos de transporte por país UE-25 2004

	Custe laboral por empregado (miles de euros)	Produtividade aparente do traballo (miles de euros)	Produtividade en base ao salario do traballo axustado (en %)	Taxa de investimento (en %)
EU-25	31,7	44,4	140,0	13,3
Bélxica	45,3	59,7	131,8	9,1
Bulgaria	3,7	5,2	139,4	12,5
Rep. Checa	9,5	13,9	146,7	11,7
Dinamarca	44,0	83,3	189,4	16,9
Alemaña	32,9	53,9	134,1	17,3
Estonia	7,9	15,6	198,1	10,1
Irlanda	56,7	73,4	129,3	11,5
España	29,5	40,6	137,7	16,8
Francia	38,5	48,8	126,8	9,1
Italia	35,7	44,3	124,2	12,8
Chipre	28,1	32,6	116,0	13,5
Letonia	4,7	9,0	191,0	13,5
Lituania	5,4	10,5	195,7	17,2
Luxemburgo	45,9	63,3	138,0	11,0
Hungría	9,8	12,7	129,0	9,1
Malta	40,9	58,6	143,2	13,3
Austria	38,4	52,5	136,9	11,2
Polonia	7,0	10,7	152,6	15,5
Romanía	3,4	6,7	198,7	16,6
Eslovenia	17,2	21,2	123,1	9,2
Eslovaquia	7,4	9,4	126,6	6,7
Finlandia	39,2	51,6	131,7	12,4
Suecia	40,4	46,9	116,1	7,1
Reino Unido	37,0	59,5	160,8	13,7
Noruega	46,1	88,7	192,5	18,6

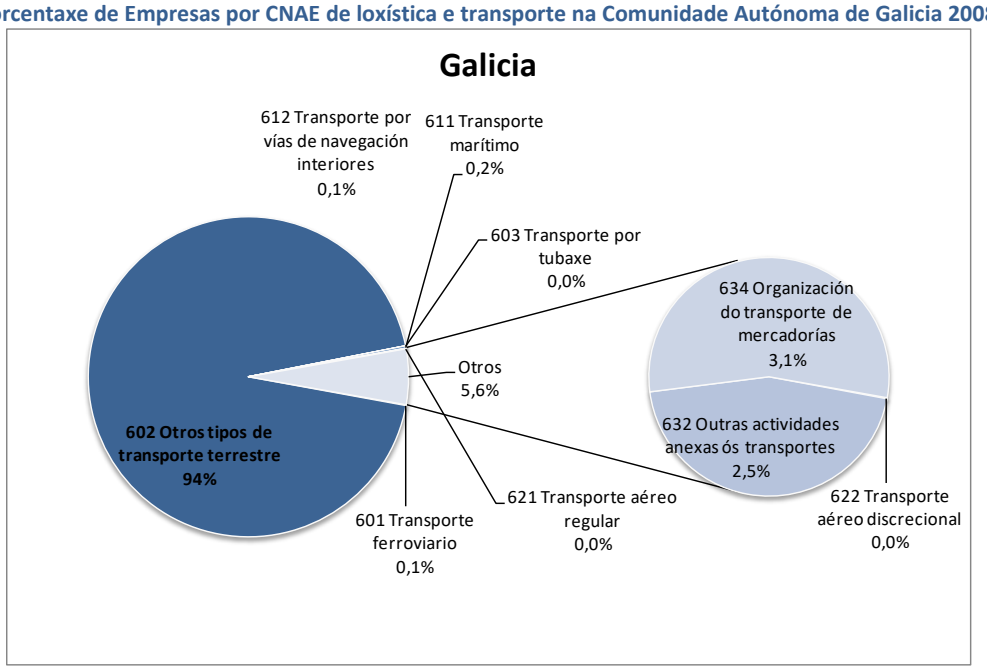
Fonte: Eurostat. Panorama of Transport 2007.

Figura 33 Porcentaxe do tipo de Transporte Interno nas distintas áreas (expresado en toneladas-quilómetros percorridos) (2006)



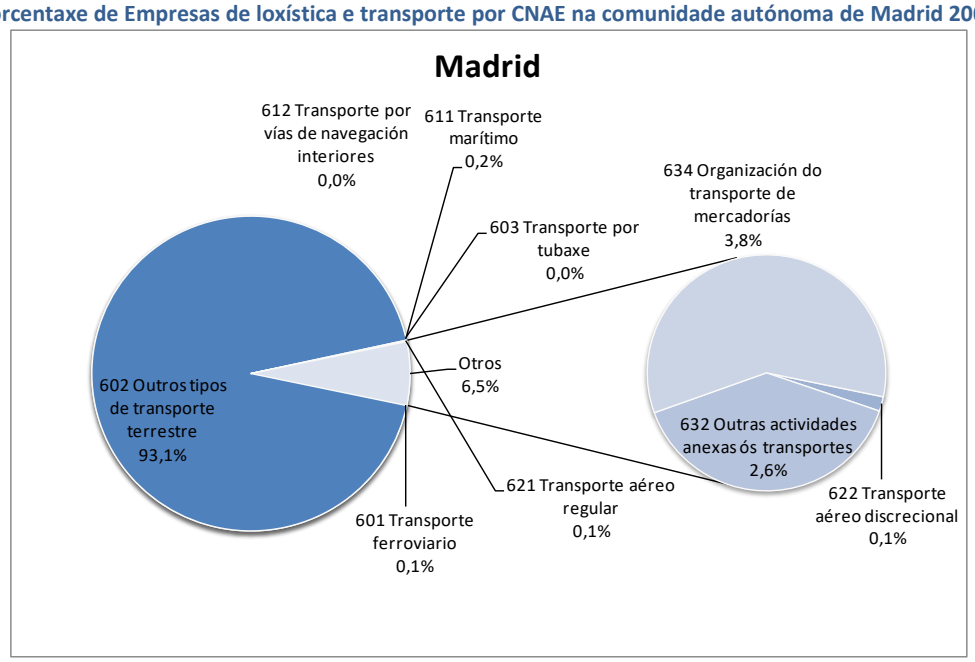
Fonte: Instituto Europeo de Estadística (Eurostat)

Figura 34
Porcentaxe de Empresas por CNAE de loxística e transporte na Comunidade Autónoma de Galicia 2008



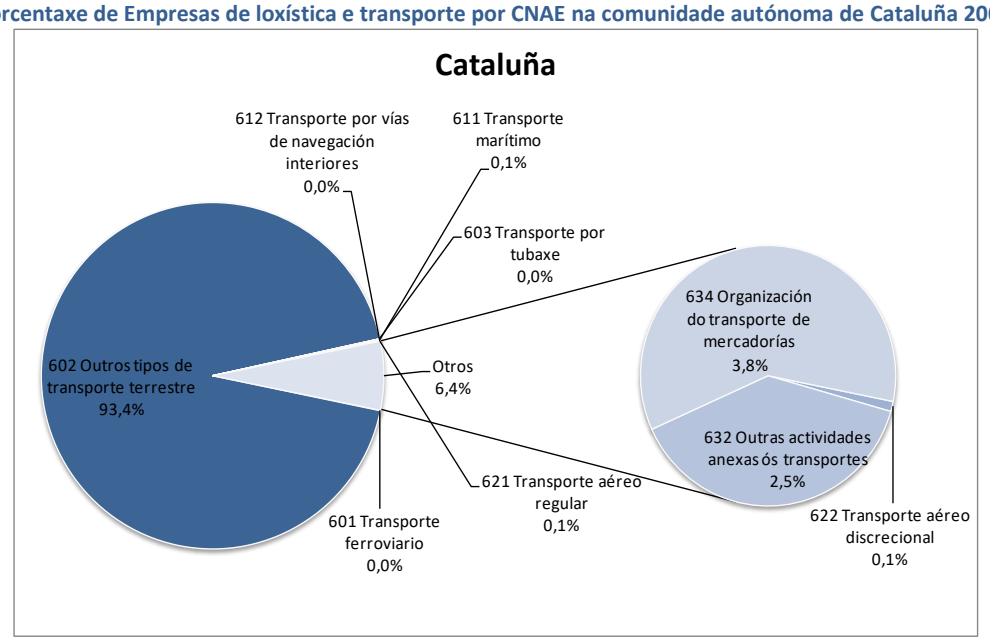
Fonte: INE

Figura 35
Porcentaxe de Empresas de loxística e transporte por CNAE na comunidade autónoma de Madrid 2008



Fonte: INE

Figura 36
Porcentaxe de Empresas de loxística e transporte por CNAE na comunidade autónoma de Cataluña 2008



Fonte: INE

Táboa 27 Transporte de mercadorías por estrada. Fluxo de mercadorías entre CC.AA. 2006. Miles de toneladas

Lugar de procedencia	Lugar de destino									
	España	Do cal expedido a outras CC.AA	Andalucía	Aragón	Asturias	Baleares	Canarias	Cantabria	Castela e León	Castela-A Mancha
Total de Destino	2.236.740	...	385.541	101.899	71.356	42.997	62.842	43.075	187.785	155.973
De outras CC.AA	...	353.155	27.297	23.607	8.937	1.403	89	8.533	30.933	35.184
Andalucía	391.441	23.197	358.245	478	227	...	...	167	1.414	2.962
Aragón	101.573	23.282	707	78.292	183	...	...	264	1.956	1.096
Asturias	72.527	10.107	237	249	62.419	...	...	580	3.339	283
Baleares	41.908	334	...	...	...	41.574	...	...	...	...
Canarias	62.808	48	...	...	...	...	62.754	...	...	...
Cantabria	43.644	9.102	220	413	852	...	...	34.542	2.241	152
Castela e León	191.520	34.668	1.471	1.443	2.367	...	...	2.988	156.851	1.964
Castela-A Mancha	167.400	40.611	3.967	820	235	...	...	162	2.246	120.789
Cataluña	330.188	39.393	2.835	10.939	660	...	...	465	2.043	1.622
Comunidade Valenciana	290.326	42.017	4.722	2.802	278	...	...	151	1.653	6.998
Estremadura	44.655	6.366	2.565	31	38	...	...	...	748	819
Galicia	131.616	12.320	727	430	1.895	...	...	263	2.843	742
Madrid	185.296	38.128	4.364	1.355	796	...	...	362	5.023	13.898
Murcia	99.675	20.338	4.055	172	49	...	...	79	373	2.536
Navarra	44.549	14.081	356	1.671	183	...	...	182	1.071	367
País Vasco	107.887	25.365	892	2.042	1.107	...	...	2.748	4.980	574
A Rioxa	25.549	7.798	179	743	67	...	...	123	1.004	171
Ceuta e Melilla	44.167	...	...	...	..	...	...	...	...	...

..... *(CONTINÚA TÁBOA EN HORIZONTAL)*.....

Lugar de procedencia	Lugar de destino									
	Cataluña	Comunidade Valenciana	Estremadura	Galicia	Madrid	Murcia	Navarra	País Vasco	A Rioxa	Ceuta e Melilla
Total de Destino	323.486	292.102	47.473	129.906	207.033	96.541	42.630	106.767	25.089	...
De otras CC.AA	32.962	43.793	9.184	10.610	59.865	17.204	12.162	24.244	7.320	...
Andalucía	2.238	4.077	4.251	364	3.462	2.679	149	539	59	...
Aragón	7.418	4.213	135	316	2.241	138	1.564	1.953	1.089	...
Asturias	623	342	89	1.713	977	85	280	1.230	80	...
Baleares	...	...	...	...	...	...	...	...	...	...
Canarias	...	...	...	...	...	...	...	...	...	...
Cantabria	655	189	23	195	980	64	234	2.781	92	...
Castela e León	2.180	2.090	1.081	2.903	9.105	481	982	3.620	978	...
Castela-A Mancha	1.986	6.818	1.618	506	24.927	2.395	233	398	283	...
Cataluña	290.794	8.861	189	922	4.773	1.075	1.508	2.257	493	...
Comunidade Valenciana	7.332	248.309	399	655	5.682	8.723	447	1.209	452	...
Estremadura	261	303	38.289	114	1.168	89	76	100	54	...
Galicia	954	828	196	119.296	1.885	219	149	1.029	148	...
Madrid	3.387	3.519	852	1.353	147.168	767	365	1.724	173	...
Murcia	873	10.437	116	139	1.210	79.337	92	159	48	...
Navarra	1.379	517	20	324	780	158	30.468	5.269	1.779	...
País Vasco	2.780	1.094	207	735	2.366	260	3.957	82.523	1.594	...
A Rioxa	462	375	9	186	306	69	2.126	1.978	17.769	...
Ceuta e Melilla	...	...	...	...	...	...	...	...	...	4.167

Fonte: Ine. Anuario 2008

Táboa 28 Evolución do Tráfico Portuario nos grandes portos en España e Galicia. 2004-2007

	ESPAÑA			GALICIA		
CONCEPTO	**2006**	**2007**	**% ev. 07/06**	**2006**	**2007**	**% ev. 07/06**
BUQUES ENTRADOS EN PORTO						
Número Total	122.790	132.207	7,67%	6.390	6.641	3,93%
Arqueo Total (Miles GT)	1.445.383	1.603.558	10,94%	60.108	66.208	10,15%
TRÁFICO DE MERCADORÍAS (miles de toneladas)						
Segundo tipo de navegación	***337.237***	***344.837***	***2,25%***	***31.233***	***37.875***	***21,27%***
Cabotaxe	43.529	44.999	3,38%	4.832	4.365	-9,66%
Exterior	293.708	299.838	2,09%	26.401	33.510	26,93%
Segundo operación:	***397,17***	***446,3***	***12,37%***	***29.508***	***33.045***	***11,99%***
Embarcadas	115,75	130,17	12,46%	5.914	7.051	19,23%
Desembarcadas	281,27	315,99	12,34%	23.576	25.986	10,22%
Transbordadas	0,15	0,14	-6,67%	18	8	-55,56%
Presentación da mercadoría	***43.529***	***44.969***	***3,31%***	***31.214***	***33.037***	***5,84%***
Graneis líquidos	12.148	13.389	10,22%	9.547	10.311	8,00%
Graneis Sólidos	7.872	7.910	0,48%	15.012	15.007	-0,03%
Mercadoría Xeral	23.509	23.670	0,68%	6.655	7.719	15,99%

Fonte: Dirección Xeral da Mariña Mercante. Ministerio de Fomento e IGE.

Táboa 29 Transporte ferroviario. Fluxo de mercadorías entre CCAA. Ano 2006. Miles de toneladas.

Lugar de procedencia	**Lugar de destino** (datos en miles de toneladas)							
	España	Andalucía	Aragón	Asturias	Cantabria	Castela e León	Castela-A Mancha	Cataluña
España	**24.941**	**2.248**	**2.695**	**636**	**693**	**2.437**	**606**	**4.105**
Andalucía	**2.622**	1.134	110	5	6	110	18	288
Aragón	**1.367**	151	170	1	8	5	25	366
Asturias	**2.452**	58	54	582	14	499	33	115
Cantabria	**1.041**	263	8	0	346	430	42	92
Castela e León	**1.880**	111	12	4	68	211	8	196
Castela-A Mancha	**308**	23	61	...	70	0	32	39
Cataluña	**4.573**	237	1.440	4	97	146	94	1.226
Comunidade Valenciana	**2.112**	72	241	25	3	197	9	392
Estremadura	**108**	2	6	38	0	0	1	261
Galicia	**2.050**	**70**	**203**	**8**	**31**	**110**	**7**	**66**
Madrid	**2.297**	233	8	5	28	12	2	128
Murcia	**460**	11	0	1	1	0	170	23
Navarra	**178**	8	1	0	182	6	5	45
País Vasco	**2.264**	105	127	0	0	285	133	278
A Rioxa	**93**	0	1	0	1	43	0	...

..... (CONTINÚA TÁBOA EN HORIZONTAL).....

Lugar de procedencia	**Lugar de destino** (datos en miles de toneladas)							
	Comunidade Valenciana	Estremadura	**Galicia**	Madrid	Murcia	Navarra	País Vasco	A Rioxa
España	**1.870**	**663**	**2.501**	**2.751**	**230**	**243**	**1.276**	**100**
Andalucía	60	435	**27**	420	6	1	51	0
Aragón	46	9	**13**	37	1	1	194	2
Asturias	682	28	**48**	100	5	39	82	59
Cantabria	34	1	**3**	56	0	0	0	0
Castela e León	58	6	**801**	90	7	0	13	1
Castela-A Mancha	3	19	**0**	39	1	0	18	0
Cataluña	140	5	**53**	911	21	25	168	0
Comunidade Valenciana	30	0	**89**	448	17	5	256	1
Estremadura	...	60	**0**	0	0	0	0	0
Galicia	**15**	**0**	**1.399**	**105**	**1**	**0**	**5**	**0**
Madrid	62	0	**801**	6	5	2	142	0
Murcia	50	0	**0**	178	6	0	12	0
Navarra	0	5	**0**	6	0	0	0	0
País Vasco	202	23	**40**	531	64	82	259	0
A Rioxa	...	0	**0**	0	0	10	35	2

Nota: excluíronse as Comunidades Autónomas das illas (Baleares e Canarias), así como das Cidades Autónomas de Ceuta e Melilla por ter valores iguais a cero en tódolos casos

Fonte: INE. Anuario 2008.

Táboa 30 Infraestruturas loxísticas en Galicia

TIPO DE ACTUACIÓN	Superficie total (Has)	Intermodalidade	Promotor	Situación
ZONA DE ACTIVIDADES LOXÍSTICAS PORTUARIAS (ZAL)				
PLISAN	419	SI	IGVS, Consorcio Zona Franca de Vigo y Autoridad Portuaria de Vigo	Proxecto Sectorial. Aprobado definitivamente 27-9-2001
ZAL. Ferrol	262		Autoridad Portuaria de Ferrol, Concello y Xunta de Galicia	Estudo informativo realizado
ZAL. A Coruña	200			Análise de viabilidade en realización (Cámara de Comercio)
ZAL. Vilagarcía	40			En Estudo
PLATAFORMAS LOXÍSTICAS INTERMODAIS				
Santiago de Compostela	165	SI	IGVS	Proxecto Sectorial Aprobado Definitivamente 27-9-2007
Baamonde (Begonte) A Coruña	107	SI	IGVS	Proxecto Sectorial Aprobado Definitivamente 21-2-2007
Monforte de Lemos (Lugo)	30	SI	Xestur lugo	Proxecto Sectorial de 2005. En funcionamento
San Cibrao das Viñas (Ourense)	32,3	SI	IGVS	Proxecto Sectorial Aprobado definitivamente 30-7-2002. En funcionamento 1ª Fase
As Gandaras (Lugo)	213	SI	Xestur lugo	Proxecto Sectorial Aprobado Definitivamente 21-2-2007
CENTROS DE TRANSPORTE DE MERCADORÍAS				
Centro de Transportes e Automoción de Verín	300		IGVS	En estudo
Centro de Transportes de Ferrol	s.d.			En estudo
Centro de Transportes de Ponte Caldelas	9		IGVS- Xestur Pontevedra	En execución
Plataforma de Valadares-Vigo	67		Consorcio Zona Franca Vigo	En funcionamento
CTM Lugo	s.d.		SEPES	En funcionamento
Centro Loxístico de Transportes de Culleredo	60		Fadesa	En funcionamento
Lalín	30		IGVS- Xestur Pontevedra	En funcionamento
Cidade do Transporte de Santiago	23		Privado	En funcionamento
CENTROS DE CARGA AÉREA				
Centro de Carga Aérea de Santiago-Labacolla	66		AENA	Previsto no Plan Director do Aeroporto

Fonte: Consellería de Política Territorial, Obras Públicas e Transportes, 2007

6.2 Agent of the innovation system more related to the Technology Platform Gallega logistics

Táboa 31 Principais Plataformas Tecnolóxicas relacionadas coa Loxística e Transporte

Plataformas tecnolóxicas europeas	
ERTRAC	European Road Transport Research Advisory Council
ACARE	Advisory Council for Aeronautics Research in Europe
ERRAC	European Rail Research Advisory Council
WATERBORNE	European Technology Platform **WATERBORNE**
PLATAFORMAS TECNOLÓXICAS ESPANOLAS	
PTFE	Plataforma Tecnolóxica Ferroviaria Espanola
PTM	Plataforma Tecnolóxica Marítima
LOGISTOP	Plataforma Tecnolóxica Espanola de Loxística Integral
PLATAFORMAS TECNOLÓXICAS GALEGAS	
LOXISGA	Plataforma Tecnolóxica Galega de Loxística

Fonte: elaboración propia

Táboa 32 Matriz de cruce de ámbitos de colaboración entre Loxisga e outras Plataformas Tecnolóxicas Galegas

DENOMINACIÓN DAS PLATAFORMAS TECNOLÓXICAS GALEGAS// (ACTIVIDADE EMPRESARIAL)	Intensidade do cruce con LOXISGA	ÁMBITO DE COLABORACIÓNS MÁIS NECESARIAS
Vindeira (TIC)	ALTA	• TIC aplicada ás mercadorías (etiquetas RFID, sensores…) • TIC aplicada aos procesos • TIC aplicada aos vehículos e contedores • TIC integrada e interoperabilidade de sistemas
PT. Automoción	ALTA	• Seguridade activa e pasiva dos ocupantes e a mercadoría • TIC aplicada aos vehículos • Motores e propulsión alternativos e fontes de enerxía renovables (automóbil) • Novos materiais aplicados aos vehículos • Novos sistemas de carga/descarga e intermodalidade
PTGN (Construción Naval)	ALTA	• Seguridade activa e pasiva dos ocupantes e a mercadoría • TIC aplicada ás embarcacións • Motores e propulsión alternativos e fontes de enerxía renovables (embarcacións) • Novos materiais aplicadas ás embarcacións • Novos sistemas de carga/descarga e intermodalidade
GMPF 2020 (Materiais e Procesos de Fabricación)	ALTA	• Loxística interna empresarial • Novos materiais aplicados a envases, embalaxes e contedores • Organización, dirección e xestión das operacións • Loxística inversa
ENERXE (Enerxía)	Media	• Fontes de enerxía renovables aplicadas aos vehículos (automóbil, embarcacións, aeronaves, ferrocarril…) • Eficiencia enerxética nos transportes frigoríficos
ENVITE (Medio Ambiente)	Media	• Loxística inversa empresarial • Medición do impacto ambiental das modalidades de transporte
PT. Granito	Media	• Necesidades de innovacións como actividades cliente (loxística e transporte do granito e produtos transformados) • Trazabilidade nas actividades do granito e produtos transformados
PT. Madeira	Media	• Necesidades de innovacións como actividades cliente (loxística e transporte de produtos transformados da madeira) • Trazabilidade de produtos transformados da madeira
Ptgal (agroalimentaria)	Media	• Necesidades de innovacións como actividades cliente (loxística e transporte de produtos agroalimentarios) • Trazabilidade alimentaria
PTXGA (Acuicultura)	Media	• Necesidades de innovacións como actividades cliente (loxística e transporte de produtos acuícolas) • Trazabilidade alimentaria
Tecnopeixe	Media	• Necesidades de innovacións como actividades cliente (loxística e transporte de produtos derivados da pesca) • Trazabilidade alimentaria
PT Forestal Galega	Media	• Necesidades de innovacións como actividades cliente (loxística e transporte de produtos forestais) • Trazabilidade dos produtos forestais
Nanogal (nanotecnoloxía)	baixa	• Aplicacións de nanotecnoloxía ás mercadorías
I+ Idea (Audiovisual)	baixa	• Necesidades de innovacións como actividades cliente (loxística nas producións audiovisuais…)
Produto Gráfico e Libro Galego	baixa	• Impresión de etiquetas intelixentes • Novos materiais derivados das artes gráficas
Biotega (biotecnoloxía)	Baixa	• Loxística e transporte de produtos alimentarios derivados da biotecnoloxía (organismos modificados xeneticamente…) • Aplicación de solucións de biotecnoloxía na loxística e transporte de organismos vivos e sacrificados

Fonte: elaboración propia

Táboa 33 Principais áreas de traballo dos Centros Tecnolóxicos das actividades de loxística e transporte de mercadorías

TRANSPORTE INTERMODAL	- Análise de transporte intermodal - Complementariedade entre modos - Planificación de conexións ferrocarril/aeroporto (viaxeiros) - Planificación de conexións ferrocarril / porto (mercadorías)
TRÁFICO E SEGURIDADE VIAL	- Xestión do tráfico - Custes da conxestión urbana - Sistema de axuda á decisión (DDS) en tráfico - Simulación da demanda - Modelización de autopistas de peaxe - Seguridade vial - Información do tráfico
LOXÍSTICA	- Deseño de sistemas de distribución física - Loxística urbana - Centros integrados de mercadorías - Xestión de RRHH nas terminais do porto - Algoritmos de rutas de vehículos - Algoritmos de servizo á demanda de persoas discapacitadas - Xestión da cadea de subministro - Loxística de aprovisionamento - Loxística interna e da produción - Almacenaxe e manutención - Loxística da distribución
SISTEMAS INTELIXENTES DE TRANSPORTE (ITS)	- Deseño de Sistemas Intelixentes de Transporte - Implantación de Sistemas Intelixentes de Transporte - Avaliación de Sistemas Intelixentes de Transporte
ENVASE E EMBALAXE	- Tecnoloxía dos materiais de envase e embalaxe - Deseño e desenvolvemento funcional de envases e embalaxes - Acondicionamento de produto - Embalaxes para a distribución de mercadorías - Embalaxe e transporte de mercadorías perigosas - Envases, Embalaxes e Medio Ambiente - Maquinaria e tecnoloxías de embalaxe
SERVIZOS	- Diagnóstico loxístico - Mellora de procesos loxísticos - Deseño de Centros Produtivos e Loxísticos - Políticas de xestión de stocks - Solucións tecnolóxicas - Externalizacións dos servizos tecnolóxicos - Deseño de redes de distribución - Optimización do transporte - Formación
OUTRAS ACTIVIDADES	- Loxística Inversa - E-fullfillment - B2B e Benchmarking -Integración da muller no sector loxístico -Trazabilidade Alimentaria

Fonte: elaboración propia

.

Táboa 34 Oferta tecnolóxica das universidades galegas relacionadas coas actividades de loxística e transporte de mercadorías

UNIVERSIDADE DE A CORUÑA			
Referencia	**Nome**	**Situación**	**Liñas de investigación**
G00098	Grupo Integrado de Enxeñaría	CIT	Deseño e automatización de liñas de produción. Desenvolvemento de software. Planificación e control da produción. Loxística: distribución e transporte. Deseño en planta. Xestión da calidade. Enxeñaría naval e oceánica.
G000284	Grupo de Ferrocarrís e Transportes Rodríguez	E. T. S. de Enxeñeiros de Camiños, Canais e Portos	Ferrocarrís metropolitanos e rexionais Tecnoloxía da vía ferroviaria Planificación do transporte

Fonte: Universidade de A Coruña

UNIVERSIDADE DE SANTIAGO			
Referencia	**Nome**	**Situación**	**Liñas de investigación**
GI-1871	Análise territorial	Centro de Innovación e Transferencia de Tecnoloxía	-Análises socioeconómicas con implicacións territoriais: turismo, industria, transportes-mobilidade. -Ordenación do territorio: urbanismo. -Mediambiente: espazos naturais, diagnóstico ambiental, climatoloxía aplicada
GI-1470	Magnetismo e nanotecnoloxía	Centro de Innovación e Transferencia de Tecnoloxía	- Estudio experimental dos sistemas nanoestructurados: Capas e partículas. - Magnetismo en sólidos: Materiais, estructuras e micromagnetismo. - Síntese e propiedades de Nanomateriais - Propiedades de transporte e magnéticas en óxidos mixtos e materiais compostos - Sintese e propiedades de polímeros e copolímeros - Estabilidade coloidal e xelificación - Simulación por Monte Carlo e Dinámica Browniana - Autoorganización en dispersions coloidais
GI-1482	Sistemas radiantes	Centro de Innovación e Transferencia de Tecnoloxía	- Deseño de antenas para a comunicación por satélite, radar e WLAN - Deseño de elementos pasivos de microondas mediante algoritmos de optimización - Metodoloxías alternativas para o ensino da teoría electromagnética - Bioelectromagnetismo - Detección de manchas de hidrocarburos utilizando técnicas SAR
GI-1636	Grupo de sistemas intelixentes	Centro de Innovación e Transferencia de Tecnoloxía	- Internet e multimedia. - Monitorización e control intelixente. - Lóxica borrosa. -- Robots autónomos. - Enxeñería do coñecemento. - Computación neuronal. -Telemedicina. - Tecnoloxías na educación - Recuperación de información - Mineiría de datos -- Computación evolutiva
GI-1871	Análise territorial	Centro de Innovación e Transferencia de Tecnoloxía	- Análises socioeconómicas con implicacións territoriais: turismo, industria, transportes-mobilidade, pesca. - Desenvolvemento local - Ordenación do territorio: urbanismo. - Mediambiente: espacios naturais, diagnóstico ambiental, climatoloxía aplicada

UNIVERSIDADE DE SANTIAGO			
GI-1893	Laboratorio de sistemas	Centro de Innovación e Transferencia de Tecnoloxía	- Sistemas de Información Xeográfica - Control e Supervisión Intelixente - Realidade Virtual - Internet e Mobilidade -- Sistemas Multimedia - Teledetección e monitorización da dinámica oceánica .na plataforma continental galega - Modelado hidrodinámico rexional - Relación entre variables medioambientais e HABS e ciclos de productividade - Teledetección como fonte de datos de valor engadido nas actividades pesqueiras - Desenvolvemento de sistemas de medición in-situ de datos oceanográficos en toda a columna de auga - Computación de materiais con técnicas ab initio. Modelado e Deseño - Electrons altamente correlacionados
GI-2003	Investigador: José Ramón Chantada Acosta	Centro de Innovación e Transferencia de Tecnoloxía	-Sistemas Información Xeográfica - Teledetección - Usos do Chan - Xeodemografía

Fonte: Universidade de Santiago de Compostela

UNIVERSIDADE DE VIGO			
Referencia	**Nome**	**Situación**	**Liñas de investigación**
EI1	Equipo de enxeñería de sistemas e automática	E.T.S. de Enxeñería Industrial	Informática industrial (sistemas en tempo real, comunicacións industriais, control e sincronización de tarefas produtivas, loxística industrial). Integración da información. Automatización da xestión. Traballo en grupo mediante redes de comunicación. Integración xestión-produción.
OE2	Equipo de enxeñería de organización	E.T.S. de Enxeñeiros Industriais	Xestión da área loxística. Redeseño de sistemas loxísticos. Xestión da produción, de stocks, da distribución física, de almacén. Deseño de sistemas de información loxística. Implantación de novas tecnoloxías no ámbito loxístico. Distribución en planta (Layout). Racionalización de envases e embalaxes. Proxectos de mellora continua (xusto a tempo). Xestión da calidade e do medioambiente.
EA10	Equipo de fundamentos da análise económica e de economía aplicada	Facultade de Ciencias Económicas e Empresariais	Economía industrial Investigación, desenvolvemento e innovación (I+D+i) Economía do transporte
EA3/A	REDE	Facultade de Ciencias Económicas e Empresariais	Empresa-medioambiente Economía do transporte Avaliación de investimentos en transporte Impacto ambiental do transporte Estudos económicos sobre diferentes métodos de regulación do transporte en áreas metropolitanas Propostas de regulación do transporte Fixación de tarifas
OC1/A	G4+	Escola Universitaria de Estudios Empresariais	Estratexia e organización empresarial Desenvolvemento de cadeas ou clúster empresariais. Planificación e promoción territorial Sistemas de información e modelización Investigación de mercados e internacionalización Innovación e xestión do coñecemento

Fonte: Universidade de Vigo

6.3 Members of each workgroup to the Close Phase 1 (may of 2009)

MEMBROS ADHERIDOS AO GRUPO DE TRABALLO

GT1 OPTINTERNA
TECNOLOXÍAS E PROCESOS INTERNOS PARA A OPTIMIZACIÓN DOS RECURSOS

TIPOLOXÍA	ENTIDADE
EMPRESAS	ANIBAL BLANCO LOGISTIC
	ATOS ORIGIN SAE
	CEFERINO NOGUEIRA
	COMASIS CONSULTORES
	GRUPO TT
	PROGECO VIGO
	REYCO
	TERMAVI
	TRANSPORTES ANÍBAL BLANCO
	TRANSPORTES PORTUARIOS GALLEGOS
	VICUS EXPRESS
CENTROS TECNOLÓXICOS	AIMEN
	INSTITUTO TECNOLÓXICO DE GALICIA
GRUPOS DE INVESTIGACIÓN UNIVERSITARIOS	GIO (UVIGO)
	GRUPO DE INVESTIGACIÓN - SIDOR (UVIGO)
	GRUPO FYSIG (UDC)
	GRUPO INTEGRADO DE INGENIERIA (UDC)
	GRUPO INVESTIGACION GED (UVIGO)
	GRUPO MODES (UDC)
	INVESTIGACIÓN LABORATORIO DE SISTEMAS (USC)

MEMBROS ADHERIDOS AO GRUPO DE TRABALLO

GT2: LOXINTEGRA
TECNOLOXÍAS E PROCESOS DE XESTIÓN E INFORMACIÓN PARA UNHA LOXÍSTICA INTEGRADA

TIPOLOXÍA	ENTIDADE
EMPRESAS	ACEN LOGISTICA
	ANIBAL BLANCO LOGISTIC
	CEFERINO NOGUEIRA
	COMASIS CONSULTORES
	FEGATRAMER
	GEFCO
	GRUPO TT
	IMATIA
	LOGIDIGAL
	PROGECO VIGO
	REYCO
	TERMAVI
	TRANSPORTES ANÍBAL BLANCO
	TRANSPORTES PORTUARIOS GALLEGOS
	TRANSPORTES VISANTOÑA
	VASCO GALLEGA
	VICUS EXPRESS
	VISUALTRANS
CENTROS TECNOLÓXICOS	AIMEN
	INSTITUTO TECNOLÓXICO DE GALICIA
GRUPOS DE INVESTIGACIÓN UNIVERSITARIOS	GIO (UVIGO)
	GRUPO FYSIG (UDC)
	GRUPO INTEGRADO DE INGENIERIA (UDC)
	INVESTIGACIÓN LABORATORIO DE SISTEMAS (USC)

MEMBROS ADHERIDOS AO GRUPO DE TRABALLO

GT3: ALMATEC
TECNOLOXÍAS ESPECÍFICAS DE SERVIZOS DE ALMACENAXE

TIPOLOXÍA	ENTIDADE
EMPRESAS	ACEN LOGISTICA
	ANIBAL BLANCO LOGISTIC
	ATOS ORIGIN SAE
	AZKAR
	COMASIS CONSULTORES
	IMATIA
	PROGECO VIGO
	TRANSPORTES ANÍBAL BLANCO
	TERMAVI
	URO
	VICUS EXPRESS
CENTROS TECNOLÓXICOS	AIMEN
GRUPOS DE INVESTIGACIÓN UNIVERSITARIOS	GIO (UVIGO)
	GRUPO DE INVESTIGACIÓN - SIDOR (UVIGO)
	GRUPO DE INVESTIGACIÓN SISTEMAS RADIO (UVIGO)
	GRUPO MODES (UDC)
	INVESTIGACIÓN LABORATORIO DE SISTEMAS (USC)

MEMBROS ADHERIDOS AO GRUPO DE TRABALLO

GT4: EQUEMAT
EQUIPAMENTO E NOVOS MATERIAIS PARA A MELLORA DA EFICIENCIA, A SEGURIDADE E A REDUCIÓN DO IMPACTO AMBIENTAL

TIPOLOXÍA	ENTIDADE
EMPRESAS	ANIBAL BLANCO LOGISTIC
	CASTROSUA
	PROGECO VIGO
	TERMAVI
	TRANSPORTES ANÍBAL BLANCO
	TRANSPORTES VISANTOÑA
CENTROS TECNOLÓXICOS	AIMEN
	ENERGYLAB
	INSTITUTO TECNOLÓXICO DE GALICIA
GRUPOS DE INVESTIGACIÓN UNIVERSITARIOS	INVESTIGACIÓN LABORATORIO DE SISTEMAS (USC)

MEMBROS ADHERIDOS AO GRUPO DE TRABALLO

- GT5: INFRALOX
  EQUIPAMENTOS E SERVIZOS DAS INFRAESTRUTURAS LOXÍSTICAS PARA A MELLORA DA MOBILIDADE E O IMPULSO DA INTERMODALIDADE

TIPOLOXÍA	ENTIDADE
EMPRESAS	ANIBAL BLANCO LOGISTIC
	AUTORIDAD PORTUARIA DA CORUÑA
	CASTROSUA
	CEFERINO NOGUEIRA
	FEGATRAMER
	GEFCO
	LOGIDIGAL
	PROGECO VIGO
	TERMAVI
	TRANSPORTES ANÍBAL BLANCO
	TRANSPORTES PORTUARIOS GALLEGOS
CENTROS TECNOLÓXICOS	AIMEN
GRUPOS DE INVESTIGACIÓN UNIVERSITARIOS	GIO (UVIGO)
	GRUPO INVESTIGACION GED (UVIGO)
	GRUPO TRANSPORTE LARGO PLAZO (UDC)
	INVESTIGACIÓN LABORATORIO DE SISTEMAS (USC)

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