

tying safely

LOSAMEDCHEM

How could the logistics
and the safety of the
transports of chemicals
be improved in the
Mediterranean area



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As counsellor in charge of European policies for the Province of Novara, during the first periods of the project I have had the opportunity to follow step by step the development of the project “LOSAMEDCHEM - How could the logistics and the safety of the transports of chemicals be improved in the Mediterranean area”. This publication represents the results of the first phase of the project, which is implemented in the framework of the EU Transnational Cooperation Programme “MED” and is co-financed by the European Regional Development Fund.

As Lead partner, I strongly believe that LOSAMEDCHEM is a significant occasion of development for all the involved areas. The publication at issue is an opportunity for the dissemination of the results of this initial phase in which the partners have carried out a SWOT analysis within their territory and that has led to the identification of Best Practices.

Moreover, I would like to underline the importance of this phase as a basis for the development of subsequent phases of the project. Furthermore, through the development of those phases I hope that it could be possible to obtain benefits for the areas involved by the project.

Finally, I think that LOSAMEDCHEM will achieve concrete results and I am sure that, through the efforts of all partners, such an objective will be reached. Indeed, the concreteness in results is a priority for us: this is because it is the only way to produce benefits to the territories involved in the project.

So I wish a successful continuation of the project for all the partners.

Counsellor responsible for EU policies for the Province of Novara
Giuseppe Antonio Policaro

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Chapter 1: SWOT Analysis

Project LOSAMEDCHEM: Logistics and Safety of Chemical products in the Mediterranean area

Preface

The Mediterranean basin has become during the last 20 years one of the world crucial traffic areas. This is due to the fact that the globalization of commercial relations, especially with Far- and Middle East has promoted the maritime transport of both finished goods and raw materials.

Nevertheless, the competitiveness of the Mediterranean regional countries and especially the ports has lagged in their development compared with the equivalent structure in North Europe.

Another negative issue characterizing the Mediterranean region is the growing unbalance between road transportation and other transport modalities: rail is losing percentage of traffic, and intermodality is painfully trying to advance: yet results are very modest.

Furthermore, chemical industry is affected by deficits in the development of chemical clusters; one of the major reasons for this is the insufficient level reached by transport infrastructure.

There is a lot to do in terms of harmonization among different regions in the fields of transport regulations and laws across Europe. In addition the coordination of transport related decisions is still insufficient.

Moreover, the conceptual development of technology for the transportation of goods using different transport ways is very limited, and cargo traffic has always lower priority compared to passenger traffic, particularly when rail modality is examined.

Finally, especially among ports, there is no trend towards a significant cooperation, but on the contrary the local competition prevents a collective approach from sharing improvements; technical and organizational; thus the efficiency gap between North and South Europe increases.

Transnational cooperation is vital for achieving improved logistics, which means reducing costs, offering better reliability and flexibility and enhancing safety, which is of utmost importance concerning the dangerous goods (about 1/3 of the whole chemical production).

Chemistry, on the other hand, is one of the most globalized industrial branches, and logistics plays a fundamental role in its expansion.

In order to react to these critical aspects, it is necessary to initiate an international cooperation process, bringing together, in a broad partnership, different Mediterranean countries, with their relevant stakeholders, and starting a common project, where analysis of the current situation is the first step.

Then, promoting the transnational transfer of know-how and good practices, and taking into account the most significant results of the analytical phase, the Partners will produce some feasibility studies. They will also tackle issues that constitute the most critical logistic aspects and define transnational projects, with the target of individuating common solutions for common needs.

Last step will be the definition of a joint strategic plan, supported by Partners from different countries, in order to ensure a continuation of the logistics proposed solutions agreed upon, and also to share a cooperative vision of future infrastructural interventions and a coordinated program of their implementation.

Main project targets

Taking into account the considerations mentioned in the previous chapter, main objectives of the LOSAMEDCHEM project are:

- 1.promoting the cooperation among the chemical districts in the Mediterranean area, between them and the main port areas, in order to enhance the competitiveness of the Mediterranean chemical industry
- 2.improving the integration between ports and their hinterland, sustaining as much as possible the intermodal transportation, and facilitating the shift of freight traffic from road to rail and waterways
- 3.increasing the overall efficiency of the chemical logistics in the Mediterranean basin, also thanks to the dissemination of the Best Practices
- 4.reducing the environmental pollution and increasing safety in the transportation of chemical goods and especially of dangerous materials
- 5.supporting the harmonization of the different traffic regulations that are currently in vigor in the Mediterranean countries/regions.

Project partners

Partners of different Mediterranean regions participate in this project, ensuring a good implementation of project activities and a global vision of the current status of the chemical industry and chemical logistics in this area.

Lead Partner is Novara Province

Other partners are:

FEPORTS - Port Institute for Studies and Cooperation of the Valencian Region

General Council of the Chambers of Catalunya

The Port Authority of Genova

The Port authority of Trieste

The Port Authority of Koper

The University of Maribor

The Thessaloniki Chamber of Commerce and Industry

The Local Councils' Association of Malta

The scientific coordination of the LOSAMEDCHEM project is responsibility of Sviluppo Chimica (Milan), the operational project arm of Federchimica (Federation of Chemical Industries).

Altogether, the Partners are committed to establish a deep and intensive cooperation to improve the current conditions of chemical industry and especially for chemical logistics, and provide examples and suggestions for suitable actions in future.

Relevant Stakeholders, in particular chemical companies and logistic service providers, are also key actors in this project.

Project activities and timing

The LOSAMEDCHEM project has been approved in April 2010, and its development will last from June, 1st, 2010 until May, 31st, 2013.

The project overall budget is about 1.6 Million Euros.

Project activities encompass 5 Work-packages:

Work-package 1 corresponds to Project Management

Work-package 2 includes all dissemination activities that will be provided during the entire project development

Work-package 3 focused, during the first year of the project implementation, on the analysis of the current situation and on the identification of the most critical areas/urgent interventions and also of the existing Best Practices. Its results are presented in this publication.

Work-package 4 is devoted to the preparation of investments, and concentrates on the implementation of feasibility studies for infrastructural projects of transnational significance.

The Work-package 5 will finally focus on the strategy development for guaranteeing future continuation of the main project outputs and the mainstreaming activities.

SWOT analysis

Strengths, Weaknesses, Opportunities and Threats

Short summary of the partners' SWOT analysis

The SWOT analysis, together with the individuation of the best practices, is the major output of the work-package 3 and constitutes the main input for the subsequent work-packages.

The main objectives of the work-package 3 are to carry out thoroughly analysis of the current situation of the chemical industry and chemical logistics in each partner's region. It also identifies strengths, weaknesses, opportunities and threats, following a standardized model and is distributed to all partners immediately after the kick-off meeting. It is coherent with the swot concepts, according to which strengths and weaknesses are understood as " internal " factors, which can be directly influenced by the companies, while opportunities and threats are " external " factors, which cannot be directly influenced by the companies themselves.

To envisage better facts and trends about global situations, external chances and risks, the project partners are supported by regional stakeholders meetings used as expert workshops.

Furthermore, experts were asked to improve possibilities and identification of best practice examples.

SWOT analysis structure and time schedule

Each partner has to supply a SWOT analysis document, the structure of which, as already mentioned, will follow a standardized model.

Each study includes a short overview of the partner's region, of the local chemical industry and of the logistic and transportation infrastructure, accompanied by the most significant traffic data.

In particular, the regional SWOT analysis, including the results of the expert interviews and workshops, is aimed at providing details of emerged needs and measures required for future actions and improvements.

A. Strengths and weaknesses of the chemical industry and chemical logistics in the mediterranean area

A1. Strengths and weaknesses in procurement

A1.1. Procurement leads time for raw materials and intermediates

The suppliers of raw materials are located globally, but the source of hydrocarbons is mainly located in middle east and north africa.

This situation privileges naturally maritime transportation and allow good forecasts for supply delivery.

Generally, partners and their stakeholders evaluate as their strength the lead time conditions for deliveries of raw materials and intermediates.

The general procurement policy is to maintain two or more suppliers for goods with critical availability. For non-critical products, supply is depending on price and, sometimes, on lead time, especially when storage capacities are limited.

A.1.2. Relations with suppliers

Most partners consider cooperation with suppliers a necessity, especially when plans are made, and planning collaboration is evaluated as a crucial issue.

The cooperative aspect is mostly judged as a factor of strength.

Naturally, relying on a supply partner needs a good and careful supplier's assessment, especially for critical materials, an efficient communication channel and reliability of both products and packaging, when the latest is needed.

All these aspects were considered in a positive way, so cooperation with suppliers is qualified as one of the strengths.

The only debated point is related to the payment conditions, where strength and weakness are both present among partners' evaluations.

Many stakeholders judge the solidity of their industrial tissue as a strong point.

A.2. Strengths and weaknesses in warehousing

Companies try to reach and keep an optimal inventory and safety stock level, and, under suitable conditions, operate with a just-in-time strategy.

They think that their efforts in this field are quite successful and therefore identify warehousing management as strength.

Outsourcing policy is mostly considered neither a strength factor nor a weakness factor, as the majority of the companies has its own storage facilities or has consignment stocks with their suppliers: in this case the selection of qualified enterprises is mandatory, especially when dangerous goods are involved.

A.3. Strengths and weaknesses in production logistics

Good knowledge of their production processes and capability of taking advantage of their internal flexibility are generally recognized by partners' stakeholders as strong points and constitute a competitive plus.

Moreover, production processes are increasingly supported by itc tools that allow production optimization and reduction of both idle times and scrap quantities.

Nevertheless, quite a few companies still think that production costs are too high.

A.4. Strengths and weaknesses in distribution and transport

Different products need specific requirements for distribution and transport, especially critical when dangerous goods (~ 1/3 of the whole chemical production) are handled.

However, distribution is normally perceived as a strength factor.

Only rail transportation gets a negative evaluation: the interoperability among national rail systems which is very low, the bureaucratic barriers, the lack of rolling stock quality, the lack of terminal infrastructure for intermodal transport prevent companies from choosing railway to road, in spite of higher safety of rail modality.

On the other hand, transportation costs, especially in rail are considered high in average, and this is a factor limiting the competitiveness of the companies.

Critical areas are also highlighted in port activity: transshipment, high load and unload times, and the fact that ships have to wait too long in the port area.

Since the comparison with the efficiency of the north europe ports is negative, many times the chemical companies which are located in the mediterranean area preferred those ports and avoid the ones in the mediterranean sea.

Moreover connections with the harbor back-areas and within the hinterland often need a substantial improvement.

As it has already been mentioned, sometimes a suitable space for the storage of chemical products, especially dangerous goods is either insufficient or inadequate; neither there are short/medium term plans for its implementation.

Inland waterways are unfortunately almost unavailable in the partners' countries.

A.5. Strengths and weaknesses in planning and controlling

The current economical crisis has produced very negative impacts on accuracy and reliability in supply planning or sales predictions, which are the basis for production planning.

Nevertheless, taking into account logistic processes related to major suppliers/final customers, stakeholders' answers are underlining their strength in these processes; strength that is coming also from the very extensive use of itc tools that increase accuracy and flexibility in production and delivery planning.

Quality assurance procedures are a common asset where chemical products are managed / transported.

The only weakness point, for some partners, is the management of very dangerous goods, as depicted in chapter 1.10 Of adr book, that requires special attention and qualified personnel is not always available.

A.6. Strengths and weaknesses in safety and security

The european harmonization of the rules for transportation of dangerous goods (adr, rid, adm, imdg) is a cornerstone for easier and transparent cargo traffic.

Reach/clp is a further step in the appropriate management of chemical substances within the european union.

In general, all partners consider this situation a strength factor for them, even though there are claims that excessive regulation can threat the competitiveness of european chemical industry.

Furthermore, it is obvious that participating in responsible care program, as many companies do, is an issue that partners consider strength for them.

The only weak aspect is related to the control of vehicles transporting high dangerous goods, where fundamental tool is satellite telemetry, not yet broadly adopted.

A.7. Strengths and weaknesses in information and communication technologies

All partners underline that the adoption of erp/mrp systems as tools for managing company processes is a strength factor, and almost all companies take advantage of it.

Supply chain tracing and controlling is becoming more and more diffuse, and tracking and tracing the cargo is not only important for the customers, but also is a tool for preventing misuse of dangerous goods. Nevertheless, some partners would like to see a broader utilization of these technologies, as well as of EDI.

The still limited utilization of satellite information, which is essential for security scopes, is a weak and critical aspect.

A.8. Strengths and weaknesses in company logistics

Most partners' companies evaluate their internal logistic skills as high/very high, and this is obviously a strength point.

A problem that is peculiar to Italy is that most young people are currently hired with temporary contracts; additional problem is that initial wages are pretty low.

This combination of negative aspects is a significant threat for the stability of skilled staff for companies involved in the chemical area; and the situation is likely to remain and not to be improved in the short time.

B. Opportunities and threats of the chemical industry and chemical logistics in the Mediterranean area

B.1. Economic trends

The present economic crisis endangers most chemical and logistic companies, and especially the small/medium sized enterprises are highly challenged by the current economic situation and they even have difficulty to survive.

Nevertheless, market signals are finally not only negative and evaluations produced by partners and stakeholders are partially positive, because both market internationalization and third world regional economic development are regarded as a chance and not as a threat.

However, some partners judge as a threat the increased global competition, especially because production processes of chemical goods in the emerging countries are reaching very high technical levels and also because countries with significant raw material assets are becoming strong competitors in the commodity market (e.g. Saudi Arabia in the petrochemical products sector).

On the other side, stronger competition may represent an opportunity for growth and an impulse for technological advances at a regional level, and the same effect can be produced by the trend to re-locate production sites in countries with lower labor costs.

Generally speaking, representatives of the chemical industry evaluate that the intensified competition and, as a consequence the higher cost pressure can be seen as an opportunity and a threat at the same time.

The current turbulent international context (especially in the northern african area and in the middle east) may represent a serious threat concerning the economical development of the mediterranean countries.

B.2. Sociocultural trends

The influence of the negative demographic trend affecting all european countries is expected to have disadvantages on the chemical industry by half of the stakeholders, while the other half is substantially neutral.

Increased sensibility to environmental pollution and a still very bad image of chemical industry regarding the environmental protection, the safety and sustainability are considered by many partners, as a potential threat towards a positive industrial development. So there is an urgent need to re-qualify the chemical industry as human friendly.

As far as the availability of skilled resources and, more generally regarding the employment, many partners highlight the negative impact due to the growing number of temporary jobs especially among young people, and the lack of qualified jobs offered by the labor market to the professional level today.

Immigration is viewed not as a threat but rather as an opportunity: migrants cover mostly operative roles, where request from local people is low.

B.3. Technological trends

All partners agree that technological competence is a huge chance for the chemical industry and logistics.

Strong innovation efforts in fields like biotechnology, an efficient energy use, renewable energy sources, and new materials have the capability to generate new economic development and to solve the upcoming high-challenges for human society.

Itc definitely come along with the opportunity to improve communication procedures, promote standardization, facilitate authorization processes and, therefore, increase the overall efficiency of the supply chain.

But itc will have an equivalent impact in the extension of automation in the industrial and logistic processes and in fostering innovation in transportation/cargo handling and warehousing.

B.4. Environment and energy

Due to the fact that hydrocarbons are the main energy source and raw materials for the chemical industry, their availability for European countries in the Mediterranean area is a threatening challenge.

Gas and oil have to be imported, as Losamedchem partners are neither strong gas nor oil producers.

The diversification and security of supplies is therefore crucial for a competitive regional chemical industry.

There is a general agreement among partners on evaluating as a threat the rising energy costs, herald of expected high risks for the chemical industry as an energy intensive industry sector.

Additional threats are coming from the increasing political instability of the countries that are oil and gas producers, which makes more critical the current situation.

On the contrary, most partners judge positively the overall availability of the different energy sources.

However, there are different opinions among the partners regarding the new international legislation about the chemical substances (REACH, CLP); referring to CO₂ emissions.

The prevailing opinion is that this legislation provides an additional burden for chemical industries, but many companies have already taken measures to deal with the new framework conditions and are, therefore, a step ahead.

Management of by-products and waste materials is mostly (there are some exceptions) considered as an opportunity in terms of environmental protection and exploitation of new materials/energy sources.

B.5. Politics and innovation

A transnational harmonization process of the traffic regulations, especially those governing cross-border transports, is universally considered a big opportunity within international corporate groups.

Moreover, as big chance is considered a coordinated development of the traffic infrastructures; this should require a definition of the intervention priorities that should be agreed upon by all partners interested in their development.

The majority of partners stressed, on the opposite, the fact that the amount of the available EU financial resources for infrastructural development may be reduced in the context of the eliminating the public expenses. This could result in a major set-back for the sector.

The destination of the territory is commonly regarded as a primary task for the public institutions, but, whereas some partners are sustaining it as opportunity, some others are afraid that the political intervention may produce negative effects and, therefore, they are oriented to view it as a threat.

Many voices are also asking for a stronger public support in favor of the chemical industry and of the relevant goods transportation, especially for non-road modalities. However, there is a fear that balance cuts will affect negatively any possible intervention, considering that we are painfully emerging from a deep crisis.

B.6. Transport infrastructure

B.6.1. Railway

In general, common understanding is that railway is not as competitive as it should be, especially for long distances, in spite of its well recognized advantages in terms of safety and of being environmentally friendly.

The current railway infrastructure level is globally regarded as insufficient, especially for cargo transportation: investment into rail network is practically zero, and its extension has been shrinking for the last years.

Economic conditions of state railroads are dramatic and the process of liberalization is a painfully and slowly progressing among a lot of obstacles.

The equipment is, in terms of quality and availability, absolutely poor and the price policy for cargo traffic is simply disastrous, so that further shifting of freight volume to road is unavoidable.

Furthermore, the bureaucratic constraints that affect transportation, the archaic labor regulations and the lack of interoperability among the different regional rail networks are additional obstacles that prevent from any possibility of increased use of this modality.

In southern europe there is a growing shortage of side tracks connecting the industrial sites with the railway network: in spite of that since track dismantling goes on the compelling industries have to choose, even unwillingly, the road.

Frequently the industrial counterpart is seen by a railway operator not as a customer to satisfy, but as a source of random interference.

The italian legislation, introduced after the viareggio accident that forbids single wagon transportation for dangerous goods, is seen more as a threat to the italian chemical industry rather than a real contribution to rail traffic safety.

Spain suffers from the historical difference of track gauge from the european standards and the time needed to implement a new bunch of rail lines compliant with it, in order to facilitate the franco-spanish transit, is a threat for the rail traffic development in the iberia peninsula.

Furthermore, not all partners' countries have at their disposal railway tracks that are class d: many times only class c tracks can be used; and due to that class difference rail equipment has to be adapted: class c tracks are not allowed to the modern rail tank cars.

The inadequate rail infrastructure is a barrier for chemical products transportation, a large share of them must use the road.

A special weakness of the rail way transportation, with the current situation, is the reloading duty at the border stations, due to the lack of interoperability.

Finally, complex custom clearance and sometimes different interpretations of the regulations by custom authorities discourage railway use for cross-border chemical transports.

Under these conditions customer satisfaction is seldom encountered.



B.6.2. Road

Traffic conditions on the road (frequency of accidents, environmental pollution, congestion level and also the toll cost) are all critical factors against a correct development of the road transportation, universally recognized as too heavy and no longer sustainable.

In order to improve road traffic situation, is required an urgent law with a specific target, which unfortunately is not present in the priority issues of most partners' authorities, therefore making the road traffic conditions a real threat.

Another threat is commonly considered the lack of harmonization of the allowed maximum weight and dimensions of road transport units at european level.

B.6.3. Sea waterways

There is common understanding among the different partners that the geographical distribution of the ports along the north mediterranean shores is quite good.

The evaluation changes dramatically with reference to the efficiency and effectiveness of these ports: in fact, logistics service providers and industries that compare performances of north european ports with those of the mediterranean ones are convinced that a lot of improvement is needed. Those are in terms of reduced labor bureaucracy and increased flexibility, hinterland connections, non homogeneous adoption of the sector regulations, even in the same country.

Negatively is also considered the location of quite a few internal hubs and transshipment ports, and their connection to road and rail networks.

These negative aspects, which are commonly reported by port users, consist of a serious threat when considering use of sea waterways.

Another threat comes from the habit of many mediterranean harbors, geographically close, to compete instead of cooperating and taking advantage of their peculiar features (e.G. Trieste-koper, barcelona-tarragona, etc.).

Nevertheless, maritime transportation is to increase in the near future, because of the number of advantages that are offered by this modality: cost, environment, a guarantee delivery time, ever bigger tons of transported goods per ship, etc.

B.6.4. Intermodality

Intermodal transport, combining the best features of different transport modalities, should imply better logistics and lower transport costs, higher safety and less environmental pollution.

The frequent declarations in favor and the explicit support of intermodality by the european community are judged as a strong opportunity for its development. However, the lack of concrete measures sustaining a real development of the intermodal transportation, especially important at regional government level represent a huge obstacle for this modality to grow.

The necessity of intermodal nodes and terminals complying with the complex requirements of the chemical goods, especially when it is the case of handling dangerous products, is largely unsatisfied: a desperately poor network of tank cleaning stations, which is very often not even included in the plans for building new terminals.

Generally, there are large terminals at strategic important traffic nodes but there is a lack of comprehensive national and, above all, international concepts.

All logistic operators have many times underlined the opportunity of a uniform international set of rules, as it is the case of the legal structure of the multimodal dangerous goods form.

At the moment there is no well developed structure for intermodal terminals in many mediterranean areas.

This leads to a loss of efficiency of chemical logistics for the combined transport of railway and road.

B.6.5. Pipelines

Pipelines are a very safe and efficient transport mode for chemical products, both liquid and gas.

Therefore the development of pipelines, especially for transporting dangerous goods, is considered an opportunity and there is consensus about a transnational interconnection of the existing regional networks.

B.6.6. Safety and security

Increasing the safety and security, implementing all the required interventions in order to improve the current situation in this direction is understood as a need.

All partners agree on considering international unified safety and security standards through all european countries a huge opportunity and a big chance for the competitiveness of the chemical industry.

Maltese partner, in particular, has considered main objective of his swot analysis safety and security issues regarding port and around port conditions and infrastructures (this can be easily understood because of the natural coastline of this small insular country).

The maltese study includes also a methodology for risk evaluation with special focus on port sites that can be usefully compared with similar procedures already existing in the other mediterranean port areas. A possible development could be the implementation of a common procedure for such task among losamedchem partners.

The comparison may also highlight what could be today a threat, as envisaged by some partners: different national/regional interpretations of this issue can create constraints that are not acceptable and, in some cases, limit the competitiveness of the market players.

B.7. .Industry sector and competition

According to some partners, the capability of tracking and tracing cargo units could be a competitive edge, especially for logistic service providers.

All partners agree that cooperation among chemical industries is a significant opportunity, especially if the cooperation eventually evolves the creation of chemical clusters, with broader positive influences on the territory economy.

B.7.1. Suppliers and customers

In general, standardization is considered as an opportunity; the potential of upward and downward integration is generally regarded as an asset not only for reducing costs but also for facilitating contacts along the supply chain, which is clearly a competitive advantage.

Similarly, suppliers' concentration on a geographical basis is considered an advantage.

Clustering of customers in specific areas is seen by most partners as an opportunity, but some consider it as a potential threat: in fact a strong geographical concentration makes easier the product distribution, but if the target market declines, consequences can be disastrous for the supplying companies.

A strong brand implies clear difference with respect to the competition and promotes customers' loyalty: it is an evident advantage.

Conclusive remarks:

Need for future actions and improvements

A. From the logistic point of view

Transportation

There is universal consensus among the partners' evaluations:

Railways: very negative notes about infrastructures level, service quality, bureaucratic constraints and lack of interoperability;

Road: traffic too heavy and no longer sustainable, due to the frequency of the accidents, the congestive level, the environmental pollution and also the toll cost;

Intermodality: in spite of frequent declarations in favor of its development, lack of concrete measures, especially at regional government level: this is a huge obstacle for this modality to grow;

Sea waterways: the efficiency and effectiveness of the north mediterranean ports are dramatically low, when they are compared with the north european ports. Labor bureaucracy, lack of flexibility, non-homogeneous adoption of the sector regulations are among the critical, universally recognized as negative, issues: the consequences are transshipment, long load and unload time and time waste when ships must queue in the port area. A big disadvantage is also represented by inadequate accessibility and interconnection between port areas and their hinterland.

Terminal added value services

Terminals for multimodal transport have a special importance for the chemical industry.

But they must offer the services that most customers require; among them we report just two examples:

Storage room for chemical goods, especially critical for dangerous products: the current situation is far from being satisfactory, because of the insufficient areas available;

Tank cleaning stations: most chemical products are liquid; multimodal cleaning stations, especially c/o intermodal hubs along the pan- european corridors, are necessary and urgently requested by all customers; yet, no bi-modal cleaning station is available along the entire length of the ten-t 6 european corridor.

B. From the ecological point of view

Future availability of fossil energy resources, tax policies regarding their utilization and implementation of climatic sustainability plans are currently non- homogeneous across europe.

Achieving harmonized eu-wide environmental regulations as determining factors for a sustainable development is a priority issue, but too often current situation is far from these targets, which are also a prerequisite for guaranteeing international competitiveness. Therefore a serious action should be undertaken in this direction by all partners.

C. From the safety/security point of view

Safety and security aspects are of the utmost importance in the chemical industry and the chemical logistics: hence there is a need of advancing the information and communication technology in these fields.

Furthermore, the increased environmental sensitivity among people should not be underestimated: this will unavoidably lead to a reshaping of the transport modalities into cleaner and more sustainable ones.

Therefore, the improvement of transportation networks involved in the distribution processes is urgent and mandatory, and a serious intervention of public authorities, coordinated at european level, is necessary.

D. From the general logistic point of view

Globalization of markets acts as an important driver for strategic competitiveness, where logistics plays a crucial role.

A growing number of trade partners and locations lead to increasing complexity within supply chain networks.





Therefore the challenge is to connect sectors and processes in both physical and informational fields.

Another cornerstone of the trade network is that the customer has become the central point of all entrepreneurial activities.

For these reasons logistics represents the ideal tool for building up customer-binding measures and for generating competitive advantages.

But the most important contribution that logistics can offer is the reduction of costs through the optimization of the supply chain processes, and especially of the relevant operational activities (loading/unloading, transportation, storage, etc.)

E. In terms of politics for transportation and infrastructures

1. Better coordination of the european plans for developing logistic infrastructures.

It is necessary that all partners agree on common priorities for the development of transport routes and on how to speed-up the respective extension of the relevant infrastructures.

Stakeholders from the political world, the industry and the administration have to be actively involved in this coordination process. By this way they will ensure that their actions are focused on removing the most critical deficits, on a transnational level.

2. More efficient use of eu structural funds, in interaction with other regional and national funding sources.

The eu funds, with their leverage effects, are especially important in the development of strategic infrastructures.

3. Long term, rational and sustainable transport policy.

Transport infrastructure and traffic are crucial for the chemical industry and chemical logistics.

Main target is the development of an optimal global logistic transport system, where coherent and sustainable goals are pursued along the whole multimodal supply chain.

This target can only be reached if all involved partners, of different countries and regions, are committed to a coordinated transnational effort, which should try also to solve the local problems.



Province of Novara SWOT Analysis of Chemical Industry and Chemical Logistics in Eastern Piedmont



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Part 1

1. Introduction To Region / Country

1.1. Short description of the Piedmont region

The Piedmont region measures 23.399 square km and its population is about 4.350.000. It borders with France, Lombardy, Valle d'Aosta, Liguria and Emilia-romagna. It's the second biggest region in Italy after Sicil



Fig. 1 – Piedmont's map and border



Fig. 2– Location of Piedmont in Italy

Around half of the Piedmont's territory is mountainous, surrounded by the Apennines to the south and by the Alps to the west and to the north with three glacial lakes: lake Maggiore (Verbano), lake Orta (Cusio) and lake Viverone. The Piedmont's plan is situated to the north of the river Po, while the Cuneo and the Alessandria's plans are extended to the south of the river. The climate is continental. The geomorphological situation of the territory is well described in the table below, reporting also the national situation.

Tab.1 – Territorial surface per altitude ISTAT and per region the 31st December 2008
(Data in hectares elaborated by the Agency for territory the 31st December 2002)

	Mountain	Hill	Plan	Total
Piedmont	1.098.663	769.830	671.753	2.540.246
Italy	10.611.010	12.541.898	6.980.693	30.133.601

Source: ISTAT Annuario Statistico Italiano, 2009 (Aggiornamento maggio 2010)

It may be interesting to analyze the consistency of the Piedmont's population in the Euro-region Alps-Mediterranean, as underlined in the table below

Tab.2 – Surface, population and population density in the Euroregion Alps-Mediterranean per region Year 2008

Regione	Popolazione residente (a)	Superficie (Km ²) (b)	Densità (d)
Liguria	1.615.064	5.421,6	297,9
Piemonte	4.432.571	25.402,5	174,5
Valle d'Aosta	127.065	3.263,2	38,9
Provence-Alpes-Côte d'Azur	4.940.000	31.399,6	157,3
Rhône-Alpes	6.160.000	43.698,2	141,0
Euroregione Alpi-Mediterraneo	17.274.700	109.185,1	158,2
Ue-27	-	4.403.356,7 (c)	-

(a) 2009

(b) 2007

(c) 2006

(d) Unioncamere Piemonte and Eurostat

Source: Eurostat, <http://epp.eurostat.ec.europa.eu>

(update may 2010)

By 31.12.2008 the active companies in Piedmont were 421,9 thousands, being about the 8% of the national scale; the main sectors are: commerce (25%), services for enterprises (14,7% but gradually increasing), construction (16,9%). These sectors absorb the majority of local business activities.

Regarding the indicator related to business density, every 100 inhabitants of the region shows a figure higher than the national average, with an indicator of 9.52 points that places the region among the first ten positions. The sole proprietorship shows an important role, absorbing the 64,26%, more than the whole north-west average (6,9%) and also higher than the national average (63,8%).

The contribution of Piedmont's companies to the national added value correspond to the 8,07%; this places the region in the fifth position at national level, and corresponds to a Per capita income of 28.720, higher than the national average but a bit lower than the average of the north-west of Italy.

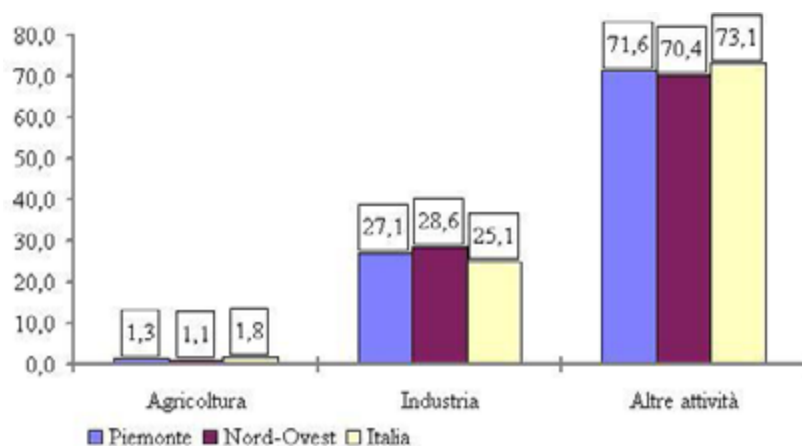


Fig.3 - Composition of value added by sector

Source: Istituto G. Tagliacarne e Unioncamere, update september 2009.

In recent years, the level of internationalization of Piedmont's economy and society has grown. The Piedmont region shows higher index than the Italian average concerning the following areas: international commerce, attraction of direct foreign investments, number of foreign employees, foreign population and training on international thematic; the international tourism is lower than the national average, but the number of foreign students in Piedmont's universities grows.

Regarding the high education system and the chemical R&D sector, Piedmont shows the following facilities:

- 3 universities with chemical departments;
- 25 Research centres public and private (excluding university's departments) with high specialization;
- 4 Scientific and technologic parks;
- 2 incubators;
- 2 Business Innovation Centres.

The table below shows Piedmont's GDP and PPP from 2000 to 2009:

Tab.3 - GDP (Milions of Euro)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
98.634,4	102.179,7	105.206,1	108.715,1	113.270,7	114.993,2	118.753,5	125.022	126.856	130.000 (stima)

Source:Istat

Tab.4 - PPP (Euro)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
23.360,9	24.233,9	24.916,8	25.575,2	26.340,8	26.520,6	27.316,6	28.209,6	28.619,1	29.269,9 (stima)

Source: Istat

1.2. Geographic framework with reference to LOSAMEDCHEM project

According to the context of the European project LOSAMEDCHEM concerning the development of the chemical freight traffic in the Mediterranean area, this analysis is aimed to underline the strengths and the weaknesses, the opportunities and the threats of the territorial frame of reference. The project takes into account the strengths and weaknesses that are mainly related to the single business realities, and also the opportunities and the threats that concern the external context where the companies are operating.

The work and the commitment of the Province of Novara in this project is not focused only on its territory, but on all the eastern Piedmont's territory, including the province of Alessandria, Verbania (Verbano, Cusio, Ossola) and Vercelli. In this context, the eastern Piedmont's corridor is a key element in the transport's framework of the north-western Italy, a territory with a great logistic vocation currently in continuous evolution. This area has developed a widespread logistic system with reference to the organizational context of the euro-Mediterranean transport system, developing the following facilities: air transport's hubs (Malpensa 2000), main ports for maritime routes (Genoa-Voltri, La Spezia, Savona), freeways for rail transport (High Capacity Line and the line Genoa-Novara-Simplon/Gottardo) and its links with alpine pass.



Fig. 4 Green lines: eastern Piedmont

Marcello Tadini: Processing of data on Regione Piemonte and Regione Lombardia. Dipartimento di Studi per l'Impresa ed il Territorio Università degli Studi del Piemonte Orientale "Amedeo Avogadro" Facoltà di Economia

The transeuropean net Ten-t is composed by linear element and point features. The linear elements consist of:

- High capacity/velocity rail net (the true innovative element of the European system) and a national conventional rail net;
- Highways and major roads with national relevance;
- Computer networks as a nervous system able to activate a smart management of the viability system;

On the other hand, the point elements are:

- Harbours, airports and international centres of modal interchange, that ensure the continental integration among maritime transport, airports and land transport;
- Urban centres that guarantees transfer and access to territories through the local nets.

Corridor 5

The backbone of the corridor Lion-Turin-Milan consists in linear and point infrastructures made by:

- High velocity/capacity rail line, composed by: base tunnels, Susa-Torino section, C.so marche and gronda merci, AV/AC station in Turin, Turin-Novara section, AV/AC station in Novara, Novara-Milan section;
- Conventional rail line that goes to Turin and then to Milan from the Frejus tunnel;
- Primary road network that starts from Frejus tunnel, through the highway A32 and the Turin's ring road and it's connected to the highway corridor called Padano that is composed by the highways A32, A21 and by the Santhià – Stroppiana's junction;
- The following point infrastructures and their links are part of the strategic corridor: Turin-Caselle airport, logistic poles of Orbassano and Novara (Malpensa airport).





Fig.5 – Geographic Representation of the corridor 5

Source: European Commission



The measures already implemented and still ongoing interventions are:

- AV/AC line, Turin-Novara sector, working since February 2006;
- AV/AC line, Novara-Milan sector, working since September 2009;
- Modernization and adjustment of the highway A4 in the Settimo-Greggio sector and Novara-Ticino sector
- Modernization measures on the highway A21.

Corridor 24

The backbone of the corridor Genoa - Rotterdam in Piedmont's territory consists of:

- High velocity/capacity rail line Genoa-Novi Ligure (Terzo Valico dei Giovi);
- Conventional rail line Genoa- Alessandria- Novara-Simplon;
- Road network: highway Voltri- Alessandria-Novara-Simplon (A26 e S.S. 33) and Genoa - Serravalle (A7).

Fig.6 - Geographic Representation of the corridor 24

Source: European Commission

The following point infrastructures and their links are also part of the strategic corridor:

- Logistic platform of Alessandria, Novara's logistic p, Domo 2;
- Back-port system in Liguria with the necessary links to the ports.

2. Description of chemical industry

2.1. Short description of the chemical industry as an introduction

As far as the Chemical sector is concerned, about 7% of all people employed by chemistry in Italy are located in Piedmont. Most of the employees, the chemical production and the research are concentrated in one Province, the Provincia di Novara that shares its border with the Lombardy Region. The Provincia di Novara is one of the 20 Provincial Departments of the Italian Observatory for the Chemical Sector; an operative branch of the Italian Ministry of Industry.

Main sectors: Basic Chemicals, Synthetic fibres, Pharmaceutical, Plastic and Rubber, Polymers, Petrochemical production.

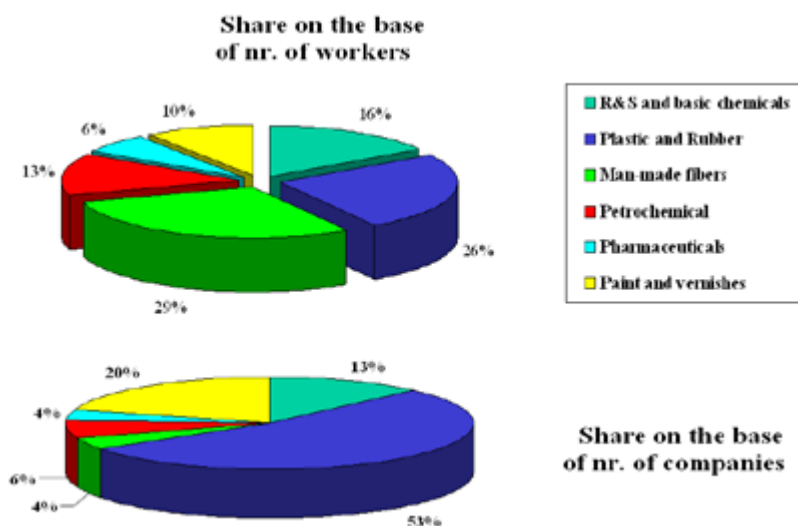


Fig. 7 – composition of the sector by number of employees and number of firms

Source: based on data Istat

Major geographic concentration of chemical sector: Provincia di Novara with the two chemical sites of S. Agabio quarter and surroundings and S. Martino di Trecate (NO), where is located one of the most important Italian refineries, SARPOM.

2.2. International Trade

Below are the figures relative to the international trade of the sector:

Tab.5 – Companies with foreign participation: 2003–2009 Piedmont Region

		Petroleum refining Products	Chemical products	Pharmaceutical products	Plastic and gum products	Total
Countries EU-15	2003	634	2.566	502	10.870	61.932
	2009	111	2.398	316	9.073	55.637
Other countries EU-27	2003	0	0	0	0	17
	2009	0	0	0	0	18
Other European countries center-east	2003	0	0	0	0	3
	2009	0	0	0	0	2.854
Other European countries	2003	0	231	0	136	5.922
	2009	0	130	0	46	2.674
North Africa	2003	0	0	0	0	22
	2009	0	0	0	0	22
Other African countries	2003	0	0	0	0	0
	2009	0	0	0	0	61
North America	2003	443	2.662	0	2.923	69.716
	2009	423	2.127	12	1.670	30.597
Central and south America	2003	0	0	0	0	0
	2009	0	0	0	0	200
Middle east	2003	0	0	0	0	35
	2009	0	0	0	0	143
Central Asia	2003	0	0	0	0	0
	2009	0	0	0	0	661
Eastern Asia	2003	0	128	0	0	6.894
	2009	627	230	0	0	7.336
Oceania	2003	0	0	0	134	214
	2009	0	0	0	0	59
Total	2003	1.077	5.587	502	14.063	144.755
	2009	1.161	4.885	328	10.789	100.262
Source: Banca dati Reprint, Politecnico di Milano - ICE						

Tab.6 – Employees of the companies with foreign participation: 2003-2009 Piedmont Region

		Petroleum refining Products	Chemical products	Pharmaceutical products	Plastic and gum products	Total
Countries EU-15	2003	4	20	3	22	419
	2009	2	17	1	20	391
Other countries EU-27	2003	0	0	0	0	3
	2009	0	0	0	0	3
Other European countries center-east	2003	0	0	0	0	1
	2009	0	0	0	0	4
Other European countries	2003	0	3	0	2	43
	2009	0	2	0	1	35
North Africa	2003	0	0	0	0	2
	2009	0	0	0	0	2
Other African countries	2003	0	0	0	0	0
	2009	0	0	0	0	3
North America	2003	1	10	0	12	178
	2009	1	13	1	11	160
Central and south America	2003	0	0	0	0	0
	2009	0	0	0	0	1
Middle east	2003	0	0	0	0	3
	2009	0	0	0	0	6
Central Asia	2003	0	0	0	0	0
	2009	0	0	0	0	8
Eastern Asia	2003	0	1	0	0	31
	2009	1	1	0	0	39
Oceania	2003	0	0	0	1	3
	2009	0	0	0	0	3
Totale	2003	5	34	3	37	683
	2009	4	33	2	32	655

Source: Banca dati Reprint, Politecnico di Milano - ICE

Tab.7 – Main interchange sectors in the province of Novara, data expressed in thousands euro and percentage change in the world market (Rank according to the value of exports): from 1st to 4th Trimester 2010

	Export			import		
	2009	2010	Var %	2009	2010	Var %
Petroleum refining products	273.185	290.492	6,3	7.583	2.748	-63,8
Base chemicals products	185.940	261.893	40,8	287.186	377.320	31,4
Other chemical products	159.829	198.237	24,0	59.236	82.085	38,6
Gum products	155.453	158.670	2,1	241.351	293.043	21,4
Medicines and pharmaceutical preparations	126.479	152.427	20,5	23.029	55.488	141,0

Source: based on data ICE and ISTAT

Below are other basic elements on the progress of the regional and sub-regional chemistry sector. In Piedmont, the percentage changed in the period 2007-2009, given by a three months variation in the sector “chemistry, gum and plastic”. It has also shown a strong worsening of the industrial production of manufacturing companies, but more stable seems to be the situation of domestic and foreign orders and the employment trend.

Tab. 8 – Percentage change given by the average three months change in the sector “Chemistry, gum e plastic” in Piedmont, years 2007-2009

Fattori	Media 2009	Media 2008	Media 2007
Manufacturing production trend	-13,2	-4,6	4,0
Domestic orders	0,4	-3,8	1,3
Foreign orders	2,49	-2,54	1,92
Turnover trend	-11,97	-0,60	4,90
Unemployment dynamics	-0,7%	1,4%	0,5

Source: Union camere Piemonte, Economic survey on the manufacturing inducçsstry of Piedmont

Concerning the direct foreign investments per sector in Piedmont and in Italy during the period 2006-2008, the production of chemical and gum products in Piedmont is twice from the Italian one.

Tab. 9 – Direct foreign investments per sector in Piedmont and in Italy Years 2006-2008

	Piemonte			Italia		
	2008	2007	2006	2008	2007	2006
Chemical products	678	846	810	5.323	5.756	4.145
Gum and plastic products	4	39	17	280	244	310
Total	682	885	828	5.603	6.000	4.456
% on total IDE	9,69%	6,47%	4,76%	4,74%	2,96%	2,78%
Total IDE	7.040	13.674	17.392	118.210	202.976	160.423

Source: Based on data Union camere Piemonte and UIC, <http://www.uic.it> (update may 2010)

Among the first thirty goods that are imported and exported more in Piedmont in 2009, the base chemical products are placed respectively in the 2nd and 11th position; the gum products in the 10th and 8th, the plastic ones in the 18th and 10th and the other chemical products in the 10th and 19th position. Finally the petroleum refinery products are placed in the 25th position and the soap & detergents in the 28th position only for the quantity of export; medicine and pharmaceutical preparations are in the 21st position concerning the import rate.

Tab. 10 – Top 30 goods by value of import and export – Piedmont, year 2009 (expressed in euro)

Good	Position	Import	Position	Export
Base chemical products, fertilizers, plastics and synthetic gum	2	1.298.431.120	11	809.840.604
Gum products	10	570.293.004	8	922.577.296
Plastic products	18	344.269.708	10	879.577.479
Other chemical products	10	364.285.498	19	391.051.550
Petroleum refinery products	-	-	25	348.151.790
Soap and detergents, products for cleaning, perfumes and cosmetics	-	-	28	308.787.253
Medicines and pharmaceutical preparations	27	223.543.543	-	-

Source: Based on data Istituto Guglielmo Tagliacarne and Istat

In the following table we have to underline in Piedmont a relevant feature regarding the import-export rate for groups of products during 2008-2009, especially these categories: coke and refined petroleum products, chemical and pharmaceutical products, chemical and botanical products, gum and plastics, other non-metallic mineral processing.

Tab. 11 - Import-export for product groups in the provinces of the eastern Piedmont and Piedmont, years 2008-2009 (a)

Provincia di Alessandria				
Sectors	2008		2009 (b)	
	Import	Export	Import	Export
Coke and Petroleum refinery products	68,47	13,85	49,54	4,94
Chemical products	406,49	503,50	315,87	408,59
Pharmaceutical, chem-medicine and botanic	8,28	15,76	8,08	18,05
Other gum and plastic products	128,36	337,12	108,97	284,96
Total	2.736,38	3.787,19	2.060,79	2.924,11
Provincia di Novara				
Sectors	2008		2009 (b)	
	Import	Export	Import	Export
Coke and Petroleum refinery products	8,25	418,59	7,58	274,16
Chemical products	512,51	486,29	390,78	396,54
Pharmaceutical, chem-medicine and botanic	34,88	95,26	26,68	133,88
Other gum and plastic products	275,33	265,05	274,14	236,67
Total	2.186,01	4.040,97	2.102,41	3.247,83
Provincia V.C.O.				
Sectors	2008		2009 (b)	
	Import	Export	Import	Export
Coke and Petroleum refinery products	0,00	0,02	0,04	0,00
Chemical products	158,40	126,73	125,36	95,24
Pharmaceutical, chem-medicine and botanic	8,13	0,26	11,35	1,06
Other gum and plastic products	26,66	106,48	12,49	79,74
Total	447,99	683,39	412,67	451,02
Provincia di Vercelli				
Sectors	2008		2009 (b)	
	Import	Export	Import	Export
Coke and Petroleum refinery products	6,27	0,08	2,08	0,11
Chemical products	147,12	132,33	118,75	119,49
Pharmaceutical, chem-medicine and botanic	25,48	27,09	27,41	29,92
Other gum and plastic products	147,12	86,64	135,05	65,82
Total	1.414,28	1.662,87	1.240,32	1.407,08
Totale Piemonte				
Sectors	2008		2009 (b)	
	Import	Export	Import	Export
Coke and Petroleum refinery products	165,98	510,29	124,77	348,29
Chemical products	2.636,26	2.077,67	1.970,80	1.754,20
Pharmaceutical, chem-medicine and botanic	310,01	348,99	267,79	377,48
Other gum and plastic products	1.383,26	2.766,04	1.209,03	2.183,95
Total	28.118,00	37.934,85	22.174,68	29.647,45

(a) Figures in millions of euros

(b) Provisional data

Source: Istat



Finally, a look on the added value on base prices, for economical activities and GDP regarding coking, refinery, chemicals and pharmaceuticals (value chain with reference to the year 2000) related to the period 2006-2008. There is also a comparison Piedmont/Italy of values regarding general industry, pure industry and manufacturing.

Tab.12 - Added value on base prices, for economical activities and GDP- value chain with reference to the year 2000. Years 2006-2008 (expressed in millions euro), Piedmont - Italy

Economical Activities	Piedmont		
	2008	2007	2006
Industry	28.251,1	29.337,9	28.680,6
Pure industry	....	24.879,2	23.874,9
Manufacturing	....	22.363,2	21.669,0
Coking, refinery, chemical, pharmaceutical	....	1.436,1	1.259,3
GDP	102.867,8	104.399,4	102.994,0
Italy			
Economical activities	2008	2007	2006
Industry	308.661,0	317.337,3	313.045,6
Pure industry	....	255.250,1	250.797,1
Manufacturing	....	226.664,0	222.231,2
Coking, refinery, chemical, pharmaceutical	....	19.353,1	19.314,2
GDP	1.276.578,0	1.289.988,5	1.270.126,4

Source: ISTAT. Year Regional Economic Accounts 1995-2008, www.istat.it (Update may 2010)

2.3. Regional Structure of Chemical Industry

The following table shows the main subjects involved in the regional chemical sector, with indications regarding the turnover and the number of employees.

Tab. 13 - Major Companies and chemical sites, turnover 2007 in Mio EUR, number of employees

¹Plants of Milan, Ravenna and Villadossola (near Novara).

²MEMC SpA has two plants in Italy: Novara and Merano (BZ). In Novara was 832 in 2007.

³Isagro Italia S.p.A.

⁴Group Turnover 138,5 MIO. Euro.

⁵Group Turnover 129 MIO. Euro.

Source: based on data CCIAA

Major Companies and chemical sites	Turnover 2007 in Mio EUR	Location / chemical site	Number of employees
1. Columbian carbon europa srl		S. Martino di Trecate (NO)	
2. Esseco spa ⁴		S. Martino di Trecate (NO)	
3. Sud chimie mt srl		Novara	
4. Novamont spa	€ 35	Novara	180
5. Univer italiana spa (gruppo ppg industries)		Cavallirio (NO)	
6. Akzo nobel chemicals spa	€ 28	Novara	65
7. Colorificio i.Co.Ri.P. Spa		Oleggio (NO)	
8. Sicpa italiana spa		S. Pietro Mosezzo (NO)	
9. Ist. Biologico chemioterapico spa – divis. Unibios		Trecate (NO)	
10. Procos spa	€ 55	Cameri (NO)	230
11. Dynacren srl		Castelletto T.(NO)	
12. Mirato nuova spa ⁵		Landiona (NO)	
13. Hb fuller italia srl		Borgolavezzaro (NO)	
14. Vinavil s.P.A. (Gruppo mapei s.P.A.) ¹	€163	Villadossola (VB)	323*
15. Alce srl - laboratorio microbiol. (Gruppo mofin alce)		Novara	
16. Idrosol s.P.A. (Gruppo f.A.R.)		Novara	
17. Memc electronic materials spa ²	€331	Novara	1250#
18. Radici chimica spa	€ 200	Novara	320
19. Kemi s.P.A.		S. Pietro Mosezzo (NO)	
20. Donegani anticorrosione srl		Novara	
21. Isagro ricerca srl	€783	Novara	603
22. Prc ticinum lab srl		Novara	
23. Proge farm srl	€4	Novara	13
24. Sarpom spa (esso italiana srl - gruppo exxon corp.)		S. Martino di Trecate (NO)	400
25. Siba srl		Novara	
26. Solvay pharma s.P.A.		Grugliasco (TO)	
27. Powder coatings (gruppo ppg industries)		Felizzano (AL)	
28. L'oreal italia s.P.A.		Torino	
29. Ucb pharma s.P.A.		Pianezza (TO)	
30. F.A.R. Fabbrica di adesivi e resine – divis.Polioli		Vercelli	
31. Rieter automotive fimit spa		Vicolungo (NO), Leini (TO), Santhià (VC)	
32. Mossi & ghisolfigroup		Tortona (AL)	100
33. Macdermid italiana - s.R.L.	€40	Trecate (NO)	150
34. Trasgo srl	16 Mln€	San Pietro Mosezzo (NO)	108
35. Diasorin s.P.A.	500 Mln€	Saluggia (VC)	500
36. Zschimmer & schwarz italiana spa	80 Mln€	Tricerro (VC)	75

Explanations:

1. Manufacture and sale of carbon black. <http://www.columbianchemicals.com/>

2. Esseco offers products that guarantee performance and safety in the field of sulphur chemistry and it derives through certified processes, a constant structural innovation and attention to the needs of the market. <http://www.esseco.com/ita/default.cfm>

3. Production of catalysts for the industry. <http://www.sued-chemie-mt.it/>

4. Producer of the Mater-Bi®, the first family of biopolymers that uses substances obtained from vegetables, like maize starch, whilst preserving the chemical structure generated by photosynthesis. <http://www.materbi.com/>

5. Manufacturer of paints, varnishes and similar coatings <http://www.univer.it/>
6. Production of thickeners. <http://www.akzonobel.com/>
7. Production and packaging of water-based paints and plastic wall coatings http://www.icorip.com/index_main.html
8. Leading global providers of security ink and solutions for the authentication of banknotes, value documents and products, as well as providers of integrated secure track and trace systems that monitor the journey of a product from manufacture to final point of sale. <http://www.sicpa.com/58.asp>
9. The chemical Unibios Division is dedicated to the production of chemical, biochemical and active ingredients for the pharmaceutical industry. The Unibios production is prevalently specialised in the manufacture of quinolones, antibacterial and antiviral drugs as well as enzymes. <http://unibios.it>
10. Pharmaceutical Fine Chemicals. <http://www.procos.it>
11. Production of patent registered medicines and generic medicines. <http://www.dynacren.it/>
12. Production and distribution for "Beauty" products (i.e. cosmetics, soap and detergents, perfumes). <http://www.mirato.it/home.php>
13. Production of adhesives. <http://www.hbfuller.com/>
14. VINAVIL, the most important Italian manufacturer of dispersion polymers and one of the largest in Europe. <http://www.vinavil.it>
15. ALCE srl LABORATORIO MICROBIOLOGICO is involved in the production of autochthonous natural starters, liquid and freeze-dried lactic starters and blue moulds. <http://www.mofinalce.it/>
16. Sodium hydrosulphite production. <http://www.gruppofar.it/idrosol/ita/index.htm>
17. MEMC is a global leader in the manufacture and sale of wafers and related intermediate products to the semiconductor and solar industries. <http://www.memc.com/>
18. RadiciGroup's diversified businesses operate worldwide and are focused on Chemicals, Plastics, Synthetic Fibres and Textile Machinery. One of RadiciGroup's key strengths is the synergistic vertical integration of its polyamide chain. <http://www.radicigroup.com/en/home/home.aspx>
19. Kemi is a chemicals company which leads the way in the research and development of anti-tack products, release agents and colour pastes for polyurethane. <http://www.kemi.it/en/index.asp>
20. Structural analysis, monitoring of corrosion and plant inspections. <http://www.donegant.it/>
21. Research into new active principles; development of the product to permit its commercial registration; defence of the product to maintain its commercial usefulness. <http://www.isagro.it>
22. Analytical development and validation of methods relevant to the active pharmaceutical ingredients, to drug products and to pharmacokinetic studies. <http://www.ticinumlabor.com/>
23. ProgeFram S.r.l. supplies consultancy and services in the Research and Development (lactic acid bacteria), Analytical (microbiological analysis) and in the Regulatory Affairs field. <http://www.progefarm.it/>
24. Production of about 7% of the oil derivatives used in Italy. It refines about 7.500.000 tons of crude oil per year. http://www.esso.it/Italy-Italian/PA/Operations/IT_Refining_Trecate.asp
25. Residual oil. <http://www.sibabitumi.com/>
26. Pharmaceuticals. <http://www.solvaypharmaceuticals.com/>

27. Powder coatings. <http://corporateportal.ppg.com/ppg/>

28. Cosmetics and perfumes. http://www.loreal.it/_it/_it/index.aspx

29. Biopharma focused on severe diseases, allergy and epilepsy, antibody research. <http://www.ucbpharma.com/>

30. Production of pure trimethylopropane (TMP). <http://www.gruppofar.it/>

31. M&G Group is presently the world's largest producer of PET for packaging applications and a technological leader in the polyester market. <http://www.gruppomg.com/>

Specifically, the eastern Piedmont's chemical sector has been analyzed through the following production's categories:

Cod. Ateco 19 Coking and Petroleum refinery products;

Cod. Ateco 20 Chemical products;

Cod. Ateco 21 Base pharmaceutical products and Pharmaceutical preparations

Cod. Ateco 22 Plastics and gum products.

Through the elaboration of local data related to the 3rd period of the 2010, the following situation emerged:

Tab. 14– Summary of the number of firms by province in eastern Piedmont and Ateco code

Cod. Ateco 2007	Alessandria	Novara	Verbania (VCO)	Vercelli	TOT
C19	6	9	0	3	18
C20	85	90	22	21	218
C21	8	10	1	4	23
C22	217	145	22	65	449
TOTAL	316	254	45	93	708

Source: CCIAA

Figures related to the territorial distribution according to Ateco code, in the municipalities of the 4 provinces interested:

Tab. 15 – Location of companies in provinces of Easter Piedmont
AtecoCode19: Coking and petroleum refinery products

Alessandria	Novara	Verbania (VCO)	Vercelli
Al001 - Acqui Terme 1 Al003 - Alessandria 1 Al009 - Arquata Scrivia 1 Al030 - Carbonara Scrivia 1 Al046 - Castellar Guidobono 1 Al180 - Vignole Borbera 1	No073 - Ghemme 1 No106 - Novara 3 No149 - Trecate 5		Vc137 - Serravalle Sesia 1 Vc158 - Vercelli 2
Totale 6	Totale 9	Totale 0	Totale 3

Source: CCIAA

Tab. 16 – Location of companies in provinces of Easter Piedmont AtecoCode 20: production of chemical products

Alessandria	Novara	Verbania (VCO)	Vercelli
Al002 - Albera Ligure 1 Al018 - Borghetto Di Borbera 1 Al021 - Bosco Marengo 1 Al053 - Castelnuovo Scrivia 1 Al068 - Felizzano 1 Al100 - Mongiardino Ligure 1 Al121 - Ovada 1 Al123 - Ozzano Monferrato 1 Al133 - Pontestura Al165 - Spigno Monferrato 1 Al183 - Villalvernia 1 Al001 - Acqui Terme 1 Al030 - Carbonara Scrivia 1 Al180 - Vignole Borbera 1 Al012 - Basaluzzo 2 Al047 - Castellazzo Bormida 2 Al144 - Rivalta Bormida 2 Al163 - Solero 2 Al181 - Viguzzolo 2 Al009 - Arquata Scrivia Al138 - Pozzolo Formigaro 4 Al142 - Quattordio 4 Al160 - Serravalle Scrivia 5 Al039 - Casale Monferrato 8 Al114 - Novi Ligure 12 Al174 - Tortona 13 Al003 - Alessandria 13	No016 - Bellinzago Novarese 1 No047 - Cavallirio 1 No066 - Fontaneto D'agogna 1 No071 - Gattico 1 No120 - Pogno 1 No133 - S Maurizio D'opaglio 1 No144 - Terdobbiato 1 No153 - Vaprio D'agogna 1 No154 - Varallo Pombia 1 No008 - Arona 2 No018 - Biandrate 2 No043 - Castelletto Ticino 2 No058 - Cuggio 2 No062 - Dormelletto 2 No069 - Garbagna Novarese 2 No083 - Landiona 2 No091 - Marano Ticino 2 No121 - Pombia 2 No068 - Galliate 3 No108 - Oleggio 3 No146 - Tornaco 3 No023 - Borgolavezzaro 4 No024 - Borgomanero 4 No032 - Cameri 4 No049 - Cerano 7 No135 - San Pietro Mosezzo 8 No149 - Trecate 8 No106 - Novara 19	Vb025 - Crevaldossola 1 Vb028 - Domodossola 1 Vb035 - Gravellona Toce 1 Vb068 - Trontano 1 Vb075 - Villadossola 1 Vb054 - Pieve Vergonte 3 Vb057 - Premosello-Chiovenda Vb050 - Omegna 4 Vb072 - Verbania 7	Vc011 - Bianze' 1 Vc032 - Carisio 1 Vc061 - Gattinara 1 Vc116 - Roasio 1 Vc148 - Trino 1 Vc122 - Rovasenda 2 Vc133 - Santhia' 2 Vc147 - Tricerro 2 Vc158 - Vercelli 10
TOTALE 85	TOTALE 90	TOTALE 22	TOTALE 21

Source: CCIAA



**Tab. 17- Location of companies in provinces of Easter Piedmont AtecoCode 21:
production of pharmaceutical products and pharmaceutical preparations**

Alessandria	Novara	Verbania (VCO)	Vercelli
AI005 - alice bel colle 1 AI074 - fresonara 1 AI095 - molare 1 AI012 - basaluzzo 1 AI114 - novi ligure 2 AI174 - tortona 2	No006 - armeno 1 No043 - castelletto ticino 1 No049 - cerano 1 No149 - tre cate 2 No106 - novara 5	Vb050 - omegna 1	Vc148 - trino 1 Vc133 - santhia' 1 Vc128 - saluggia 2
TOTALE 8	TOTALE 10	TOTALE 1	TOTALE 4

Source: CCIAA

Tab. 18 - Location of companies in provinces of Easter Piedmont
AtecoCode 22: production of gum and other plastic products

Alessandria	Novara	Verbania (VCO)	Vercelli
AI004 - Alfiano Natta 1 AI015 - Bergamasco 1 AI028 - Cantalupo Ligure 1 AI040 - Casalnoceto 1 AI049 - Castelletto D'orba 1 AI052 - Castelnuovo Bormida 1 AI059 - Cerrina 1 AI109 - Morano Sul Po 1 AI113 - Murisengo 1 AI115 - Occimiano 1 AI120 - Ottiglio 1 AI129 - Pietra Marazzi 1 AI140 - Predosa 1 AI141 - Quargnento 1 AI154 - San Salvatore Monf.To 1 AI161 - Sezzadio 1 AI168 - Strevi 1 AI173 - Ticineto 1 AI185 - Villanova Monferrato 1 AI180 - Vignole Borbera 1 AI029 - Capriata D'orba 2 AI043 - Cassine 2 AI051 - Castelletto Monf.To 2 AI079 - Garbagna 2 AI091 - Masio 2 AI099 - Moncestino 2 AI122 - Oviglio 2 AI167 - Stazzano 2 AI172 - Terzo 2 AI133 - Pontestura 2 AI183 - Villalvernia 2 AI160 - Serravalle Scrivia 2 AI081 - Gavi 3 AI153 - S Giorgio Monferrato 3 AI177 - Valenza 3 AI068 - Felizzano 3 AI163 - Solero 3 AI009 - Arquata Scrivia 3 AI138 - Pozzolo Formigaro 3 AI012 - Basaluzzo 3 AI017 - Bistagno 4 AI094 - Mirabello Monferrato 4 AI030 - Carbonara Scrivia 4 AI142 - Quattordio 4 AI114 - Novi Ligure 4 AI169 - Tagliolo Monferrato 5 AI021 - Bosco Marengo 5 AI181 - Viguzzolo 5 AI132 - Pontecurone 6 AI121 - Ovada 6 AI047 - Castellazzo Bormida 6 AI162 - Silvano D'orba 8 AI053 - Castelnuovo Scrivia 8 AI001 - Acqui Terme 9 AI039 - Casale Monferrato 9 AI174 - Tortona 17 AI003 - Alessandria 45	No026 - Briga Novarese1 No037 - Casalbeltrame1 No039 - Casaleggio Novara1 No040 - Casalino1 No055 - Cressa 1 No065 - Fara Novarese1 No077 - Granozzo Monticello1 No079 - Grignasco1 No097 - Mezzomerico1 No098 - Miasino1 No100 - Momo 1 No122 - Prato Sesia 1 No143 - Suno 1 No157 - Veruno 1 No016 - Bellinzago Novarese 1 No066 - Fontaneto D'agogna 1 No133 - S Maurizio D'opaglio 1 No069 - Garbagna Novarese 1 No006 - Armeno 1 No001 - Agrate Conturbia 2 No002 - Arno 2 No030 - Caltignaga 2 No070 - Gargallo 2 No088 - Maggiore 2 No103 - Nebbiuno 2 No159 - Vicolungo 2 No047 - Cavallirio 2 No008 - Arona 2 No018 - Biandrate2 No121 - Pombia2 No043 - Castelletto Ticino 2 No049 - Cerano 2 No149 - Trecate 2 No138 - Sillavengo 3 No071 - Gattico 3 No024 - Borgomanero 3 No052 - Comignago 4 No131 - Romentino4 No154 - Varallo Pombia 4 No023 - Borgolavezzaro 4 No025 - Borgo Ticino 5 No091 - Marano Ticino 5 No068 - Galliate 5 No108 - Oleggio 5 No135 - San Pietro Mosezzo 5 No082 - Inverio 6 No062 - Dormelletto 6 No032 - Cameri 6 No076 - Gozzano 7 No114 - Paruzzaro 10 No106 - Novara 13	Vb008 - Baveno 1 Vb053 - Piedimulera 1 Vb025 - Crevoladossola 1 Vb019 - Casale Corte Cerro 2 Vb035 - Gravellona Toce 4 Vb072 - Verbania 5 Vb050 - Omegna 8	Vc007 - Asigliano Vercellese 1 Vc015 - Borgo D'ale 1 Vc047 - Costanzana 1 Vc062 - Ghislarono 1 Vc065 - Greggio 1 Vc068 - Lenta 1 Vc070 - Lignana 1 Vc115 - Rive 1 Vc131 - S Germano Vercellese 1 Vc137 - Serravalle Sesia 1 Vc011 - Bianze' 1 Vc061 - Gattinara 1 Vc133 - Santhia' 1 Vc031 - Caresanablot 2 Vc090 - Palazzolo Vercellese 2 Vc091 - Pertengo 2 Vc152 - Valduggia 2 Vc156 - Varallo 2 Vc032 - Carisio 2 Vc042 - Cigliano 3 Vc049 - Crescentino 3 Vc107 - Quarona 3 Vc128 - Saluggia 4 Vc016 - Borgosesia 5 Vc071 - Livorno Ferraris 7 Vc148 - Trino 7 Vc158 - Vercelli 8
Totale 217	Totale 145	Totale 22	Totale 65

Source: CCIAA

3. Description of transport infrastructure

3.1. Infrastructural equipment and regional competitiveness:

The Piedmont's situation regarding infrastructural equipment is considered good in comparison with the national standards. The analysis of the single categories shows that the majority of the factor's indicators are around or over 100. We can see that the road network gets a very good result, positioning itself among the first five regions in Italy and the rail network is among the first ten:

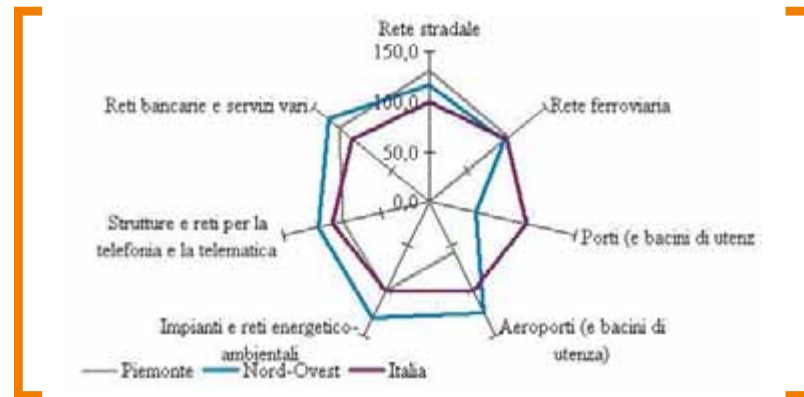


Fig.8 Index of infrastructure endowment 2009. Italy = 100

Source: Istituto G. Tagliacarne e Unioncamere, update september 2009.

Tab. 19 – Endowment index of infrastructural networks (Italia=100) in Piedmont and in North-west, years 2001 and 2009

	Piedmont		North-west	
Reference year	2001	2009	2001	2009
Road network	119,86	130,11	107,68	115,74
Rail network	108,40	102,08	97,21	96,73
Harbor's equipment	0,00	0,00	67,83	47,91
Airport's equipment	60,13	54,99	128,68	124,03
General economical infrastructures	87,14	83,15	109,83	108,99
General infrastructures (economical and social)	86,53	84,96	109,71	108,16

Source: Atlante della competitività delle province e delle regioni realizzata dall'Istituto G. Tagliacarne e Unioncamere, update september 2009.

Tab. 20 - Endowment index of infrastructural networks (Italia=100)
provinces of eastern Piedmont, Years 2001 and 2009

	ALESSANDRIA		NOVARA		VCO		VERCELLI	
Reference year	2001	2009	2001	2009	2001	2009	2001	2009
Road network	180,83	225,91	168,36	234,06	77,46	61,27	208,50	235,05
Rail network	214,32	185,27	210,21	167,68	98,02	138,35	100,27	104,09
Harbour's equipment	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Airport's equipment	40,52	29,73	0,00	0,00	0,00	0,00	17,72	10,69
General economical infrastructures	105,87	99,17	105,83	108,58	61,30	53,07	84,94	80,20
General infrastructures (economical and social)	91,71	91,30	99,93	103,77	63,15	53,08	74,68	73,64

Source: Atlante della competitività delle province e delle regioni realizzata dall'Istituto G. Tagliacarne e Unioncamere, update september 2009.

The national Strategic network (QSN) for the “Regional Policy for Development 2007-2013”, among the main targets, identifies the strengthening of the production chain, the services and the competitiveness. The reference n.6, “nets and links for viability”, identifies how the regional policy could intervene and contribute to improve the logistics and the viability and what kind of actions should be taken according to the demand of products of the territory.



Fig.9 – Main logistic poles:
Torino, Novara e Alessandria

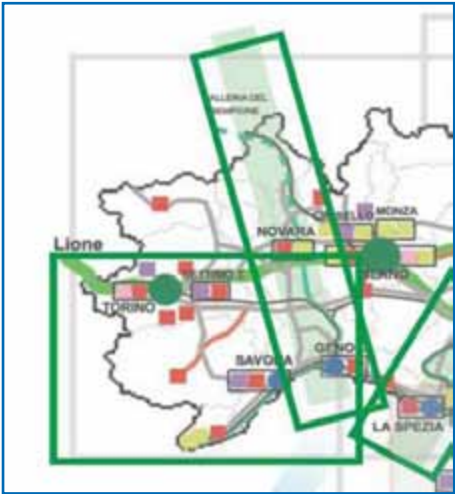


Fig.10 – Main territorial systems of infrastructures and logistic

Source: Regione Piemonte



3.2. Accessibility and mobility in Piedmont. The management of the planning process

The transport's planning process (the traditional plan for transports) has been articulated in different levels:

It follows the Structural and Strategical View document (VSS), or else the elaboration of sectoral plans and strategic projects the VSS is a long period structural document including important strategic choices. On the other hand, the sectoral plans have to elaborate the content of the projects and, in the mean time, to improve the VSS document, through the identification of fields of action, strategic lines and adequate interventions. These plans are activated through annual implementation programs, integrated by the regional budget planning and a yearly updating process, at least for what concerns the evaluation and financial planning.

The sectoral plans are:

- Regional plan for sustainable mobility;
- Regional plan for road safety;
- Regional plan for logistic;
- Regional plan for info mobility;
- Regional plan for infrastructures;
- Regional plan for public transport.

The Plan for logistic of the Piedmont region (Department of Transportation and Infrastructure, Transport Management, logistics, mobility and infrastructures) carried out a measurement of the relative impacts caused by the traffic on the corridor 5(east-west) and on the axis 24 (north-south), taking into account the influence of the Genoa's harbour on the Piedmont's viability.

The reference value identified is the freight traffic in Piedmont in the year 2004 that amounts to 322.991.953 t (source: ISTAT). This figure has been updated to the 2007 data (according to the following growth factors: GDP growth 2005-2006 = 1,9%; freight traffic growth/GDP growth = 1,2). From these calculations emerged the following data: 330.356.170 t. The most recent data on modal distribution between rail transport and road transport shows that the first amounts to the 7% of the total (source:Trenitalia Cargo), while the remaining 93% still travels by road (source: ISTAT). It is analyzed:

1. the traffic related to GDP;
2. the intra European traffic;
3. the traffic related to Genoa and other Ligurials ports.

The addition of the 3 components, spread over the responsibility's lines and 3 different time horizons, has produced the following demand of foreseen traffic.

Tab. 21– Iron and gum traffic’s evolution forecasts in incremental tonnes, referred to the year 2007, years 2010, 2015, 2020

	TONNELLATE INCREMENTALI RISPETTO AL 2007		
	2010	2015	2020
TRAFFICO LEGATO AL PIL	13.226.535	36.258.666	60.585.740
FERRO	991.990	3.172.633	6.058.574
GOMMA	12.234.545	33.086.032	54.527.166
TRAFFICO EXTRA - GENOVA	793.592	5.801.386	24.234.296
FERRO	26.453	676.828	4.846.859
GOMMA	767.139	5.124.558	19.387.437
TRAFFICO LEGATO A GENOVA	7.000.000	16.800.000	26.600.000
TOTALE	21.020.127	58.860.052	111.420.036
Delta % rispetto alle tonnellate trasportate nel 2007	6,36%	17,82%	33,73%

Source: Regione Piemonte

Then, this quantity has been translated in trains/day and trucks/rush hour. The estimation of the number of trains/day is calculated through the following ratio:

- t/TEU = 14 (source: Maersk);
- 220 working days/year;
- TEUs/train,

The estimation of the number of trucks/rush hour is calculated through the following ratio:

- 220 working days/year;
- rush hour/whole day = 1/13;
- TEUs/trucks = 2.

With reference to the conversion ratio here above, the incremental tons correspond to the trains and the trucks as follow:

	2010	2015	2020
TRAFFICO LEGATO AL PIL			
FERRO (treni/g)	11	35	66
GOMMA (camion/ora di punta)	153	414	681
TRAFFICO EXTRA - GENOVA			
FERRO (treni/g)	2	8	53
GOMMA (camion/ora di punta)	10	65	243
TRAFFICO LEGATO A GENOVA			
FERRO (treni/g)	49	105	168
GOMMA (camion/ora di punta)	57	131	205
TOTALE			
FERRO (treni/g)	62	148	287
Delta % rispetto al 2005	22,1%	52,9%	102,5%
GOMMA (camion/ora di punta)	220	610	1.129
Delta % rispetto al 2005	5,93%	16,44%	30,43%

Tab. 22– Iron and gum traffic’s evolution forecasts in trains/day and trucks/rush hour, years 2010, 2015, 2020

Source: Regione Piemonte

Logistic propensity in the province of Alessandria

Finally, we came to the following conclusions:

- With reference to the 3 time horizons, the incremental traffic value is about to grow by the 6% in 2010, 17% in 2015 and 33% in 2020 over the reported situation ;
- The assumption that, in the future, the rail transport is going to grow over the road transport means that the increases of the number of vehicles on the road will be marginally less in percentage than the increase of traffic volumes (respectively the 5,93%, the 16,44% and the 30,43% over the 3 time horizons of reference);
- The situation is different for what concerns the rail transport itself, that, in a long term period, is supposed to double (the increase over the 3 periods of reference are about the 22%, the 53% and the 102%).

The operative proposals of the Regional plan for logistics are then reported below for each province of the Eastern Piedmont.

The traffic flows northward, derived from the development of the Liguria's harbours and the European development axis that goes from the south of France to the Eastern Europe, generates the creation of two development dossals:

- the corridor south-north, that connects the Genoa Voltri's harbour to the Simplon and thus the central Europe area;
- the corridor west-east, with a more local feature, that connects Cuneo and Asti to Casale where it joins the highway Voltri - Sempione.
- The role of Alessandria and Casale results is very strategic in both the axis of regional rebalancing, concerning not only the redevelopment of the area and of the productive activities, but also concerning the infrastructural system.

Global Logistic	Local and ditrict logistic
<ul style="list-style-type: none"> - Increase the role of the province as potential back port of Liguria's harbours, by exploiting and strengthening the already existing inter ports and exploring new possible solutions. - Promote the implementation of the third pass and the efficiency of the rail system. 	<ul style="list-style-type: none"> - Explore new logistics initiatives to support the so-called goldsmith district (air cargo, valuables logistics). - Consider new global infrastructures for district's logistical services and city logistics initiatives. - Centralization of some district logistics activities

Logistic propensity in the province of Novara

The territory of Novara, beyond the definitions of European development corridors as the Blue Banana or the Sunbelt, is a cross point between the north-south and west-east corridors; for this reason it has to be seen from the perspective of a territorial organization and development focused on this intersection. Then, the development of a logistics subsystem could be taken into consideration in order to create an aggregator pole mainly for the finished product leaving the district.

Global Logistic	Local and district logistic
<div>1. Realization of great infrastructural projects to consolidate the role of the province as an "hinge area" in Europe and to promote the creation of new companies related to the logistics and the first treatment of goods;</div> <div>2. Qualify Novara as a pole of services for the productive system, the research and the universities, a pole strongly integrated to the local business reality;</div> <div>3. Promote and strengthen the CIM as a complementary pole, not as a competitive one, compared to Milan.</div> <div>4. logistics platform – tertiary</div>	<div>- Strengthen the industrial propensity of the province, through the development of competitive SMEs, especially in the field of innovation, skills and human capital;</div> <div>- Strengthen the competitive abilities of local enterprises towards high market's segments, emphasizing the offer of high quality goods, highly differentiated and innovative, able to embed services and knowledge with an high added value.</div> <div>- Then, the development of a logistics subsystem could be taken into consideration in order to create an aggregator pole mainly for the finished product leaving the district.</div>

The analysis of the communication system of the province highlights two aspects: the potential offers by its way to the outside and the constraints due to the territorial morphology. In its basic structure, the communication system of the Verbano Cusio Ossola is a sort of crossroad where several important routes meet each other and branch out towards Vallese and Ticino (Switzerland) to the north and towards Piedmont and Lombardy to the south. Both guidelines directed to the north bring important and close alpine pass that offer an easy access not only to the Swiss area but also to the French and German ones. The guidelines towards south offer a quick way out to Piedmont and Lombardy plans.

Logistic propensity
in the province of
Verbano Cusio
Ossola

Global Logistics	Local and district logistics
The main target is to confirm the primary role of the Simplon as transnational corridor that requires a modernization of the Italian side to attract the traffic now transferred to the Swiss itinerary of the Loetschberg.	The district is characterized by companies with a high degree of internationalization, hence companies already organized to optimize their own logistic flows (with internal management or outsourcing). Concerning the logistics the main companies should experiment a better sharing of the information flows, promoting the creation of a “virtual stock” to improve the district’s logistics.

Logistic propensity in the province of Vercelli

The province of Vercelli is situated among the provinces of Turin, Novara and Alessandria, and these 3 provinces have surely more development perspectives regarding logistics, since they already exist infrastructures and they are expected interventions.

Global Logistics	Local and district logistics
<p>The expected interventions on the infrastructural system according to the PTCP are:</p> <ul style="list-style-type: none"> - requalification and improvement of the road network; - requalification of the rail network - the national “corridor” East-west, comprehending the Milan-Turin highway and the high capacity rail line with the interconnection to the old line in the section Livorno Ferraris and Santhià; - the route of the new “piedmont” connection and its links towards Valsesia and Santhià. 	<p>For this purpose, from the logistics side, it’s useful to verify the integration level of the districts, according to what emerges from the neighbouring provinces.</p> <p>A good instrument for this analysis could be a research on the freight traffic’s features of the districts and the logistics “dependence” with respect to the areas of Novara and Alessandria.</p>

3.3. Road Transport



Fig.11 – Piedmont Highways

Source: Aiscat



Fig.12 - Piedmont State Roads

Source: Regione Piemonte



Fig.13 – italian highway network scheme



Fig.14 –north italian highway network scheme

Source: Aiscat

Through an updated interpretation of the data regarding highway traffic (Source: AISCAT information, n.3-4 July- September and October-December 2009 – Italian Association for Highways and tunnels) is possible to analyze the volumes referring to the following parameters:

- “Light” vehicles: this category includes motorbikes and two-axle vehicles with a ground clearance lower than 1,3 meters.
- “Heavy” vehicles: this category includes two-axle vehicles with a ground clearance higher than 1,3 meters and all three or more axle vehicles.
- Effective vehicles: it's the number of all vehicle units – cars, trucks, tractors, articulated lorry – entering the highway, despite of the kilometers ran.
- Km vehicles: total of kilometers traveled by vehicle units that entered the highway.
- Theoretical vehicles: vehicle units that ideally travelling on the entire highway, give rise to the overall distance equal to the one obtained indeed (Km vehicles above mentioned); the number of these vehicles is given by the ratio vehicles/Km and highway length.
- Criteria adopted to calculate the total: the total of the theoretical average daily vehicles is obtained comparing the sum of vehicles-Km to the sum of the highway's segments length and the number of days taken into consideration.

The grand total of vehicles-Km is represented by the sum of the registered vehicles-Km, during the examined period, on all the highway's operative segments.

Tab. 23 – Summary of the highway net to the 31-12-2009

Highways	In Eserc.	In Costr.	In Progr.	Totale	Gestione
Aosta - Traforo Monte Bianco	32,4	-	-	32,4	Raccordo Autostradale Valle d'Aosta S.p.A.
Quincinetto - Aosta	59,5	-	-	59,5	Società Autostrade Valdostane S.p.A.
Raccordo A5 - S.S. 27 del G.S. Bernardo	7,9	-	-	7,9	Società Autostrade Valdostane S.p.A.
Torino - Ivrea - Quincinetto	51,2	-	-	51,2	Autostr. Torino - Ivrea - Valle d'Aosta S.p.A.
Ivrea - Santhià	23,6	-	-	23,6	Autostr.Torino - Ivrea - Valle d'Aosta S.p.A.
Torino - Bardonecchia	75,7	-	-	75,7	Soc. Italiana per il Traforo del Frejus S.p.A.
Torino - Savona	130,9	-	-	130,9	Autostrada Torino - Savona S.p.A.
Sistema Tangenziale di Torino	81,0	-	-	81,0	Autostrada Torino - Ivrea - Valle d'Aosta S.p.A.
Torino - Piacenza	164,9	-	-	164,9	S.A.T.A.P. S.p.A.
Asti - Cuneo	39,4	-	50,8	90,2	Soc. Autostrada Asti-Cuneo S.p.A.
Voltri - Gravellona Toce (dir. Bettole, Santhià)	244,9	-	-	244,9	Autostr.per l'Italia S.p.A.
Milano - Serravalle	86,3	-	-	86,3	Milano Serravalle- Milano Tangenziali S.p.A.

Source: AISCAT Informazioni, n. 3-4, 2009 – quarterly newsletter edited by the Associazione Italiana Società Concessionarie Autostrade e Trafori.

Tab. 24a – Traffic values, Piedmont and valle d'Aosta highway net, years 2008-2009 and variations – light vehicles traffic

HIGHWAYS AND TUNNELS	Effective average daily vehicles		Theoretical average daily vehicles		Veicoli-Km in milioni		
	2.008	2.009	2.008w	2.009	2.008	2.009	Variaz.%
TRAFORO DEL MONTE BIANCO km.5,8	3.285	3.244	3.285	3.244	6,96	6,89	+ 1,0
TRAFORO DEL GRAN S. BERNARDO km.12,8	1.442	1.411	1.442	1.411	6,74	6,61	+ 2,0
TRAFORO DEL FREJUS km.6,8	2.318	2.364	2.318	2.364	5,75	5,88	- 2,2
AOSTA-TRAFORO M.TE BIANCO km.32,4	7.002	6.616	6.916	6.510	81,50	77,20	+ 5,6
TORINO-BARDONECCHIA km.75,7	17.886	17.974	8.879	8.908	245,30	246,80	- 0,6
QUINCINETTO-AOSTA km.59,5	24.134	53.359	14.797	14.431	321,40	314,30	+ 2,3
TORINO-IVREA-QUINCINETTO km.51,2	36.857	36.908	18.587	18.545	347,40	347,50	0,0
IVREA-SANTHIA' km.23,6	15.305	15.122	13.767	13.503	118,60	116,60	+ 1,7
ASTI-CUNEO km.39,4	11.528	8.755	4.638	3.625	66,00	34,20	+ 93,0
TORINO-SAVONA km.130,9	45.638	43.570	17.188	16.351	821,20	783,40	+ 4,8
(GE)VOLTRI-GRAVELLONA TOCE km.83,7 (A)	49.765	48.025	28.147	27.216	859,90	833,70	+ 3,1
(GE)VOLTRI-GRAVELLONA TOCE km.161,2 (B)	59.506	58.657	14.445	14.246	849,90	840,50	+ 1,1
MILANO-SERRAVALLE km.86,3	85.495	84.120	39.879	39.556	1.276,60	1.246,00	+ 2,5

(A) Voltri-Alessandria and A7, (B) Alessandria-Gravellona Santhià

Source: AISCAT Informazioni, n. 3-4, 2009 – quarterly newsletter edited by the Associazione Italiana Società Concessionarie Autostrade e Trafori.

Tab. 24b – Traffic values, Piedmont and valle d'Aosta highway net, years 2008-2009 and variations – heavy vehicles traffic

HIGHWAYS AND TUNNELS	Effective average daily vehicles		Theoretical average daily vehicles		Vehicles-Km win millions		
	2.008	2.009	2.008	2.009	2.008	2.009	Variaz.%
TRAFORO DEL MONTE BIANCO km.5,8	1.462	1.650	1.462	1.650	3,09	3,50	- 11,7
TRAFORO DEL GRAN S. BERNARDO km.12,8	144	177	144	177	0,67	0,83	- 19,3
TRAFORO DEL FREJUS km.6,8	1.922	2.303	1.922	2.303	4,77	5,73	- 16,8
AOSTA-TRAFORO M.TE BIANCO km.32,4	2.281	2.432	2.255	2.403	26,60	28,50	- 6,7
TORINO-BARDONECCHIA km.75,7	6.093	7.132	3.039	3.548	84,00	98,30	- 14,5
QUINCINETTO-AOSTA km.59,5	4.879	5.171	3.481	3.744	75,60	81,50	- 7,2
TORINO-IVREA-QUINCINETTO km.51,2	6.785	7.593	3.068	3.385	57,30	63,40	- 9,6
IVREA-SANTHIA' km.23,6	3.524	3.971	3.283	3.684	28,30	31,80	- 11,0
ASTI-CUNEO km.39,4	3.688	2.623	1.550	1.090	22,00	10,90	+ 101,8
TORINO-SAVONA km.130,9	9.492	9.904	3.430	3.579	163,90	171,50	- 4,4
(GE)VOLTRI-GRAVELLONA TOCE km.83,7 (A)	13.490	14.124	7.880	8.320	240,70	254,90	- 5,6
(GE)VOLTRI-GRAVELLONA TOCE km.161,2 (B)	13.891	15.158	3.472	3.798	204,30	224,10	- 8,8
MILANO-SERRAVALLE km.86,3	21.429	22.353	8.689	9.166	276,10	288,70	- 4,4

(A) Voltri-Alessandria and A7, (B) tratto Alessandria-Gravellona Santhià

Source: AISCAT Informazioni, n. 3-4 luglio-settembre e ottobre-dicembre 2009 – quarterly newsletter edited by the Associazione Italiana Società Concessionarie Autostrade e Trafori.

Tab. 24c – Traffic values, Piedmont and valle d'Aosta highway net, years 2008-2009 and variations – light and heavy vehicles traffic

HIGHWAYS AND TUNNELS	Effective average daily vehicles		Theoretical average daily vehicles		Vehicles-Km in millions		
	2.008	2.009	2.008	2.009	2.008	2.009	Variaz.%
TRAFORO DEL MONTE BIANCO km.5,8	4.747	4.894	4.747	4.894	10,05	10,39	- 3,3
TRAFORO DEL GRAN S. BERNARDO km.12,8	1.586	1.588	1.586	1.588	7,41	7,44	- 0,4
TRAFORO DEL FREJUS km.6,8	4.240	4.667	4.240	4.667	10,52	11,61	- 9,4
AOSTA-TRAFORO M.TE BIANCO km.32,4	9.283	9.048	9.171	8.913	108,10	105,70	+ 2,3
TORINO-BARDONECCHIA km.75,7	23.979	25.106	11.918	12.456	329,30	345,10	- 4,6
QUINCINETTO-AOSTA km.59,5	29.013	58.530	18.278	18.175	397,00	395,80	+ 0,3
TORINO-IVREA-QUINCINETTO km.51,2	43.642	44.501	21.655	21.930	404,70	410,90	- 1,5
IVREA-SANTHIA' km.23,6	18.829	19.093	17.050	17.187	146,90	148,40	- 1,0
ASTI-CUNEO km.39,4	15.216	11.378	6.188	4.715	88,00	45,10	+ 95,1
TORINO-SAVONA km.130,9	55.130	53.474	20.618	19.930	985,10	954,90	+ 3,2
(GE)VOLTRI-GRAVELLONA TOCE km.83,7 (A)	63.255	62.149	36.027	35.536	1.100,60	1.088,60	+ 1,1
(GE)VOLTRI-GRAVELLONA TOCE km.161,2 (B)	73.397	73.815	17.917	18.044	1.054,20	1.064,60	- 1,0
MILANO-SERRAVALLE km.86,3	106.924	106.473	45.508	48.722	1.552,70	1.534,70	+ 1,2

(A) Voltri-Alessandria and A7

(B) Alessandria-Gravellona Santhia

Source: AISCAT Informazioni, n. 3-4, 2009 – quarterly newsletter edited by the Associazione Italiana Società Concessionarie Autostrade e Trafori.

Forecasts about development of road transport (quantities and terminals): In the medium period (3/5 years), without significant investments in rail infrastructures, the current trend to prefer road to rail will continue.

A new transnational Region (Euro region) was created in July 2007, which encompasses 3 Italian Regions: Piedmont, Valle d'Aosta, Liguria, and 3 French Regions: Rhone- Alps, Provence Alps, Cote d'Azur.

This "Euro region" covers an area of about 110.000 square Kilometres, with 16 Mio inhabitants, and its constitution is mainly aimed at reinforcing the already existing cross-border cooperation in different fields, like:

- innovation
- research and development
- cross-border traffic
- accessibility
- sustainable economic development

3.4. Railway Transport

Piedmont railway infrastructure has 1.873 km of lines, about 77 km inside the metropolitan node of Torino; 75 are the main stations, main railroads:

- Turin-Bussoleno-Bardonecchia (-Modane)- Frejus (France border);
- High Speed/High Capacity Turin-Novara (-Milan), opened in 2006 in Piedmont and in progress in Lombardy;
- (Milan-) Trecate-Novara-Vercelli-Turin;
- Turin-Asti-Alessandria-running to Genoa by the line Alessandria-Novi Ligure-Arquata (-Genova) and to Nord-EastthroughAlessandria-Tortona-(Voghera-Piacenza-Bologna);
- (Berna-Iselle) -Domodossola-Novara-(Genoa), very important for the traffic of goods between Tirreno and, through Simplon, Switzerland;
- Domodossola-Verbania-Arona-(Sesto Calende-Gallarate).

The rail network represents for the Piedmont region a unique infrastructural equipment. In fact, it is one of the widest network in Italy in absolute terms and in population and territorial extension. Two main elements are potential: its inhomogeneity and the persistence of many critical points. To improve the efficiency of the rail network is necessary to carry out the following interventions:

Requalification process, in terms of definition of its functional-typological categories (currently defined as basic network, complementary network and junction), in terms of assignment of lines to classes (for instance, nowadays a big part of the Piedmont's sector of the corridor 24 is not classified as primary net);

Transfer the local network to the region (currently part of the complementary network);

Need for a quick definition of a new Intervention plan for the adjustment of the regional network, according to: defined standards, a new structure for more functional development of the territory and the solution of critical points.

This process could be taken to the streamlining of RFI and so to the opportunity to re-launch its proper role, as operator of the national and international strategic network connections.

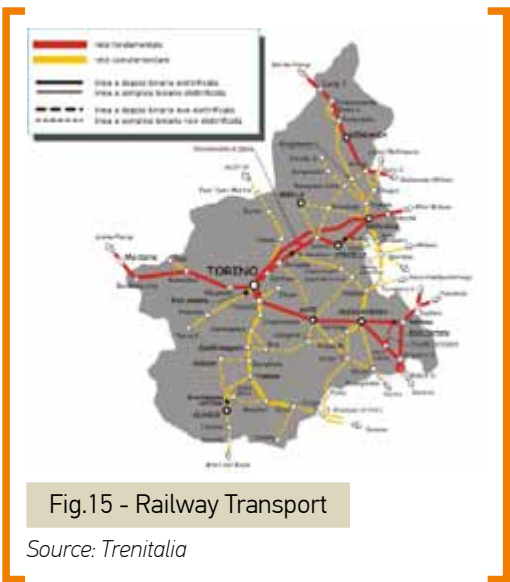


Fig.15 - Railway Transport
Source: Trenitalia

Tab. 25 – Extension and characteristics of the Piedmont’s rail network

Km Rfiw	Single Platform	No-Electrified	618,09
	Double Platform	Electrified	524,44
	Sub Total		730,47
Km Gtt			1873,00
	Single Platform	No-Electrified	16,00
	Double Platform	Electrified	76,13
	Sub Total		18,87
Total Km Piedmont			111,00
			1984,00

Source: Regione Piemonte

The lines

Table 25 describes the infrastructural features of the Piedmont network.

As we can see, 60% of the network is made by a single platform and more than 50% isn't electrified. This involves the use of different materials for the track and so results in the inhomogeneity and inflexibility of the service.

Concerning the freight traffic, through the encoding of the combined freight traffic, that fix the limits within which the cross section for rolling stock has to be restrained (target limit), is detected that the only highway segment enabled for the target limit P/CBO is the line that from Novara goes towards Domodossola to the north.

On the main section Torino-Novara-Milano and on the complementary lines Alessandria-Novara and Fossano-Torino, the traffic PC/45 is enabled. It is allowed the transit of ordinary trains transporting High-cubes containers (biggest kind of container allowed).

On the strategic section Turin-Modane and Alessandria-Genoa the PC/30 traffic is enabled. On the Chieri - Asti Alessandria section, on the Mondovì, Ceva, Savona section and on the secondary line that connects the cross-director from Savona to Alessandria is enabled the PC/32 traffic.

From the situation described above, several interventions are required:

- The complete electrification of the network
- The strengthening of single platform lines with proper interventions to allow the exchange;
- Double all the single platform lines, starting from the most critical;
- The adjustment of the target limit of entire lines, according to assigned functional standards.

So the process of the elimination of level crossings has to be completed, starting from the main line.

Freight terminals

The railway hubs are the strategic nodes of the rail network; the process of modernization of the rail system mainly depends on their organization, hence it's an important part of the international policy for freight modal rebalancing (comprehending the alpine pass).

Piedmont's regional hubs are: Turin, Novara and Alessandria (we can also add the smaller hubs of Domodossola, Rivalta Scrivia and Novi Ligure).

The main intermodal centres have been developed around the marshalling yards. Their organization is the strategic node of the regional logistic system.

Therefore, it's necessary to proceed to a process of reorganization and re-launch of this system, in functional terms concerning the integration with the area and activities around (providing also joint management companies). In practical terms, freight terminals should be landmarks and ensure different mode of transport: container, combined together or not.

All the activities to develop hubs should provide:

- The refunctionalization, also for technologic-implantation aspects, of marshalling yards in order to make them suitable for new foreseen activities;
- The creation of necessary viability infrastructures to ensure an adequate access to the area;
- The extension of customs procedures to areas intended for back port terminals;
- The development of settlements, close to the marshalling yards, dedicated to complementary logistics activities, referring to adjacent intermodal centres;
- The individuation of management standards and the consequent commitments to be done by private operators individuated as managing entity;
- The development of informatics systems in order to organize the information flows and to have a more efficient managing of the operations;
- The adoption of necessary safety measures for the environmental protection;
- Provide an adequate equipment to ensure a proper regional structure of reference to cross the Alps.

RFI proposed an intervention program on each regional hub, which the first step consists the signing of the memorandum of understanding among all the subjects involved in the creation and management of the Alessandria's hub, foregone also with dry-port functions. This hub is supposed to be followed by the one in Turin and Novara.

The other regions concerned by the corridor 24, Piedmont, Liguria e Lombardy, with a recent memorandum of understanding to strengthen the line port-back port, have ensured their commitment to constant monitoring the restructuring process of the marshalling yard and back port of Alessandria. Moreover they wish to create new intermodal terminals (Mortara, Tortona and Sacconago).

Tab. 26 – Goods transported by big companies from/to regions by destination/origin - Year 2005 (a) (tonnes)

REGIONS	origin			Destination		
	National	Abroad	Total	National	Abroad	Total
Piedmont	1.662.711	4.216.251	5.878.962	4.281.905	7.472.533	11.754.438
	5,3%	37,5%	13,9%	13,7%	28,5%	20,5%
Italy	31.182.863	11.239.667	42.422.530	31.182.863	26.230.070	57.412.933

(a) The regional data are collected every five years as required by EC Regulation Ce 91/2003. Source: Istat

Tab. 27 – International transport of goods entering in Italy by big companies and country (a) - Year 2009 (tonnes, tonnes-km thousands)

	Entrata		Uscita	
Paesi Di Origine	2009 (B)		2009 (B)	
	Tonnes Loaded	Tonnes-Km Discharged	Tonnes Loaded	Tonnes-Km Discharged
Belgio	2.352.271	335.427	1.481.007	233.835
Francia	2.644.926	665.287	1.270.277	405.609
Germania	11.790.119	2.165.584	8.392.604	1.441.714
Altri Paesi Unione Europea	6.341.507	1.694.282	3.273.569	650.416
Unione Europea	23.128.823	4.860.580	14.417.457	2.731.574
Altri Paesi Extra-Ue	1.395.171	218.090	831.314	122.078
Totale	24.523.994	5.078.670	15.248.771	2.853.652

(a) For the calculation of ton-km route is considered the only place on the national territory.

(b) From the year 2009 have been restated the two groups of companies (SMEs) according to the freight traffic goods established by EC Regulation 91/2003. Comparisons between data for 2009 and previous years are related to those two groups must calculate this change.

Source: Istat

Tab. 28– Intermodal rail freight by big companies per intermodal transport units and way of transport (a) - Year 2009 (tonnes, tonnes-km thousands)

INTERMODAL TRANSPORT UNITS	2009 (b)	Tons	Tons-km
NATIONAL			
Containers and swap bodies		10.913.391	4.314.699
Semi-trailers unaccompanied		325.327	82.956
Road vehicles accompanied		-	-
Unknown		-	-
Total		11.238.718	4.397.655
Average path			391,3
INTERNATIONAL OUTPUT			
Containers and swap bodies		5.235.157	1.005.198
Semi-trailers unaccompanied		2.108.335	415.543
Road vehicles accompanied		3.183.212	393.739
Unknown		21.273	3.497
Total		10.547.977	1.817.977
Average path			172,4
INTER NATIONAL INCOMING			
Containers and swap bodies		7.002.714	1.056.500
Semi-trailers unaccompanied		2.358.869	493.072
Road vehicles accompanied		3.257.776	399.090
Unknown		52.883	8.786
Total		12.672.242	1.957.448
Average path			154,5
TOTAL			
Containers and swap bodies		23.151.262	6.376.397
Semi-trailers unaccompanied		4.792.531	991.571
Road vehicles accompanied		6.440.988	792.829
Unknown		74.156	12.283
Total		34.458.937	8.173.080
Average path			237,2

(a) For the calculation of ton-km route is considered the only place on the national territory.

(b) From the year 2009 have been restated the two groups of companies (SMEs) according to the freight traffic goods established by EC Regulation 91/2003.

Comparisons between data for 2009 and previous years are related to those two groups must calculate this change.

3.5. Alpine passes situation

According to the “Alpine service 2009” made by the Federal department for environment, transports, energy and telecommunications (DATEC) of the Swiss Federation, in 2009, in the section of the Alpine chain between Moncenisio/Fréjus (F) and Brennero (A) the following data were found.

The goods transported by road or by rail totalled to 94,6 million tonnes. If we compare this figure to the 50,7 million tonnes of the 1980, in the last 29 years the goods volume has increased by 87%; but comparing with the 2008 data it decreased by 17,2%.

The rail transport share among the total freight amounts the 38,4%, resulting the same of the previous year. In France it is 12%, in Swiss 61,1% and in Austria 32,1%.

The transit traffic share compare to the traffic total volume reached the 68,3%; 22,9% in France, 72,6% in Swiss and 87,4% in Austria.

The rail share in the transit traffic reached the 79,1%; 0,9% in France, 79,5% in Swiss and 93,1% in Austria. The heavy vehicles passed through the Swiss Alps, as freight traffic, amount to 1,180 million units, showing a decrease equal to the 8% with reference to the year 2008 and 16% in 2000; the last year before the introduction of the TTPCP and the weight limit of 34-40 tonnes. Compare to the previous year, the volume of goods transported by heavy vehicles decreased by 14,4 million tonnes, stood to the 13,4% (-7%). In comparison with 2000, an increase of 51% has been registered. More than 100 000 heavy vehicles had travelled through the Alps on the highway.



Fig.16 - Rappresentazione dei segmenti alpini o archi

Source: Alpinfo 2009 (Dipartimento federale dell'ambiente, dei trasporti, dell'energia e delle telecomunicazioni DATEC - Confederazione Svizzera)

Tab. 29 – Totale traffico merci attraverso le Alpi (traffico interno, d’importazione, d’esportazione e di transito), anni 200, 2004, 2008, 2009

		Frejus E Mont-Cenis				Simplon				Gotthard			
		2000	2004	2008	2009	2000	2004	2008	2009	2000	2004	2008	2009
Road	Vmp1000	1.553	1.163	824	686	27	97	82	68	1.187	969	973	900
Road	Mio.T	25,8	16,8	12,2	10,2	0,1	0,7	0,9	0,7	7,6	9,9	10,8	10,2
Railway	Tcc Mio.T	5,0	3,7	2,6	1,1	3,7	3,0	3,3	2,6	6,9	6,0	5,5	3,8
Railway	Tcna Mio.T	3,6	2,6	1,5	0,8	0,1	2,6	5,1	5,1	8,9	9,7	9,7	7,6
Railway	Sm Mio.T		0,1	0,5	0,5	0,0	1,2	1,5	1,6	1,0	0,5	0,3	0,2
Railway	Totale Mio.T	8,6	6,4	4,6	2,4	3,8	6,8	9,9	9,3	16,8	16,2	15,5	11,6
Road+ Railway Mio.T		34,4	23,2	16,8	12,6	3,9	7,5	10,8	10,0	24,4	26,1	26,3	21,8

Source: Alpinfo 2009 (Dipartimento federale dell'ambiente, dei trasporti, dell'energia e delle telecomunicazioni DATEC - Confederazione Svizzera)

Legenda:
mio.t million net tons
VMP Heavy goods vehicles (trucks, lorries and trucks weighing over 3.5 ton permitted)
TCC wagonload (excluding intermodal traffic)
TCNA unaccompanied combined transport (traffic Huckepack unaccompanied and large containers)
SM intermodal freight transport (road or mobile highway)
TCNA+SM entire combined traffic

3.6. Waterway Transport

A waterway that connects lakes, rivers and canals that is mostly fended by the Nufenenstock glacier to Gottardo, where Lake Ticino begins. The Ticino sheds its waters into Lake Maggiore, in Locarno, which is a waterway terminal station from Switzerland right to the



Fig.17 - Diagram of the waterway Lago Maggiore - Venice (right detail of the section of relevance to the Province of Novara)

Source: :Istituto per i navigli, 2010

The Navigli Institute, ever since 1998, has done projects that have valorized Milan and Pavia's canals: the aim is to restore the amusement navigation and to manage that people can travel from Lake Maggiore to Venice, passing through Milan. Moreover, always starting from River Ticino and going towards River Po there has been planned a work in progress to create a "path" where boats can be able to travel and reach Piacenza.

This lock will allow re-connecting River Po to Piacenza and Cremona for the complete navigation from Pavia to Venice.

3.7. Pipeline Transport (not gas pipelines)

The general situation is described through the following tables and illustrations.

Explanations: Pipeline used for transporting Crude Oil (Quiliano-Trecate) is about 150 km long. The other pipelines (10) are used for transporting chemical products- globally centred in Piedmont, are more than 700 km long.

Predictions about development of pipeline transport (quantities and terminals): No increase of the extension of pipelines is foreseen in the next 5 years.

The percentage of different products transported through pipelines will probably change, with a growing share of lighter cuts.

See chart; the control hub of the pipelines lies in S. Martino di Trecate, near Novara (15 km.). Note: the gas pipelines network in Piedmont is 2000 Km. long and the transported methane quantity is about 6 Mio. m3 (2006).



Fig.17 – North-Italy fluid transport network

Source: http://www.esso.com/Italy-Italian/PA/about_what_refinery_trecate_logistics.aspx

Tab. 30a – Articulation pipelines in Italy for the transport of oil

Label Number on map	Project Name	Start Point	End Point	Diameter (inches)	Length (Km)	Capacity (1000b/d or bn cm
E14	---	Gagliano	Gela	-	-	-
E15	Genoa Region	Genoa	Cremona	12, 14	153	84
E16	Genoa Region	Genoa	Rho	12	130	76
E17	VeniceRegion	Porto Marghera	Mantua	10	123	54
E18	Ragusa	Augusta	Cremona	23	57	24
E19	Trieste Region	Trieste	Timan	26	145	-

Source: http://www.theodora.com/pipelines/italy_switzerland_and_austria_pipelines.htm

Tab. 30b – Articulation pipelines in Italy for the transport of gas

Label Number on map	Project Name	Start Point	End Point	Diameter (inches)	Length (Km)	Capacity (1000b/d or bn cm
E39	---	Brindisi	Cremona	-	-	-
E40	Algeria-Italy Gas Pipeline via Sardinia [GALSI]	Cagliari (Sardinia)	Olbia (Sardinia)	-	300	8-16
E41	Algeria-Italy Gas Pipeline via Sardinia [GALSI]	Olbia (Sardinia)	Pescaia	-	200	8-16

Source: http://www.theodora.com/pipelines/italy_switzerland_and_austria_pipelines.html

Label Number on map	Project Name	Start Point	End Point	Diameter (inches)	Length (Km)	Capacity (1000b/d or bn cm
E22	---	Ancona	Guattaneo	6, 8	137	-
E23	---	Civitavecchia	Rome	12	65	-
E24	---	Cremona	La Spezia	-	-	-
E25	---	Ferrara	Chivasso	10	81	-
E26	---	Ferrara	Cremona	10	93	-
E27	---	Ferrara	Venice	-	-	-
E28	---	Ferrara	Venice	8, 16	185	-
E29	---	Fumicino	Rome	-	-	-
E30	---	Livorno	Florence	5, 10	80	-
E31	---	Priolo	Gagliano	6	170	-
E32	---	Ravenna	Venice	-	126	-
E33	---	Ravenna	Verona	-	150	-
E34	---	Romo	Gaeta	8, 2x16	110	-
E35	---	Trecate	Savona	-	-	-
E36	---	Trecate	Chivasso	10	84	24
E37	---	Trieste	Udine	10	80	-

Source: http://www.theodora.com/pipelines/italy_switzerland_and_austria_pipelines.html

Fig.18 – Center-North Italy fluid transport network

Source: http://www.esso.com/Italy-Italian/PA/about_what_refinery_trecate_logistics.aspx



4. Description of chemical logistics in the region / country

In Italy the most common way of transport is the road system (regarding almost the 62% of total freight traffic). The chemical sector, on the other hand, shows a more balanced management of the different modalities. A minor use of the road transport (51%) that, according to average accidents data, results as the most dangerous way of transport.

Fig.19 - Modes of transport of chemicals and the total of goods transported in Italy (%)

Source: Federchimica, XV Rapporto

Responsible Care, Ministero dei trasporti

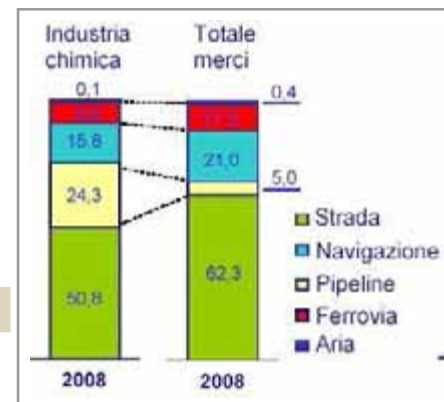


Fig.20 - Trends in Italy accidents in transport of goods by road and rail (number of accidents per k

Source: Federchimica, XV Rapporto

Responsible Care, Ministero dei trasporti



In 1998, in order to increase safety standards, Federchimica established the Transport Emergency Service (SET), aimed to support public authorities in the management of chemical products transport. The SET intervention teams, composed by qualified technicians coming from involved companies, ensure the covering of the entire territory, thanks to a quick intervention system.

The logistics is a very important and strategic element for the chemical industry. In fact this element has an incidence of cost on the revenues about 10% and 15% (depends on the company). Due to its structural deficiencies, Italy has the highest costs in Europe for logistics and this fact strongly influences its international competitiveness.

Tab.31 – Comparison among logistics costs in Europe (cost per Km, index Italy = 100)

Source: Centro Studi Sistemi di Trasporto, 2008

Italia	100,0
Austria	96,5
Francia	94,5
Germania	93,4
Slovenia	78,1
Spagna	76,8
Polonia	67,8
Ungheria	66,9
Romania	58,0

About 75% of chemical products transported in Piedmont Region are crude oil and oil derivatives. Other main chemical products are basic chemicals, synthetic fibres, pharmaceutical, plastic and rubber, polymers, petrochemical production.

The current Piedmont situation for chemical logistics is very close to the National one: mainly road transportation, declining of rail transportation, good usage of pipelines. As it will be discussed in greater detail at the point 8.6.1, critical issues are related to railway services.

Relevance of the logistics sector in general for Piedmont region:

- number of logistics companies: 14.700
- gross added value of the sector: €7700 Mio
- number of employees: 38.000

Major logistic companies providing services for the chemical industry:

- SaimaAvanderoSpA
- GondrandSpA
- Huktra Italia
- Tts Multimodal Belgium
- DHL Express
- CematSpA
- NorbertDentressangle Italia
- SatapSpA
- Hupak SA
- FNM SpA
- Trenitalia Cargo SpA
- Trago Srl

4.1. Activities with high risk of relevant accidents – the role of the Piedmont region

Piedmont region, through the combined action of its structures, prepares guidance documents in support of technical and administrative authorities in order to offer a harmonized activity on its territory. It also conducts studies and researches to reduce risks and forwards information and working instruments for institutions and subjects involved for the prevention and protection process.

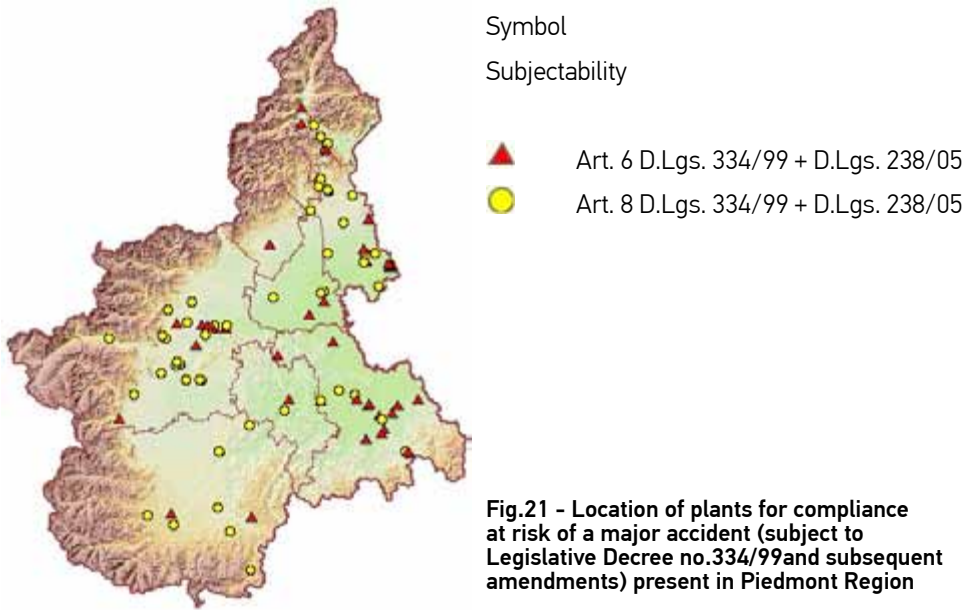
Regarding the risk of relevant accidents, or rather the regulation originated by the Seveso's accident (province of Milan) in 1976, at the end of 2005 was evident the need to intensify control and monitoring activities on the dangers connected to the industrial system. This target provided a control action on the level of adequacy of the System Security Management (SGS) of the companies and a coordination activity regarding first the External Emergency Plan (PEE) and then the Technical papers on relevant accident risk (RIR); technical documents attached to the General municipal town plans (PRGC).

The Seveso's regulation (D.Lgs. 334/99 modified by D. Lgs. 238/05) provides that the administration ensures the best risk prevention through: check of the safety measures, disposition of eventual improvements, public information, emergency planning and correct urban and territorial planning. Currently, in Piedmont there are 104 plants which are considered at risk of relevant accident, distributed as following in Piedmont's provinces, on the bases of the compliance which are subjected.

Tab.32 – Distribution of companies at risk on the regional territory:

Provincia	Art. 6	Art. 8
Alessandria	5	16
Asti	1	1
Biella	0	1
Cuneo	8	2
Novara	16	13
Torino	17	10
Verbano-Cusio-Ossola	4	3
Vercelli	5	2
Totale	56	48

Source: Regione Piemonte (aggiornamento 21 marzo 2011)



Source: Regione Piemonte (aggiornamento 21 marzo 2011)

Tab.33–List of plants for compliance at risk of a major accident (subject to Legislative Decree no.334/99and subsequent amendments) present in Piedmont Region

Provincia Di Alessandria			
Name	Subjectability	Municipality	Activity
Arkema S.R.L.	Art. 6, 7 E 8	Alessandria	Produzione Chimica Di Base O Intermedi
Autosped S.R.L.	Art. 6, 7 E 8	Tortona	Deposito Commerciale Di Sostanze Tossiche
Boero Bartolomeo S.P.A.	Art. 6, 7 E 8	Tortona	Produzione E/O Utilizzazione Di Resine Sintetiche
Carbotrade Gas S.P.A.	Art.6 E7	Alessandria	Deposito E/O Imbottigliamento Di Gas Liquefatti Infiammabili
Elantas Deatech S.R.L.	Art. 6, 7 E 8	Quatiordio	Produzione E/O Utilizzazione Di Resine Sintetiche
Grassano S.P.A.	Art. 6, 7 E 8	Predosa	Trattamento Rifiuti
Iciesse S.P.A.	Art. 6, 7 E 8	Arquata Scrivia	Produzione Chimica Di Base O Intermedi
Inter.E.M. S.R.L. Internazionale Esplosivi Monferrato	Art. 6, 7 E 8	Murisengo	Produzione E/O Deposito Di Esplosivi
Lamberti S.P.A.	Art. 6, 7 E 8	Viguzzolo	Produzione Chimica Di Base O Intermedi
Liquigas S.P.A.	Art.6 E7	Quargnento	Deposito E/O Imbottigliamento Di Gas Liquefatti Infiammabili
Metlac S.P.A.	Art. 6, 7 E 8	Bosco Marengo	Altre Attività Specifiche
Nobel Sport Martignoni S.P.A.	Art. 6, 7 E 8	Tortona	Produzione E/O Deposito Di Esplosivi
Novigas Consorzio	Art. 6, 7 E 8	Novi Ligure	Produzione E/O Stoccaggio Di Gas Tecnici
Nuova Libarna S.R.L.	Art. 6, 7 E 8	Arquata Scrivia	Deposito E/O Trattamento Di Oli Minerali
Poliresin S.R.L.	Art.6 E7	Pozzolo Formigaro	Produzione E/O Utilizzazione Di Resine Sintetiche
Ppg Industries Italia S.P.A.	Art. 6, 7 E 8	Quattordio	Produzione Chimica Di Base O Intermedi
Prodotti Chimici E Alimentari S.P.A.	Art. 6, 7 E 8	Basaluzzo	Produzione Chimica Fine O Farmaceutica
Restiani S.P.A.	Art. 6, 7 E 8	Alessandria	Deposito E/O Trattamento Di Oli Minerali
Sigemi - Sistema Integrato Genova-Milano S.R.L.	Art. 6, 7 E 8	Arquata Scrivia	Produzione Chimica Fine O Farmaceutica
Solvay Solexis S.P.A.	Art. 6, 7 E 8	Alessandria	Produzione Chimica Di Base O Intermedi
Tazzetti S.P.A.	Art.6 E7	Casale Monferrato	Deposito Commerciale Di Sostanze Tossiche

Provincia di Novara			
Name	Subject Ability	Municipality	Activity
Akzo Nobel Chemicals S.P.A.	Art.6 E7	Novara	Produzione Chimica Di Base O Intermedi
Balchem Italia S.R.L.	Art. 6, 7 E 8	Marano Ticino	Produzione Chimica Fine O Farmaceutica
Carlo Nobili Rubinetterie S.P.A.	Art. 6 E 7	Dormelletto	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Carlo Nobili Rubinetterie S.P.A.	Art.6 E7	Suno	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Columbian Carbon Europa S.R.L.	Art. 6, 7 E 8	Trecate	Produzione E/O Utilizzazione Di Resine Sintetiche
Cromatura L.C. S.R.L.	Art. 6 E 7	San Maurizio D'opaglio	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Eigenmann & Veronelli S.P.A.	Art. 6, 7 E 8	Trecate	Produzione Chimica Fine O Farmaceutica
Eni S.P.A.- Divisione Exploration & Production	Art. 6,7 E 8	Trecate	Deposito E/O Trattamento Di Oli Minerali
Esseco S.R.L.	Art. 6, 7 E 8	Trecate	Produzione Chimica Di Base O Intermedi
Fratelli Creola S.R.L.	Art. 6 E 7	Gozzano	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Giacomini S.P.A.	Art. 6 E 7	San Maurizio D'opaglio	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Idrosol S.Pa	Art. 6, 7 E 8	Novara	Produzione Chimica Di Base O Intermedi
La Vichimica S.P.A.	Art. 6 E 7	Tornaco	Altre Attività Specifiche
Lampogas Nord S.R.1.	Art. 6 E 7	Cameri	Deposito E/O Imbottigliamento Di Gas Liquefatti Infiammabili
Liquigas S.P.A.	Art. 6, 7 E 8	Trecate	Deposito E/O Imbottigliamento Di Gas Liquefatti Infiammabili
Mac Dermid Italiana S.R.1.	Art. 6, 7 E 8	Trecate	Produzione Chimica Di Base O Intermedi
Memc Electronic Materials S.P.A.	Art. 6 E 7	Novara	Altre Attività Specifiche
Mirato S.P.A.	Art. 6 E 7	Landiona	Deposito E/O Imbottigliamento Di Gas Liquefatti Infiammabili
O&M S.R.L.	Art.6E7	San Maurizio D'opaglio	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Paini S.P.A. Rubinetterie	Art. 6 E 7	Pogno	Produzione Metalmeccanica O Di ZZManufatti Con Trattamenti Galvanici
Procos S.P.A.	Art. 6, 7 E 8	Cameri	Produzione Chimica Fine O Farmaceutica
Radici Chimica S.P.A.	Art. 6, 7 E 8	Novara	Produzione Chimica Di Base O Intermedi
Rastelli Rubinetterie S.P.A.	Art. 6 E 7	Gozzano	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Rivoira S.Pa	Art.6 E7	Novara	Produzione E/O Stoccaggio Di Gas Tecnici
Rmp Savoini S.R.L.	Art. 6 E 7	Galliate	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Sarpom S.P.A.	Art. 6, 7 E 8	Trecate	Deposito E/O Trattamento Di Oli Minerali
Tamoil Petroli S.P.A.	Art. 6, 7 E 8	Trecate	Deposito E/O Trattamento Di Oli Minerali
Tigas S.R.L.	Art. 6, 7 E 8	Trecate	Deposito E/O Imbottigliamento Di Gas Liquefatti Infiammabili
Totalerg S.P.A	Art.6 E7	Trecate	Deposito E/O Trattamento Di Oli Minerali

Provincia di Verbano Cusio Ossola			
Name	Subject ability	Municipality	Activity
Cromatura 2T S.R.L.	Art.6 E7	Omegna	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Galvanoplast S.R.L.	Art.6 E7	Gravellona Toce	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Liquigas S.P.A.	Art.6 E7	Premosello Chiovenda	Deposito E/O Imbottigliamento Di Gas Liquefatti Infiammabili
Pravisani S.P.A.	Art.6 E7	Ornavasso	Produzione E/O Deposito Di Esplosivi
Tecnoacque Cusio S.P.A.	Art. 6, 7 E 8	Omegna	Trattamento Rifiuti
Tessengerlo Italia S.R.L.	Art. 6, 7 E 8	Pieve Vergonte	Produzione Chimica Di Base O Intermedi
Tessengerlo Italia S.R.L.	Art. 6, 7 E 8	Villadossola	Produzione Chimica Di Base O Intermedi

Provincia di Vercelli			
Name	Subject ability	Municipality	Activity
F.A.R. Fabbrica Adesivi Resine S.P.A.	Art. 6, 7 E 8	Vercelli	Produzione Chimica Di Base O Intermedi
Galvanotecnica Production S.R.L.	Art.6 E7	Vercelli	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Gammastamp S.P.A.	Art.6 E7	Bianze'	Altre Attività Specifiche
Gessi S.P.A.	Art.6 E7	Serravalle Sesia	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Lavorazioni Industriali S.P.A.	Art.6 E7	Vercelli	Produzione Metalmeccanica O Di Manufatti Con Trattamenti Galvanici
Sifte Berti S.P.A.	Art.6 E7	Vercelli	Deposito Commerciale Di Sostanze Tossiche
Zschimmer E Schwarz Italiana S.P.A.	Art. 6, 7 E 8	Villadossola	Produzione Chimica Di Base O Intermedi

Source: Regione Piemonte (aggiornamento 21 marzo 2011)

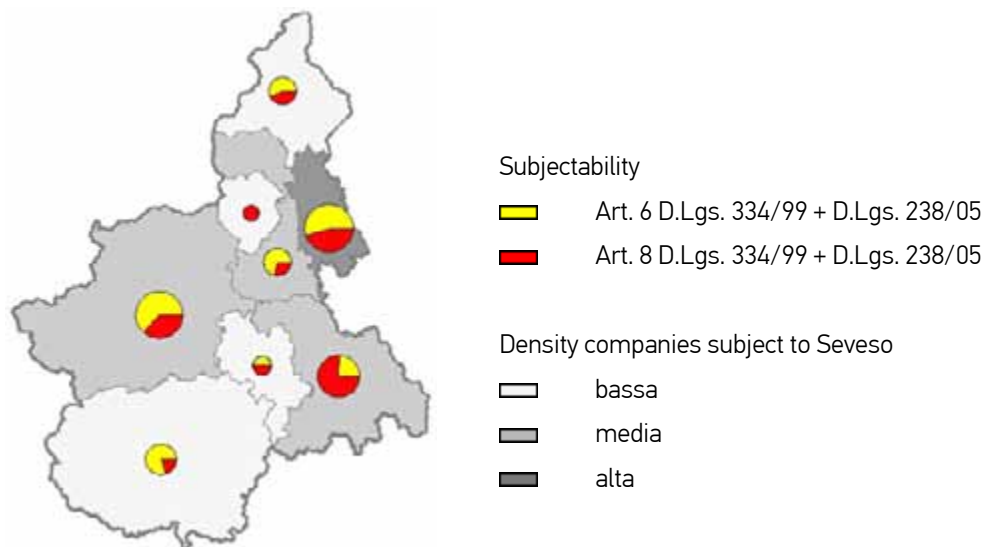


Fig.22 - Breakdown of plants for compliance at risk of a major accident (subject to Legislative Decree no.334/99and subsequent amendments) present in the Piedmont Region.

Source: Regione Piemonte (update 2011)

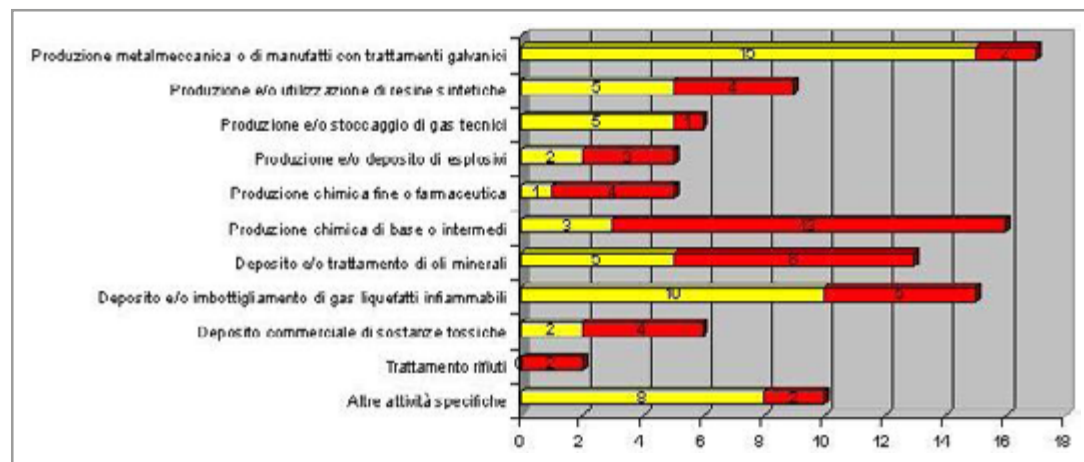


Fig.23 - Breakdown of companies by activity and performance

Source: Regione Piemonte (update 2011)

4.2. SIAR – Informative system of the activities with risk of relevant accident

The Piedmont region, with the regional law 32 of the 30th of June 1992 in execution of the DPR 175/88 (Seveso I), provided the creation of an informative system on activities with risk of relevant accident. Then, on the bases of past experiences, it has been decided to: implement an instrument able to organize plant's characterized information, to provide to the territorial's competent administrations several supporting instruments, to take decisions and integrate territorial information concerning atrophic and environmental elements on activities with risk of relevant accident. The system is structured as the sections below report, showing information both alphanumerical and geographical; in the following pattern we can see the responsible bodies for these information sharing.

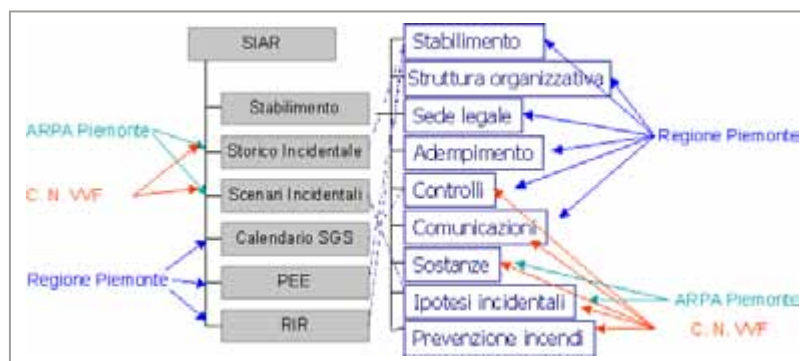


Fig.24 - Organization chart of the informative system for the activities with risk of relevant accident

Source: Regione Piemonte (update 2011)

- Plants: it's the main section that collect statistics, administrative and technical information of the registered companies, e.g. geo referencing of the plants, etc.;
- Accident Scenarios: report the description of accident scenarios, frequency of occurrence, damaged areas, toxic substance involved and geographical data (representation of dangerous centres, damaged areas etc.).
- SGS Calendar: reports the planning calendar of controls on the System Security Management of the region, given by the system on the bases of registered data.
- External Emergency Plan (PEE): this section comprehends administrative news and progress, approvals, efficiency of the External Emergency Plan.
- Technical papers on relevant accident risk (RIR): this section comprehends administrative news and progress, approvals, efficiency of the RIR papers.
- Historic incidental: here are registered the accidents happened in the plants and outside the plants (roads and railways), the kind of event and the impacts.



Fig.24 - Sample screens of the information system of activities at risk of a major accident

Source: Regione Piemonte (update 2011)



Fig.25 - Trecate S. Martino area

Source: Regione Piemonte (update 2011)

The region has also several plans for the rehabilitation of critical areas. These plans represent an integration of the three years program 1994-1996 for the environmental protection, which corresponds to the deliberation of the interministerial committee for economic planning (CIPE) dating 21.12.1993. The target is to offer an adequate answer to the safety optimization requirements in the critical areas of Trecate S. Martino and Novara S. Agabio.



Fig.26 - Novara S. Agabio area

Source: Regione Piemonte (update 2011)

[Part 2]

Results of individual interviews with chemical companies and logistic operators

The following section summarizes the results of individual interviews conducted with the most significant chemical industries and logistics operators of novara province, as well as interesting hints / considerations

Interviews conducted in the period january - march 2011

1. Please define which are the sectors (industry or services) where your company is operating

The swot analysis has been started through in-depth interviews held with the following local institutions:

Department of local development and common policies – Province of Novara.

Department of urban and territorial planning – Province of Novara.

A.I.N. (Novara Industrial Association) – Novara.

Eastern Piedmont's University – Novara.

Taking into account the previous interviews held during 2009 in the purview of similar projects (with the following enterprises: MEMC S.p.a.; RADICI CHEMICALS S.p.a.; PROCOS S.p.a.; NOVAMONT S.p.a.; PROGE FARM S.r.l.; TICINUM LAB S.r.l.; HUPAC S.A.; HUKTRA Italia S.p.a.; C.I.M. S.p.a.; TRENITALIA S.p.a., ISAGRO RICERCA S.p.a., AKZO NOBEL CHEMICALS S.p.a., MAPEI S.p.a. – VINAVIL Division S.p.a.), further enterprises has been identified, distributed as follow in the provinces of the easter Piedmont:

- two in the province of Alessandria

PPG INDUSTRIES ITALIA S.P.A.

GRUPPO M&G

- seven in the province of Novara

IDROSOL S.P.A.

ESSECO S.R.L.

SUED - CHEMIE CATALYSTS ITALIA S.R.L. IN BREVE SCCI S.R.L.

COLUMBIAN CARBON EUROPA SRL

MACDERMID ITALIANA - S.R.L.

SOCIETA' A RESPONSABILITA' LIMITATA RAFFINERIA PADANA OLII MINERALI S.A.R.P.O.M. S.R.L.

TRASGO SRL

- two in the province of Vercelli

DIASORIN S.P.A.

ZSCHIMMER & SCHWARZ ITALIANA SPA

A brief description of every enterprise allows to a better understanding and places the answers given during the interviews through the questionnaire.

GRUPPO M&G

- From the website: www.gruppomg.com:

M&G Group is the biggest worldwide producer of PET for packaging as it's a leader company, under a technologic point of view, in the polyester market. The key elements of its success consist of the understanding of the customer's needs, the strong technologic integration; the knowledge on all aspects related to technical studies and technical plans and, last but not least, consists of the smart and quick decisional processes.

- From the interview:

The representative met for the interview has not been able to answer to questions about logistic issues; this is why it has been assigned to this field the value "neutral". The main M&G plants are located in the US, Mexico and Brazil. In Italy there is only one plant situated in Patrica (FR), surely not comparable to the American ones and another plant will be built in Crescentino (VC), which will also have a small size. The logistics is followed by every single plant (thus in Italy will be followed in Patrica) under the coordination of qualified personnel working in Houston (USA). Even if we had to face this lack of information, the meeting has been particularly interesting because we had the opportunity to have direct information on a very innovative project that the group is carrying forward with a new company called IBP (Italian Bio Product). IBP is also a way to answer to the European directives that mix bioethanol with fuel. Under a strategic point of view, the carrying out process of the IBP project (Italian Bio Product) is aimed to be included in a more complex system with the following targets:

- To emancipate our country from energy imports;
- To cut down CO2 emissions and reduce the pollution deriving from fossils combustion (like coal).





Below is the IBP (Italian Bio Product) filled form.

IBP (Italian Bio Product)

IBP (Italian Bio Product) is an M&G's spin off company, aimed to product ethanol (additive alcoholic) for automotive fuel, following the most recent technologies. Ethanol can be produced for fuel as a result of the sugar/starch fermentation (e.g. corn starch) or for biodiesel fuel as a result of oil squeeze (rape, palm, soy). For this production IBP has carefully analyzed how to avoid in advance the emission of carbon dioxide and –especially– the interference with the food production chain. This new technology is able to obtain ethanol from not edible trees even through a more complex sugar extraction process, especially through the fermentation of cellulose and semi cellulose.

The pith individuated comes from the common cane (*Arundo donax*) and in perspective wheat straw and probably also in rice straw (even if it needs a difficult treatment of the silicon component), that presents the following benefits: grows quickly, spontaneously and often with invasive weed, it's rarely present in sown areas but, on the other hand, it's very current on borderline fields.

Then it's been individuated the adequate economy of scale to take the risk to build a continuous running plant for the production of 40.000 ton per year equivalent to 50 ton per day. For this target the territory of the municipality of Crescentino has been chosen (VC), due to the three following reasons:

- There is a railway station;
- the venue is in Piedmont;
- Utilization of an already existing plant.

The area is about 150.000 mq and it's owned by an industrial sector of the former Teksid (Fiat Group foundation) with an area of 1 million mq and 50% of that consist of a foundry's sand landfill and the remnant is occupied by industrial plants (mostly abandoned).

The estimation of the raw material (common cane) availability in the measure of 70 km (short chain) has been evaluated in 80.000 hectares available; these that are necessary for the plant's operation amount to 4.500 hectares.

The strategic targets for this process are:

Carry out a highly innovative plant and show it's good functioning;

Aim to sell the know how for the building of further plants like this around the world (e.g. only in the US the ethanol plants convert are 150 units).

PPG INDUSTRIES ITALIA S.P.A.

From www.ppg.com:

PPG Industries is a leader and has manufacturing facilities and its equity affiliates in more than 60 countries around the globe. Founded in 1883, the company serves customers in industrial, transportation, consumer products, and construction markets and aftermarkets. PPG operates in more than 60 countries around the globe. Sales in 2010 were \$13.4 billion and PPG's shares are traded on the New York Stock Exchange (symbol: PPG).

PPG's Quattordio plant manufactures automotive coatings, refinish and industrial coatings, resins, adhesives, sealants and pretreatment chemicals.

IDROSOL S.P.A.

From www.gruppofar.com:

Founded in 1977, IDROSOL is one of the most qualified worldwide companies of sodium hydrosulphite that sells all over the world for 30 years with the trademark "Albite". The sodium hydrosulphite is one of the most used and efficient whitening product, mostly in paper and in textile industry.

The company employs 50 workers, has its management and commercial venue in Cologno Monzese and a production plant in Novara in an area of 70.000 mq and it produces sodium hydrosulphite with the most recent technology of sodium format.

Through a capillary commercial net made by its own seller and external personnel, the company has business everywhere in the world (Europe, Far East, America, Africa.), with an export share that overcomes the 70% and completely covers all the application areas.

From the interview:

Base product: sodium hydrosulphite with an a formulation adjustable to all the customer's needs particularly concerning its used in the paper and textile sectors (90%), beyond the pharmaceutical sector and some ecological application concerning field drainage. It can be produced in powder packed on pallet or it can be treated bulk directly for the container.

The production has faced a big loss in 2009 when it has decreased from 18.000 ton. to 11.000 ton; an important decrease if we think that in recent years the production almost reached the 23.000 ton.

ESSECO S.R.L.

From www.esseco.com/ita:

Esseco offers products in the chemical sector of sulphur and its derivatives through certified process.

From the interview: The burning of sulphur comes off in an oven 6/8 ton per hour. For the production it needs the supply of: ammonia produced in Italy (transport by road), sulphites and sodium hydroxide (transported by train). The raw material is assured by big stocks in Sicily and Sardinia, mainly liquid sulphur – refinery waste (all Italian), that is brought by road from Mantua or Taranto by ship to Genoa then by road with trucks. The liquid sulphur is easier to work and is manageable through a liquefaction

process; on the contrary the solid material needs indoor storage.

It's mainly used in the following sectors: alimentary for the conservation of the product (e.g. cherries gathering, jams), for the production of paper and sugar as whitening, for water depuration (Central America), particularly for the detection of the arsenic and in agriculture as a fertilizer.

SUED - CHEMIE CATALYSTS ITALIA S.R.L. IN BREVE SCCI S.R.L.

www.sued-chemie-mt.it

From Wikipedia: Süd-Chemie is a multinational that operates worldwide. It's one of the main companies in the sector of catalysts and adsorbents (in chemistry, any solid element with a surface initiating the phenomenon of adsorption is called adsorbent) and it's specialised in the creation and treatment of chemical material for surfaces. Concerning the plant of Novara, originated by the Donegani institute, it operates in the research sector, production, marketing and technical assistance of catalysts for chemical and pharmaceutical process.

COLUMBIAN CARBON EUROPA S.R.L.

www.columbianchemicals.com

From Wikipedia: The Columbian Chemicals Company is an American chemical group. In 2008 it has been sold to the Korean company DC Chemical Co. The Columbian Chemicals Company produces carbon black (the main element for tires fabrication with gum). Its plants are located in: South and North America, Europe (Germany, Italy, Spain, and Hungary) and Asia (Korea and China).

From www.columbianchemicals.com

Carbon black is the product of combustion – pyrolytic process. The process typically converts petroleum-based feedstock oil into carbon black by injecting oil into a reactor, which “cracks” the oil at temperatures more than 1000°C. The reaction process, occurring in milliseconds, ends with a quenching step at the reactor's outlet.

A carbon black aerosol stream emerges from the reactor and then passes through a series of filters to separate the carbon black from the combustion gases. The carbon black is collected as powder or granular product and is packaged for delivery to customers in every part of the world.

Carbon black colloidal and performance properties are a function of a number of process factors. Columbian adjusts these properties to produce high quality ASTM grades and specialty grades to meet the specific end-market requirements where carbon black is consumed.

MACDERMID ITALIANA - S.R.L.

From **www.macdermid.com/industrial/italy.html**:

For more than 75 years, MacDermid Industrial Solutions has provided technology-based solutions to the surface coating industry. Our special formulations of chemical based products are used for decorating and protecting metals and plastics in such applications as chrome plating of alloy wheels, high perfor-

mance fasteners and electrolyses coating of computer disc drives. Our customers are mainly coating applicators, found in all industrial manufacturing regions.

From the interview:

The company is the result of the take-over of another Italian company in the 1998. The chemical product regarding the treatment of surfaces with a proprietary formulation it has developed a high and diversified production thanks to an intense R&D activity. 60% of the production is similar to the ones of the other plants, but 40% is specific of the Trecate's venue that operates with its own customers. The production is divided in 5 parts:

- plating (galvanic) decoration use (gilding), functional (chemical nickel), electronics (circuits);
- lubricant, oil for engineering sector (protection and coolant);
- metallurgist, pet plastic recycling;
- aluminium chromium;
- tarmac treatment, sell of salts for metal alteration.

Società a responsabilità limitata raffineria padana olii minerali s.A.R.P.O.M. S.R.L.

From http://www.esso.com/Italy-Italian/PA/about_what_refinery_trecate.aspx:

The Sarpom (Società a responsabilità limitata Raffineria Padana Olii Minerali S.A.R.P.O.M. S.r.l.) San Martino di Trecate (Novara), situated on the border of the Natural Park of Ticino, is located in the heart of the industrial triangle including the cities of Milan, Turin and Genoa. The refinery has an effective capacity of 8,75 million tons per year.

Nowadays it employs almost 400 workers, moving more than 1.500 people and it is situated on an area of one million mq.

From the interview:

The company configures itself as a sort of contractor in house inside the group, with a turnover of pure processing: 75% Exxon Mobil, 25% Total Erg.

Incoming products: (via oil pipeline in Vado Ligure): crude oil, additives, dyes, ether (increase octane in the fuel), biofuel.

Output products: gpl, fuel, kerosene, automotive gasoline, heating gasoline, fuel oil, bitumen, byproducts (sulphur), intermediate.

TRASGO SRL

From www.trasgo.com:

Trasgo S.r.l. operates in the logistic sector supplying transport services, a fleet of company-owned vehicles and three logistics centres, a complete, well-defined range of services, including domestic and international shipping as well as hazardous materials and combined road-rail transportation.



From the interview:

The company has been contacted to deepen the movement and transport of products by the company Mirato S.P.A. for which it's acting as logistics provider with 6-7 destinations by road for big organized delivery and booking, in every Italian region except Sicily, Sardinia e Venezie. Mirato's international delivery is conducted by other agents. The company owns spaces for storage also for Mirato and underlines the difficulties that this sector is facing due to the unfair competition caused by the absence of adequate controls.

DIASORIN S.P.A.

From <http://www.diasorin.com/en/home-page/index>:

With more than 40 years of international experience, the DiaSorin Group develops, produces, and distributes immune agent kits for clinical diagnostics. Thanks to its well established expertise, specifically in the immunodiagnostics market, DiaSorin has become "the" in vitro diagnostics specialist.

From the interview:

The company originally was part of the Fiat Group and was called Sorin biomedica. It has been taken over by a US company in 1996 with a sensible worsening of the enterprise's performances, at least till 2000, when four managers made a buyout operation. Thanks to their management the turnover has grown four times. In 2007 the company has been listed to the stock exchange with a value of 12€ per stock, in 2010 has risen to 33€ per stock. Above in Saluggia, the company is distributed in other 5 sites in the world: Germany, USA, UK, Ireland and South Africa. The main product is the reagents for diagnostic in vitro, especially for blood analysis.

ZSCHIMMER & SCHWARZ ITALIANA SPA

From <http://www.zsi.it>:

After a century of activity the Zschimmer & Schwarz group counts 20 companies and more than 800 employees in Europe, Asia and America. The "Tensioattivi" sector was founded in 1931 with the sulphating of fat alcohols. This technology has rapidly developed and since then the company has started to expand more and more, particularly in the Italian region called Zschimmer & Schwarz italiana S.p.A. It has become one of the main companies in the detergency and personal care field in Italy and abroad as well.

From the interview:

Three venues in Italy, the Tricerro one specialized in detergent and personal care and two more sites in Vicenza e Sassuolo, both suited for textile specialities, ceramic and leather.

The following table summarize all the contacted companies and their turnover and employment data.

Company	Product	Group	Legal Venue	Local Unit	Group Employees	Local Unit Employees	Group Turnover	Local Unit Turnover
Ppg Industries Italia S.P.A.	Paints And Coatings (Cataforesi)	Ppg Industries	Usa	Quattordio (Al)	N.D.	450	N.D.	N.D.
Gruppo M&G	Carbon Polyester	Gruppo M&G	Tortona	Tortona (Al)	2500	100	3,5 Bil \$	-
Idrosol S.P.A.	Sodium Hydrosulphite (Whitening For Textile And Paper Industry)	Gruppo F.A.R.	Cologno Monzese (Milano)	Trecate (No)	800	45	230 Mln€	15 Mln€
Esseco S.R.L.	Sulphur Chemistry And Derivatives	Esseco Group	Trecate (No)	Trecate (No)	300	210	N.D.	60 Mln€
Sued - Chemie Catalysts Italia S.R.L. In Breve Sccl S.R.L.	Catalysts And Adsorbent	Sued Chemie Group Aeg	Germania	Novara	5500	75	900 Mln€	25 Mln€
Columbian Carbon Europa Srl	Black Carbon Products	Columbian Chemicals Company	Usa	Trecate (No)	1000	74	N.D.	70 Mln€
Macdermid Italiana - S.R.L.	Surface Treatment Products	Macdermid Inc	Usa	Trecate (No) Biella (Bi)	2500	150	800 M\$	40 Mln€
Societa' A Responsabilita' Limitata Raffineria Padana Olii Minerali S.A.R.P.O.M. S.R.L.	Petrochemical Products From Refining And Intermediate Products For Chemistry	Exxon - Mobil	Usa	Trecate (No) Roma	Some Thousands	400	-	-
Trasgo Srl	Provider Logistico	-	-	San Pietro Mosezzo (No)	-	108	-	16 Mln€
Diasorin S.P.A.	Biotechnologies (Farmaceutica)	Diasorin S.P.A. (6 Siti Nel Mondo)	Saluggia (Vc)	Saluggia (Vc)	1100	500	500 Mln€	500 Mln€
Zschimmer & Schwarz Italiana Spa	"Tensioattivi" (Sulfation Of Fat Alcohol) For Detergents And Personal Care	Gruppo Zschimmer & Schwarz	Tricerro (Vc)	Tricerro (Vc)	800	75	120 Mln€	80 Mln€

2. What are the external opportunities or threats particularly capable of influencing chemical industry in the mediterranean area?

2.1. Economic trends

The recent economic trends are seen overall as an opportunity. In particular the economic development is mostly considered as follow: in the Mediterranean area, worldwide and regional, even if in some cases the regional dimension is seen as a very competitive one. The salary's growth is seen as a natural process whereas the strengthened competition is considered more as a threat. This is due to the fact that in many productive sectors there are few competitors around the world and also due to the development of some emerging countries which is worrying the local/regional system.

2.2. Socio-cultural trends

The demographic transformations, or else the socio-cultural framework, are mainly perceived as natural and just few times as an opportunity or a threat and sometimes we encountered the following considerations:

- the training of extra-EU personnel is a further problem in recent years. In other cases it was seen as irrelevant, but sometimes these workers represent the 10% of the whole personnel of a company;
- The young applicants show difficulties to accept a job in the chemical sector, especially concerning the work organized in 3 turns.

All the individuals consider the education standard and the personnel skills in the chemical sector in terms of availability of suitable human resources as a brilliant opportunity.

2.3. Technologic trends

The technologic trends are clearly considered as opportunities, just in few cases these are seen with indifference regarding specific productions as information and communication technologies and innovation on storage technique.

2.4. Environment and energy

The opinion concerning environment and energy is very intricate, because we have faced many different situations among the consulted companies, so that the feedback "neutral" has been chosen as a way in the middle between positive and negative factors, showing that in many situations the environment issue is a strong transition element. In details, the climate change and the law against the emission of carbon dioxide are considered as a "neutral" factor.

The availability of not renewable energy resources together with the renewable ones is seen as an opportunity and only in few cases as threat or neutral factor.

However, energy costs are considered as a problem and in few instances are seen as an opportunity of change towards innovation.

We can also report that the energy transition indeed is the main development activity for some companies, like: Chemtex Italia srl, engineering company connected to IBP (Italian Bio Product), the spin-off of Mossi & Ghisolfi for the production of ethanol and R&D research. (See IBP form, Italian Bio Product).

2.5. Policy and innovation

According to our analysis, the company's interest towards innovation policies seems to be very strong, with particular attention to the development of transport's facilities, environment policies and towards any kind of financial support/subsidies.

On the other hand we have to state that laws and rules regarding primarily the harmonization of transport's ways and also the environment policies are not rated as good as we think, since, sometimes, entrepreneurs have too many rules to respect without a fair compensation; or those rules are not clear enough and could be hard to be explained to a third party, like customers or agents. A company has underlined how the regulatory framework on chemical materials has become very complex after the entry into force of the REACH regulation, a new EU regulation on chemicals and on their safe utilization that covers the registration, the evaluation, the authorization and the restriction of chemicals. REACH is the acronym of Registration, Evaluation, Authorization and Restriction of Chemicals and, integrating many EU policies on chemicals acts as a complementary tool towards other safety and environmental policies, nevertheless, without replacing some already existing specific regulations (e.g. cosmetics and detergents).

2.6. Transport facilities

In order to integrate chapter 3 "Description of transport infrastructure", it seems appropriate to deepen the analysis on the results emerged from the questionnaire.

As underlined in the above mentioned chapter, there is a considerable availability of transport facilities in the provinces of Novara, Vercelli and Alessandria. This fact is confirmed by the reaction of many companies on this task, considering the local infrastructural system as an element of strength and competitiveness.

Concerning the chemical industry, among all issues, the "key element" for the companies of this sector is the transport of dangerous goods, due to the amount of restrictions and regulations applied on this kind of transport.

Each subject involved in the transport of dangerous goods (e.g. consignors, loader, carrier, receiver) has his own precise duties. For instance, the consignor has to classify the goods, choose the proper packaging (container or tank), consider the level of risk of the goods transported and he has also to provide all the necessary documents to the carrier.

For example: the consignor, among all the required documents for the road transport in Europe, has to provide the so called "written instructions", written up in all the languages of the nations. The carrier has to pass through and report all the necessary instructions in case of accident.

The transport of dangerous goods by road is regulated by the ADR international agreement, which is updated every two years. The original agreement has been signed in Geneva on September 30th 1957 as the "European Agreement concerning the International Carriage of Dangerous Goods by Road". The issue related to the transportation of chemical goods focuses on the evolution of an integrated system among facilities, on the way of transport and related services, in which a central role is to be assigned to the rail transport. As a matter of fact, there are three strategic reasons to improve the rail transport:

- The pressures towards sustainable way of transport, with a lower impact on the environment, are about to increase in the next years: the rail mode could contribute to decrease the amount of CO₂ emissions caused by the transportation systems; today in Europe, corresponds a quarter of the total emissions of CO₂.
- The supranational dimension of the markets contributes to create the proper conditions for exploring the competitiveness of the railway services in medium and long distance, in order to support the network of European routes.
- The strategic role of the European harbour's system required an appropriate network of rail freight service to support the traffic organization from/to the port.

The European process of "liberalization" of the railway system started in 1990, even though it started to work indeed after further incentives and impulses in 2001, with the approval of the so called "First rail package" directives. These directives provided the following actions: the parting between facility's operator and railway undertakings, the regulation of the access to facility, set up capacity's allocation, fares for the use of the facility, safety certificates and railway licences. In 2004, the commission approved a further directives package regarding themes as safety, interoperability and the creation of a European railway agency. Officially, the European process of liberalization of the railway system got fully operational from 2007 and this process had to face several structural problems.

The restructuring process of former monopolistic companies hasn't been completed yet (in some cases it is only at the beginning), while the new entrants focus only on the most attractive traffic segments. The main consequence of this situation has been the decrease of the service's offer, due to the rationalization of operative parameters of the former monopolist, which gave up market segments and traffic flows less attractive in the logic of the economical balance.

This fact occurred for two main reasons:

- First, a proper industrial policy for railway liberalization was missing. That means a policy taking into account the heavy economic losses registered by freight service's managers, which imposed to take the sector out of the way of a possible income's redistribution through the liberalization of the monopoly, as it happened in other sectors of the European public utilities;
- Second, the management models of service's supply would have required deep injections of innovation, not only concerning the railway convection itself, but also for all those ancillary services, strategically for the overall supplying services (manoeuvres, terminal management, quality of the access tracks to the railway network).

Nevertheless, in spite of the difficulties and delays registered, the opportunity to re launch the rail transport is still concrete. In conclusion, the challenge is still open and brings back the market share of the rail market's services to 20%, like it was in the Seventies, is still possible.

(Silvio Beccia, Liberalizzare significa rilanciare, il giornale della logistica, 21.09.2010).

The Italian situation is certainly due to a low competitive market, as already showed in the "Considerations and proposals for a competitive regulation of the market to support economic growth" (AS453, 11 giugno 2008) of the Authority for competitiveness and markets.

Although in the rail transport, the ownership and the organizational structure of the State Railways group (FS) represents, on the competitive side, a relevant weak element, above all is the pending opening to competition of passenger's transport and the entry into market of new operators. In recent years, some changes presented in the organizational structure of the FS group are certainly important and these changes follow the European directive on liberalization. Nevertheless, the only separation concluded between Italian Rail Network (RFI) and Trenitalia doesn't seem to be enough. The presence of "proprietary links" between the two societies and the persistent lead role of RFI on some regulatory functions, continue to prevent from the creation of a proper competitive market.

The rail transport sector is characterized by similar tensions between public service obligations and competition where a lack of clear rules concerning public service obligations can limit market access opportunities. The ability to exploit the leverage of cross subsidies between profitable and not profitable routes allows the dominant operator to impede the regular access to the market and the growth of competitors. Furthermore, the poor transparency regarding the effective costs of the service implies that the contribution requested to other operators is calculated on the costs of FS group and not on the costs of the most efficient operator.

In Italy, the dynamics of rail freight transport have been modified after the Viareggio's rail accident on June 29th 2009. The accident occurred after the derailment of the freight train 50325 Trecate-Gricignano that caused the leak of GPL gas and the consequent fire in the station of Viareggio and the area around. After these facts, the National safety Authority applied much stricter rules on the rail transport of dangerous goods.

The Italian National Safety Authority (ANSF) is Florence-based. The Agency, operative since June, the 16th 2008, was set up in reference to art. 4 of the Legislative Decree 10th of August 2007. 162 implementing the EU Directive n. 2004/49/CE (Safety Directive).

ANSF is a newness of concept for Italian railway safety, both for the new line between principles and rules and for the division of responsibilities among railway operators. The Ministry of Transport and Infrastructure supervises the Agency activity.

ANSF is technically independent from all the railway operators: it guarantees a non-discriminatory treatment to all the subjects related to the railway transportation. The Agency gives to the railway operators the principles for their safety rules, checks the maintaining of the current safety levels and promotes a steady improvement in safety, taking into consideration the technological and scientific progress. ANSF plays a role in the harmonization of national and international safety regulations, encouraging the European railway interoperability.

It has been so determined to provide extraordinary controls like the check out of train's axes like the ones that started the Viareggio's fire and the obligation to provide a Control System of the Train Running (SCMT) on trains transporting dangerous goods. This control is articulated as follow: traceability, standard construction, manufacturing, manufacturer, maintenance activities, subjects deputed to maintenance; control on the closure system of wagons coming from abroad; more stringent standards for non-destructive testing (e.g. ultrasound) for workshops and specialized personnel.



After the train disaster in Viareggio, it has been activated by the EU a “Task Force Freight Wagon Maintenance” as itinerant commission with the duty to monitor and analyse data and perspective functions regarding safety; another target is to harmonize and extend the criterias and the safety rules on dangerous goods transport among the EU member states, but ERA (European Railway Agency) has recently stated that this concept is applicable only on voluntary bases.

From the 1st April 2010, as a result of the entrance into force of the “Short-term mitigation measures concerning the transport of dangerous goods”, it won't be possible to transport dangerous goods with widespread traffic on the Italian network (it refers to the transport of these goods on a single wagon part of determined convoy) but only on a special and complete train for these kind of goods. The same rule is also applied for non-dangerous goods, even if railway stations are mainly capable for widespread traffic. Concerning the transport of dangerous goods by road, it's important to underline the effort and the commitment of the Piedmont Region that adopted the Regional plan for logistics in January 2010; plan drawn by the Department for transport and facilities, which identifies a framework for design-projects and pilot projects as reported below.

Piedmont Region, the Regional Plan for Logistics, Department of Transportation and Infrastructure, Transport Management, logistics, mobility and infrastructures, January 2010

Dangerous goods

The transport of dangerous goods is a critical element, an origin of dangers for the population and the environment but, in the mean time, it's a basic element for many economical sectors; for this reason, all the subjects involved in it (companies, operators and owners of facilities, authorities) grow their interest for a better knowledge and safer management of the transport.

It has been divided in four parts:

- Analysis of the situation of the territory: population density, parks and protected areas, industrial districts and positioning of the fire fighters stations;
- Definition of the road subnet for dangerous goods transport and identification of the itinerary to be equipped according to safety standards;
- Through the overlap of provincial “subnets”, a first reference road graph has been made. Its target is to frame the main guidelines on which intervene, mainly for adjustments and safety reasons.

A series of initiatives will be developed to follow and implement the projects:

- a. To develop the knowledge and the commitment of other partners, new projects on the issue “dangerous goods” are about to be proposed, in the field of the European programming 2007/2013, involving both the French and Swiss side.

As a matter of fact, the transport of dangerous goods is regulated at European level (ADR Regulation) only for the configuration of the containers and the transportation itself. It still answers to the so called logic “command and control”. References about European programming on transportation risk management are missing.

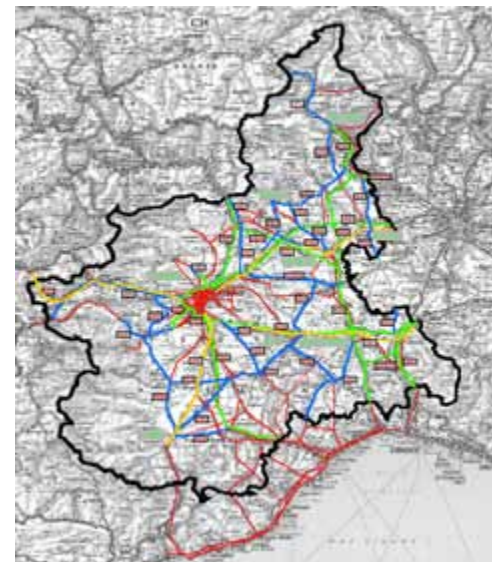
In this context, it's expected that the new network will better coordinate with borderline territories, with the aim to guarantee sharing of information, to adopt common preventive and protective measures in order to manage the traffic and, consequently, to protect the territory on environmental and atrophic aspects.

The project proposed at the thematic table is an Italy-Swiss project that could be transferred also to the French side through ALCOTRA; below there is a list of the targets and the results:

- Direction of the strategic infrastructures;
- Territorial planning of densely populated areas, with particular attention to the transport of dangerous goods in these lands;
- Arrangement of adequate emergency garrisons, in order to minimize the effects and the consequences of possible accidents connected to dangerous goods transport on the territory;
- Creation of a Control Centre among the subjects involved in the project, in order to guarantee the gathering and the analysis of data related to the transport of dangerous goods and, on the other side, to monitor on real time the information connected to any accident on the territory so as to ensure a quick and efficient service of communication and emergency.
- Planning of adjustment interventions on the road network and rest areas in order to prevent possible accidents with consequences on the environment.

b. Realization of a pilot project for the management of emergencies connected to vehicles transporting dangerous goods, with the cooperation of the Italian Police (Piedmont and Valle d'Aosta department).

The regional Plan for Road Safety and the relative implementation program 2007-2009 deals, among the main targets, with the problems connected to road accidents that require direct interventions: accidents related to working activities, accidents related to dangerous goods transport and accidents depending on a poor regulated road traffic management.



2.6.1. Railway

The rail transport constitutes a knotty problem for many of the contacted companies, even if a third of them consider the rail transport a neutral factor concerning their business.

One of the most worrying is the fact that rail and road connections that should be increased and strengthened in various aspects of interoperability, they do not increase but they tend to decrease; this is partly the result of the railway current policy. As expected, the opinion on bureaucracy regarding this field is seen as threat. Considerations as the location and the positioning of the railway system, the terminal's location, the accessibility and the capacity of the wagons, the accessibility to terminals, and other aspects such as the capacity and efficiency of terminals and the interoperability, are perceived as opportunities. In some cases the interpretation is linked to the actual arrangements of use, highlighting the need of improvement of the rail network, due to the deficiency of the services, according to their opinion mainly caused by the Trenitalia oligopoly.

The strength of this system, especially for the Novara's companies, surely is the proximity to a complex and integrated system of inner rail junctions, such as the station of Trecate, Boschetto di Novara and

CIM (Centro intermodale Merci) of Novara. A highway directly connected to the Novara CIM that goes straight to Northern Europe and represents one of the key elements for success.

The problems that emerge, like the worsening of transport conditions after the recent regulation's stiffening on chemicals transport and the low efficiency of the goods transport, decrease the possibility of assembling trains with joint individual wagons, making several problems then to individuate the right economy of scale. Results then make more difficult the entry on the market of new operators (e.g. the French company Captrain, see next form) that cannot activate an adequate movement of wagons caused by the oligopoly of Trenitalia. The system appears to be stuck and inflexible so that many enterprises avoid using the rail transport, passing from many hundreds of movements to few units in a short time.

2.6.2. Road

Regarding the road system, if we exclude the highway tolls that are seen as a threat or as neutral, the rest are considerations on expediency, due to the good positioning and structure of the road network compared to the international operability/standard. The road system is the main way of transport of goods for those companies which are not connected to the rail network. However, the above mentioned deficiencies of the railway system are fostering the use of the road network also by the rest of the contacted companies. The amount of goods transported by road is increasing thanks to the service flexibility and the fare convenience. Among the weakness links of the Italian framework we easily find the low effectiveness of the transport's regulations on heavy vehicles that it's helping the spread of the so called unfair competition, especially by foreign operators, mainly from Eastern Europe. The inadequate controls on heavy vehicles, above the problems resulted from the over-use of the road network, produce serious consequences on the environmental impact and on safety conditions as well. In this context the particular situation caused by obsolete regulations as in the case of the cyanide's transport emerges and it obliges travelling only from dawn to sunset and also to have a special driving license for this kind of transport. This is an anachronistic procedure that informs the authority for the route of the goods. Concerning the pharmaceutical sector, where urgent deliveries have to be done like in the "cold chain" for the transport of bodies, there are some important and flexible solutions which can be applied.

2.6.3. Maritime traffic routes

The maritime traffic routes are mostly considered as an opportunity for the following reasons: positioning, capacity and efficiency of the ports and the distribution terminals. The connection with the hinterland is considered as opportunity by half of the companies while the remaining considers it as neutral factor.

Obviously the main port of reference is in Genoa.

The considerations change among those who say that it's adequate and those who assert that the port could be improved especially on distribution capacity of the terminals and on the efficiency of the agents for handling. The access to the ports is mainly by road; just few transports go through railway, actually only in case of particular conditions concerning loads and movements that result to be convenient and manageable. For some peculiar problems regarding access and supplying, the analyzed system interacts with other port facilities, some Italians (Ravenna, Brindisi, Leghorn, La Spezia) and some abroad (Rotterdam).

2.6.4. Intermodal

The arguments on the intermodal system are mainly considered as opportunities with a small percentage of companies considering these neutral. The intermodality practiced by the contacted companies shows all the possible combinations available, sign of a strong operational vitality and continuous research on efficiency and quality. From the analysis emerges that for many operators, this physiognomy matches to an increasing capacity to differentiate products and solutions to answer to all the marketing and commercial requests. Among the peculiarity of some business realities, we can easily underline the links between distribution centers (hub) that could be close or far depending on the case, or the specific feature of the oil transport, characterized by a deep intermodal combination: iron – sea; pipeline – sea; pipeline – tank (Arluno, Chivasso, Malpensa), without using the modality iron – rubber. Among the most reported problems we have for example the interoperability and standards with respect to the discretion of the customs rules applied in different countries. Many agents hope for an improvement of this situation especially in Eastern Europe.

2.6.5. Pipeline

The evaluations on this kind of facility are mostly neutral, because few companies use this way of transport. One company uses it for the transport of refinery oil and, however, considers it as a neutral factor. We don't have companies using the international connections but some use the regional ones, especially in the oil sector for the transfer between Arluno and Malpensa.

2.6.6. Safety (at national/regional level)

The safety (at national/regional level) in all its aspects is considered an opportunity and only marginally a threat. Many companies reported that the danger of incoming or outgoing products depends on the kind of commodity produced and for the sector is often under the ADR regime. Some companies have reported that the effect of the "Viareggio disaster" has certainly worsened the business dynamics on safety and the relative costs, but it has introduced a new knowledge on prevention. In this context an agent stated that since the ministerial check on dangerous goods is in force, even if it requests more work on safety, it has ensured a strong peace and sense of security in the sector, with big benefits from the psychological point of view.

2.7. Industrial Sector And Competitiveness

2.7.1. Supplier

According to the evaluations on the "supplier factor" most of the companies consider it as an opportunity and only few of them consider it as neutral or threat. The geographic areas change from company to company, from sector to sector, it goes from a regional dimension of some companies to a worldwide perspective of some others.

2.7.2. Customers

According to the evaluations on the “customer factor” most of the companies consider it as an opportunity and only one as a threat regarding the standardization of the product. Also in this case the concentration/distribution geographic areas change from company to company, from sector to sector, from a regional dimension of some companies to a worldwide perspective of some others.

2.7.3. Access to market

The observations on access to market are evenly distributed between considerations of opportunity and neutral, the second ones to concern economies of scale, brand identity and the availability of substitute goods. Only the differentiation of the product shows a majority of opportunity's considerations. In this context we have situations where the differentiation of the product represents a threat due to the fact that it forces the product to continuous changes in the production chain causing stock problems, cost increase, need of new storage options, etc. There are other cases that carry hundreds of different types of finished product and, with all the different kind of packaging; it could get to some thousands of trading patterns. It is worth mentioning that some companies are working more on the planning than on the command, always trying to plan in advance the main production's factors thanks to a complex inner informative system. Some agents underline that the availability of substitutes in the refinery sector is applicable only on the intermediate products. Less differentiation is better. As a matter of fact, today there are very small differences due to the different national standards which pose various problems of adaptation. After all, it emerges that some companies had found out a sort of compensation's dynamics between the risk of challenging the strong competition coming from Asia and the consumption growth of their populations.

3. What are internal strengths/weaknesses from your company's point of view?

3.1. Supply

All the supplying factors are considered as elements strengthening the company. Regarding the delivery times of raw materials and intermediate products we have registered some weakness and neutral interpretation, as well as for the product's quality (mainly neutral), taking into account that in many cases we are talking about products with little or no packaging components. The situation completely changes for payments and delivery terms/deadlines, where half of the considerations on this theme are negative. Some specific business placements can help to better understand the framework just analyzed:

- Optimization capacities in function of pyramidal clusters making part of the subcontracting system of big companies.
- Ability to react to conditions due to an almost monopolistic markets, for instance through business policies providing double or triple supplier for raw materials provisions;
- Ability to understand and search for frames of market stability allowing to plan production process and so to enjoy greater benefits in the transaction cycle.

3.2. Storage

Regarding the evaluation on the storage factor the companies consider safe storage and just-in-time strategies a strength point, and so it's consider the inventory level just with some neutral consideration. On the other hand the stocktaking's costs are considered a weakness point. The outsourcing policy is rarely considered a strength factor. In fact most of the companies consider it as neutral. This policy is often seen as a business dilemma for entrepreneur's cause of the difficult evaluation of advantages and handicaps concerning this theme, every company have its own approach to this field. A non-outsourcing policy generally prevails, especially when the production process is entirely developed inside the company and the only outsourcing request regards services as logistics, handling and maintenance. For this purpose it could be interesting to analyze the experience of one company approaching the "working capital" strategy that means "produce only when it's needed indeed" and everything concerning the security/safety of storage. By doing so, the just-in-time strategy focuses on quick answers to market requests and this involves the loyalty of the costumer, but, above all, this is a pretty risky strategy. Concerning the outsourcing policy, it's interesting to underline the company's strategy that through its recovery plan defines the further outsourcings needs which are relative to the risk and the danger caused by the flexibility of the structures or the incompatibility of those.

3.3. Production logistics

The production logistics theme shows a complex situation touching the following points: sophistication of the production process where we have found different considerations and opinions depending on the company strategy; the production process flexibility is seen as a strength point and only in few cases as neutral. The production costs are seen as a weakness point by half of the companies and the stability of this process is mainly considered as a strength component. Some agents have also reported that to get a more linear and efficient classification of the production costs, a deeper and more complex analysis should be made, due to the high added value of the specific productions. A particular case regards the problem affecting a big amount of production process that requests low costs and low risks of production (e.g. transport and finalized product) but, in the meantime very high risk factors depend on service and technical assistance that affect up to the 35% of costs component. For other sectors, it's reported that some processes are way too complex and so they are considered a weakness point. It means that these productions could be a source of income and strength in the national market but a weakness in the international one. Among all the companies, there is awareness to the fact that the more logistics will be developed the more their strength will decrease in the national market, with a strong impact on the business organization of the company.

3.4. Distribution and transport

Distribution and transport are widely considered as strength component, with some small differences following this decreasing order: delivery's time and performance, kind of transport and efficiency of payments tools. The opinion on the last two elements (kind of transport and efficiency of payments tools) is mainly positive. But the situation changes when we talk about maritime transport's costs largely considered as neutral or weakness. In the evaluation of specific issues we can find all the regulation on the relationship among production, transport and distribution regarding every possible case where time and modes of transport generate strong competitive differences.



3.5. Planning and control

The procedures for planning and control are mostly considered as strength. In particular we have those who predict one month in advance the possible requests of the customer, with continuous variance analysis and control procedures amounting to 6/700 analysis per month. Another company reports that till few years ago there were monthly programs; today's programs are daily, that always try to satisfy as good as possible the customer's needs.

3.6. Ordering process

The ordering process is considered by the majority of companies as strength. Some elements of distortion depend on the international economic situation. For instance, some suppliers, that are facing critical moments and instrumentally rise up the price of their service, create a situation of market rigidities that could get worse, even implying oligopoly or monopoly consequences. This presents the risk of the growth of acquisition policies by big worldwide companies. These risk and stickiness elements contribute to upgrade research and development activities.

3.7. Safety (enterprise level)

Entrepreneurs put many attention and efforts on safety as they find this task a strengthening factor. Some companies have created specific working groups aimed to train and keep updated their employees about safety on the workplace. Other companies have chosen a different approach, even more detailed than law's requirements, considering safety a high strategic value topic. Some companies developed Responsible Care programs, effective on some not ordinary situations as car accident caused by cyanides burned on the motorway or for the adoption of automated systems to treat and manage dangerous goods.

3.8. ITC for enterprise logistic

The ITC for enterprise logistic is considered as strength and only few companies mark it as neutral. Regarding the chemical sector, this is an outsourcing component due to the fact that it's managed by external suppliers of logistic services, but ERP/MRP systems for the inventory management are widely applied through SAP equipment. To summarize, the SWOT analysis can be highlighted by reassuming some of its specific and essential features emerged during our interviews:

Strengths

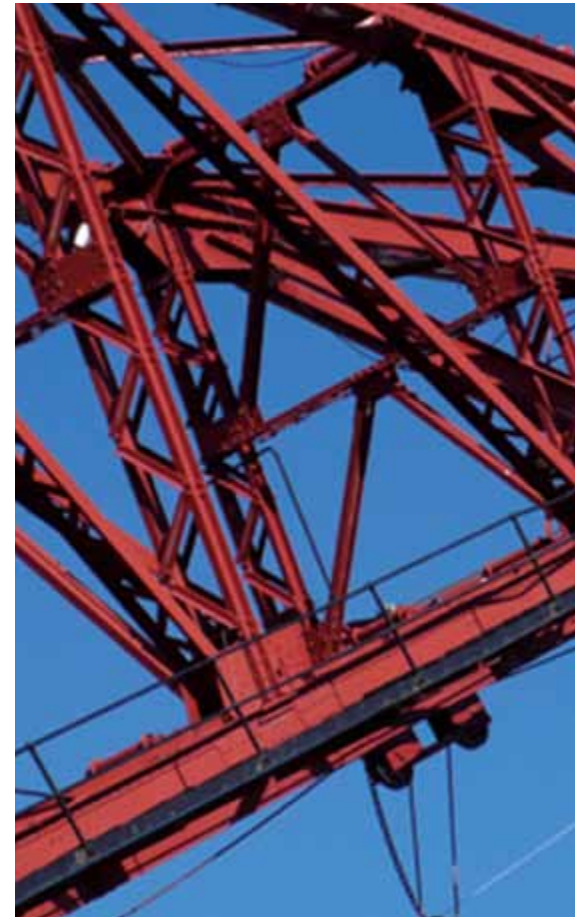
- Full awareness of international changes and careful evaluation of its further potential in terms of production and commercial;
- Strong value assignment to professional skills and to the improvement of socio-cultural luggage of the personnel;
- Good planning framework regarding the transport system at regional level;

- Growth of control and planning instruments at regional, national and European level for safety and risk prevention;
- Good accessibility to local roads and motorway network;
- Proximity to Malpensa international airport;
- Buona dotazione di condotta per il trasporto dei fluidi collegati al settore petrolifero;
- Very good approach to safety policies at enterprise level, mainly considered as an opportunity for strategic and competitive growth;
- High level of internationalization of our enterprises;
- High quality productions and strong ability to adapt to the diversification of products widely requested by the market and its evolutions;
- Very high quality on managing customers/supplier process and relations;
- Carrying forward of efficient R&D projects;
- Maintenance of good employment levels.

Weaknesses

- Some companies are facing troubles in relation to the process of taking advantage on energetic transition and energetic sustainability policies. This matter concerns especially those companies working with fossil fuels;
- Partial functioning of the harbour's system, especially the Genoa one;
- Tendency not to increase the railway sidings;
- Several difficulties on the harmonization of safety standards', customs regulations and interoperability;
- Increasing problems regarding the transport of dangerous goods through railway, especially after the entry into force in 2010 of the new regulations after the Viareggio disaster. These regulations obliged to transport dangerous goods via railway only on specific trains (specifically prepared for this kind of transport) and won't be possible to transport these goods on one wagon attached to a not equipped train anymore;
- Slowness of the privatization and liberalization process in the rail network, even if a specific European regulation dated 2007, already in force, is aimed to ensure fair competition on railway market access;
- Under using of inner railway platforms of some companies.

Opportunities



- Assignment of great opportunities to the development of the Mediterranean area and, to a smaller extent, to regional economies;
- Creation of spin off activities by some companies in the field of innovation and testing of new sustainable technologies;
- Much attention for the widening of potential emerging markets abroad;
- Awareness of the possible framework changes regarding competitive sectors and good tendency to develop adequate adaptation policies;
- Potential of employment growth especially concerning companies with a strong innovation and research sector.

Threats

- Critical situation about open competition on railway transport services and consequent worsening of marketing potential and competitiveness of local economical systems;
- Progressive lost of competitiveness on goods transport on rail with a drastic decrease of the volume of goods transported and consequent increase of the volume transported by road;
- Awareness regarding the possible approach of new competitors and operators due to the development of transport and logistics;
- Loss of control on some components of the productive system due to the policies of internationalization/outourcing of some services;
- The acceleration of competitive processes and innovation could take forms of corporation and employment downsizing;
- Exploitation of dominant position by some big suppliers could lead to the increase not only of speculative approaches but also of the acquisition policies by bigger worldwide companies.





Genoa SWOT Analysis Results

AUTHOR
Port Authority of Genoa

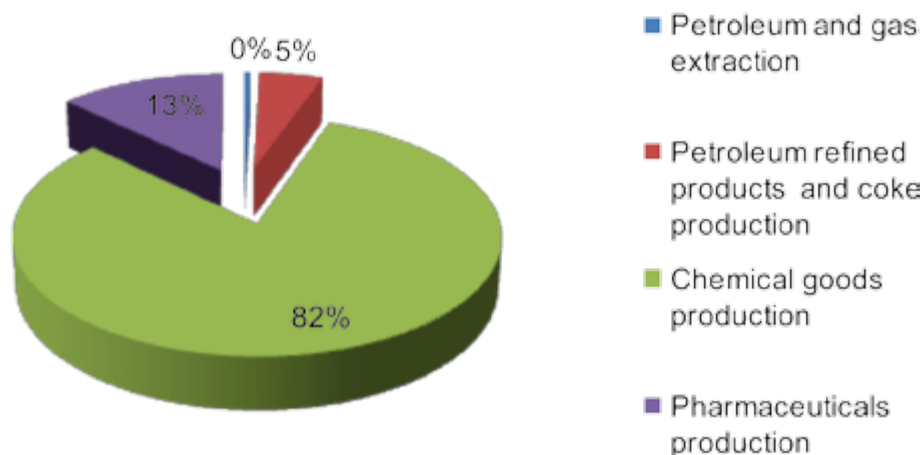


1. The chemicals industry in Liguria

In 2009 the industrial sector of Region Liguria was affected by the crisis, even if the downturn in Liguria territory has been lower than the national data. From the industrial sectors of the region, the chemical was one of the most sensitive to the macroeconomic decline together with the steel industry, the mechanical segment, the plastic and rubber production. On the other hand, the industrial sectors of Liguria that better resisted to the crisis were: shipbuilding, plants construction, advanced technologies production.^Z

Going more in detail into the chemical sector, in 2009 on the Liguria territory were active 203 chemical firms (1,7% of the industrial firms in Liguria). A reduction of 5 units (-2,5%) in the number of chemical firms was registered with respect to 2008.

The most relevant share of the chemical sector in Liguria is represented by the production of chemical goods (82%), followed by the pharmaceutical production (13%) (see graph)



Number of chemical firms in Liguria by type (2009)

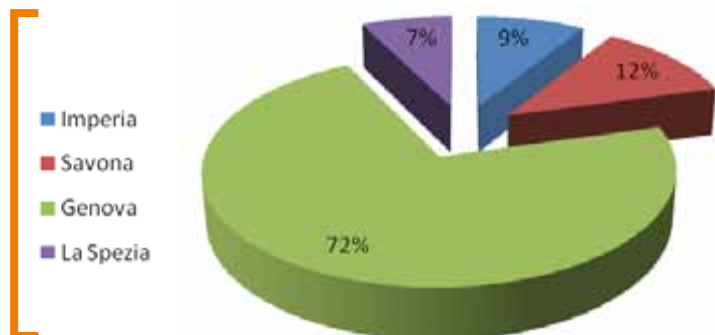
Source: Infocamere, 2011.

Strictly related to the chemical sector, the manufacture of plastic and rubber products is present in Liguria with 182 firms.

The largest part of chemical firms in Liguria is situated in the province of Genoa (146 firms representing the 72% of the total in the region). The other three provinces of Liguria register more or less the same number of chemical firms on their territory (see graph).

Distribution of chemical firm on the Liguria territory (number of firms, 2009)

Source: Infocamere, 2011.



Even if the number of chemical firms in Liguria is limited (just 1,7% of the total) they represent an important component of the economy, since they produce almost 10% of the value added of the industrial sector in Liguria. In the same way, the chemical segment contributes to the 6% of the total employment in the Ligurian industrial sector; on average, 4,900 workers yearly are employed in the chemical sector in Liguria.

Besides the chemical productive environment in Liguria, another relevant issue for the present analysis is represented by the logistics cluster of the region mainly constituted by the ports of Savona, Genova and la Spezia. In fact, the Ligurian port system (together with the port of Livorno) can be considered the fifth port range in Europe in terms of throughput.



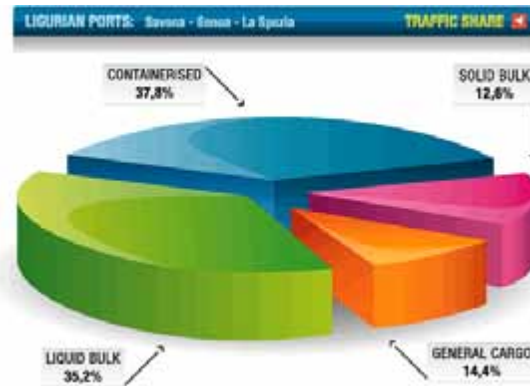
The European container port system and logistics core regions in the hinterland

Source: ITMMA, 2009

In the framework of the chemical sector the Ligurian port system is very important since it is the main Italian gate in the liquid bulk traffic (the traffic of the port of Trieste is shipped abroad). These traffics are crucial for the supply of the industrial sector of northern Italy, especially for the chemical.

To date, in terms of total throughput, the three ports handle approximately 93 million tons per year, whilst container traffic has now risen to over 3.3 million TEUs.

The volume of the liquid bulk which is handled by the Ligurian ports amounts to almost 34 millions of tons (almost 22.5 millions are crude oil imports) while the traffic of solid bulk reaches 13 millions of tons.



2. Genoa Port

The Port of Genoa is a premier Southern European gateway for Far East traffic moving through the Suez Canal and for trade with North Africa and the Eastern Mediterranean. It has successfully capitalized upon its invaluable experience and professionalism inherited from its age-long seafaring tradition to provide a high level service quality to all users.

Today the Port of Genoa features a 22-kilometre coastline which stretches seamlessly from the old port area westwards to the new port in Voltri, and covers a total surface area of approximately 7 million sqm.

It is a multi-service port which boasts 25 specialized terminals, managed by top private terminal operating companies, equipped to accommodate all classes of ships and caters for all key commodity sectors: container, general cargo, perishable goods, steel, forest products, solid bulk, liquid bulk, petroleum products, cruise and ferry passengers.

In addition, backed-up by a group of dedicated companies, the port guarantees a full range of vital complementary services from ship maintenance and repair to customized telecommunications and data processing.

Whilst agents, forwarders, brokers and insurers are all major components of Genoa's vibrant shipping community and are equipped to meet the diverse requirements of terminal users at a competitive price. Genoa is also home of the classification society RINA and Italy's foremost Merchant Marine Academy.

Genoa sits in the industrial and consumer heartland of Northern Italy and Southern Europe with easy access to/from the major inland routes, so that the large volumes of container and other cargo generated in this area are naturally tributary to the Port of Genoa.

All developments at the port are geared towards improving the already substantial road and rail connections with these markets. From Milan and Turin, Genoa is only 150 km away, Basel (Switzerland) 517 km, Munich (Germany) 627 km and Vienna (Austria) 963 km. Block trains are loaded on-dock at many of the port's terminals and offer direct services to international destinations, as well as to major Italian cities.

The fact that the Port of Genoa has a reputation for cost-effectiveness and handling efficiency is demonstrated by the fact that the leading international shipping lines serve the port regularly. Over 150 regular liner services connect Genoa with ports worldwide, offering a wide variety of choice to importers and exporters. The Ligurian city offers an excellent geographical mix of ports' destination, with particular focus on the Far and Middle East and Indian sub-continent, and with increases in ship calls to the emerging markets in the Mediterranean and Africa.

Within this framework, the Port Authority of Genoa is firmly committed to launching an extension of the seaport, just over the Apennines, with the development of a network of inland ports, including the establishment of a new railway hub in Alessandria strategically located, between Genoa and the industrial heartland of northern Italy and Southern Europe (Switzerland, Bavaria).

The Port Authority has taken a large stake in the company which has been set up to operate the multimodal hub, thereby reinforcing Genoa's aim to become a Mediterranean alternative to ports in the northern range.

In addition, last year the Port Authority of Genoa inaugurated a major dedicated shuttle train service between Genoa's main Voltri Terminal and the container handling facilities in the Rivalta Scrivia Inland Terminal, sited in close proximity to the manufacturing and consumer centers in both the Milan and Turin areas.

The Rivalta Scrivia Inland Terminal has the authorization on the part of the Customs Authorities of the Port of Genoa to operate a bonded area, offering customs clearance services, to Genoa's port clients; this means that the containers arriving in Genoa can be moved directly off the berth by train, thereby leading together efficiency and relieving pressure on the port's shore side facilities.

Furthermore, plans to expand the Rivalta Terminal Europa facilities have been approved and construction work started in 2010.



Concerning port infrastructures, in the short term, works are underway to landfill and restructure specific areas in the port terminals, to optimize berth occupation and to extend current yard operating surface. Moreover they improve the road and rail access and ease the flow of trucks to/from the port, and expand the storage facilities where the port's value-added services are generated.

New terminal development at Calata Bettolo moves ahead to create through land reclamation a 180,000 sqm area, offering a 18,000 box yard capacity, which will be equipped to handle 800,000 TEU per year.

The plan is to construct a new 625-linear meter quay with an alongside depth of 17 m. The Port Authority will soon invite bids for the operating concession on this facility.

Furthermore, the landfill between Ronco and Canepa piers is scheduled to start soon in order to create a new yard space in the Sampierdarena basin. This will add a further 60,000 sqm within three years.

It is important to note that a range of major rail infrastructure projects, aimed at improving Genoa's inland connections, are now being implemented:

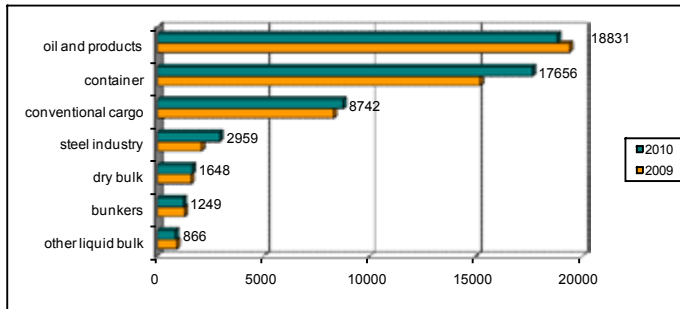
- The 5 billion euro third railway passes through the Apennine Mountains linking Genoa's docks to the major consumer and industrial centres in Lombardy and Piemonte: 500 million euro has been allocated by the government to prepare the ground for major work to start.
- The seven-year 622 million euro project to restructure Genoa's rail node which will allow an effective separation of freight and passenger traffic in the Voltri and Sampierdarena area, the two major port basins.



3. Traffics and terminals

After a two-year period of decreasing traffic, basically due to the global financial and economical crisis, the year 2010 was, finally, a positive year for almost all the goods handled in the port of Genoa. With a final throughput of about 27 million tons of general cargo (for both conventional and containerized goods) which means a plus 12,5% with comparison to the previous year, the port of Genoa was confirmed as Italian leader port, and one of the most important Mediterranean ports, for this kind of cargo.

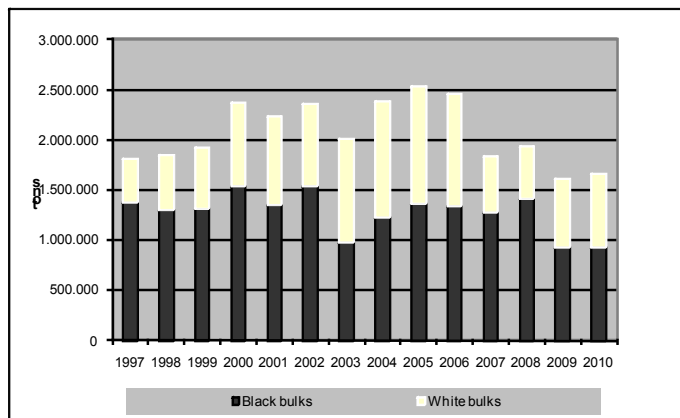
Also other cargo sectors as dry and liquid bulk reached final positive results, with a remarkable plus 14% increase for the chemical products handling. At the end of the year a small decrease was noticed only in the oil products field.



Genoa port throughput for type of cargo – 2009 / 2010 (Tons x 1000)

Source: Genoa Port Authority

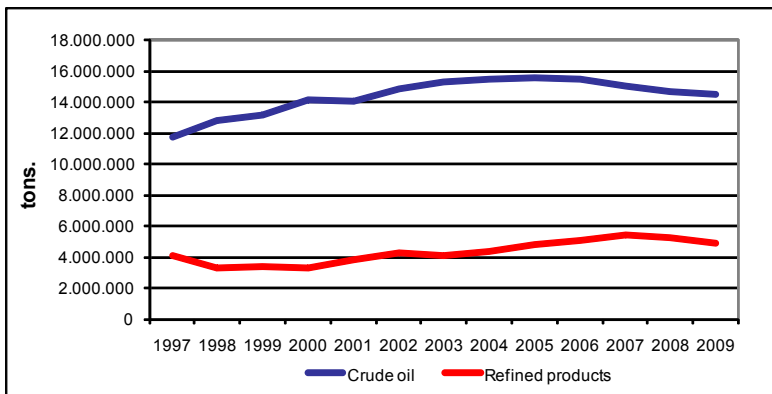
Since 2007 the traffic of coal and other “white” bulk products is constantly decreasing due to a reduced demand of these kinds of products in the Northern Italian area. Nevertheless, the year 2010 closed with a 65.000 tons increasing, stopping the negative trend of the last 3 years.



Genoa dry bulk handling volumes– from 1997 to 2010 (tons x 1000)

Source: Genoa Port Authority

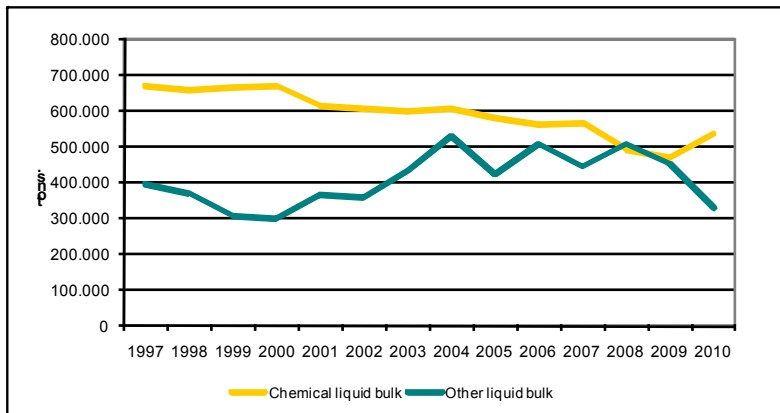
The average throughput of crude and refined oil is remaining almost constant during the last 5 years. The average traffic of crude oil remains stable between 15 and 16 million tons, whilst refined goods traffic reached an average throughput of 5/6 million tons in 2008 and 2009. Notwithstanding the minimal decrease of crude oil volumes handled, Genoa remains the most important port for the imports of petroleum flows to the Northern Italy. Moreover, it is worth stressing that among the liquid bulks the traffics of biodiesel/biofuels are experiencing a relevant growth in recent years.



Genoa dry bulk handling volumes– from 1997 to 2010 (tons x 1000)

Source: Genoa Port Authority

During the last decades a constant negative trend was noticed also in the traffic of chemical liquid bulk. Hopefully, since 2009, this negative trend seems to have stopped and 2010 closed with a slightly increase of this kind of goods.



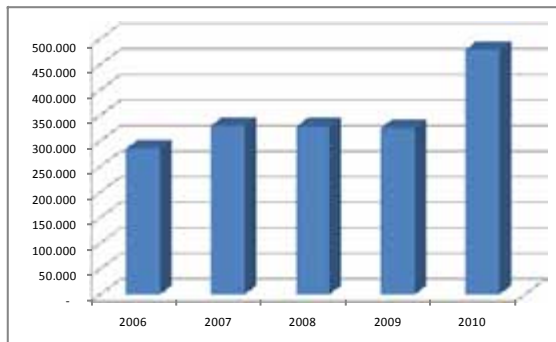
Genoa dry bulk handling volumes – from 1997 to 2010 (tons x 1000)

Source: Genoa Port Authority

During 2010 the port of Genoa handled 100.000 additional tons of containerized chemical in comparison with the previous year. This can be considered a good result for the port of Genoa, taking into account that this kind of cargo had been almost the same for about 4 years, from 2006 to 2009.

The traffics of containerized dangerous goods increased about 67% in the last three years (+14% ACGR).





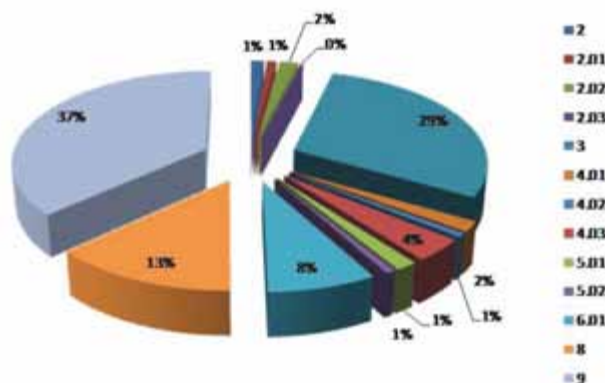
Containerized dangerous traffic in the port of Genoa – from 2006 to 2010 (tons)

Note: (direct imbarkment/disembarkement excluded)

Source: Genoa Port Authority



Three are the major classes of hazardous goods handled and stocked in the port of Genoa: marine pollutants and other miscellaneous materials (37%), substances liable to spontaneous combustion (29%) and corrosives materials (13%). Also toxics (8%) and other materials liable to emit flammable gases (4%) represent a quite imp oxidizing substances and organic peroxides. In particular, the volumes of dangerous goods belonging to IMO classes 4.03 and 9 experienced a relevant growth during the last 5 years (respectively +753% and +363%).



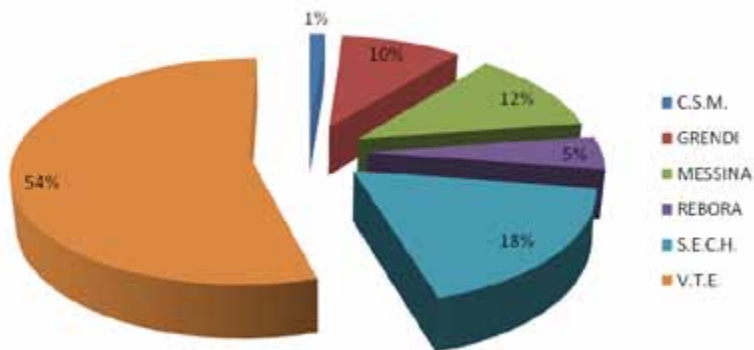
Containerized dangerous traffic in the port of Genoa by IMO class

Note: (direct imbarkment/disembarkement excluded)

Source: Genoa Port Authority

According to the Italian Port Law of 1994, the port of Genoa's general cargo traffic, as well as of all the other goods, is operated by private companies, whose facilities and services will be described in detail in the following pages. Regarding the handling of dangerous goods (mostly chemicals), six of the general cargo terminals of Genoa's port have to be considered: VTE, SECH; Messina; Rebora, Grendi and CSM (which during 2010 stopped handling hazardous cargo).

Whilst VTE and SECH terminals operate exclusively containerized cargo, the remaining Messina, Rebora and Grendi terminals operate also conventional goods (especially ro-ro traffics). As shown by the picture and described in the following text, VTE represents the major Genoese terminal operator in the traffic of dangerous goods with a 54% share of the total containerized dangerous traffic generated by the port. But also Sech (18%) and Messina (12%) greatly contribute to the handling of hazardous cargo making the port of Genoa one of the most important logistics nodes in this particular kind of traffics.



Containerized dangerous traffic in the port of Genoa by terminal

Note: (direct embarkment/disembarkement excluded)

Source: Genoa Port Authority

As stated above, in the port of Genoa there are several terminals/ coastal depots involved in the chemical logistics and capable to handle all kinds of cargo (containerized, conventional, liquid bulk, solid bulk). In the following pages is presented a brief description of these companies and facilities.

Voltri Terminal Europa S.P.A. - Vte

ZZVoltri Terminal Europa, located in the area of the Prà - Voltri port, ranks as the Port of Genoa and the upper Tyrrhenian Sea's leading terminal.

With a quay length of 1,200 meters along 5 modules and a draft of 15 meters, the terminal is equipped to accommodate simultaneously four last generation full-container vessels and three ro-ro ships. A turning basin of over 700 meters means that all kinds of vessels can arrive and depart easily, quickly and safely.

Equipment

Area

Terminal: 1,100,000 sqm

Warehouses: 20,000 sqm

Retroporto: 300,000 sqm

Stacking area

Empty container storage area: 40,000 sqm

Ground slot: 12,000

Reefer plugs: 500

Dangerous goods area: 500 slots

Equipment

10 post-panamax cranes

20 RTGs

24 reach stackers

3 RMGs

Quay

Length: 1,400 m.

Berths: 5

Depth: 15 m

Rail facilities

- 8 rail tracks 650 m.

VTE is well connected to the North Italian motorway network, with direct access to the A26 to Milan and the A10 south to La Spezia. An automated real-time container tracking system, coupled with 12 lanes for container traffic and 2 for non-containerized and heavy-weight cargo, ensure fast gate clearance.

VTE, equipped with 3 RMGs, also features direct rail access to Genoa / Ventimiglia and Genoa/Milan and Turin railway lines, the latter equipped to accommodate "high cube" containers. There is a total of 8 + 8 marshalling tracks, each 650 meters in length.

Voltri Terminal Europa is controlled by the PSA International Group through its majority share in Sinport company which also controls VECON S.p.A., the container terminal in the Port of Venice.

PSA International, based in Singapore, also operates in Europe HNN terminals in Antwerp, Sines terminal in Portugal and 28 terminals in 16 countries worldwide.

Another important feature of Voltri is the district park, which forms the nucleus of an integrated logistics platform. It incorporates a modern office tower of 7,200 sqm, 20,000 sqm of warehouses, and an integrated centre dedicated to the provision of value-added services to logistics and distribution companies.

Terminal Contenitori Porto Di Genova S.P.A. - Sech

Located less than one hour from the port gate, SECH (Southern European Container Hub) has a direct efficient link-up with its hinterland as it sits close to the Genova-Ovest motorway exit and the Campasso railway station.

SECH can handle up to 500,000 TEU per year, and guarantees the highest standards of service quality and security, as testified by the OHSAS18001 and ISO9001:2008 certification awarded, in addition to the declaration of compliance with the IMO (International Maritime Organisation) ISPS anti-terrorism code.

In 2008 the company investment program funded the completion of the transition to a new operational system and the construction of a covered area for Customs controls.

In addition, suitable software has been introduced for the management of operational activities in the event of strong winds, following specific structural modifications to the ship-to-shore container cranes and the installation of new wind gauges in the most sensitive parts of the terminal which monitor conditions in real-time. Henceforth, the wind speed threshold for the blockage of all port operations has now risen.

Area

Terminal: 205,000 sqm.

Stacking area

Reefer plugs: 154

Dangerous goods area: 405 TEUs

Equipment

4 post-panamax ship-shore gantry cranes (outreach: 16 container rows)

1 super post-panamax ship-shore gantry crane (outreach: 18 container rows)

6 RMGs

8 RTGs

15 reachstackers

3 forklifts

Quay

Length: 526 m.

Berths: 2

Depth: 14.5 m.

Rail facilities

3 x 370 m. tracks

Ignazio Messina & C. S.P.A.

One of the oldest established companies operating in the Port of Genoa, Ignazio Messina & C. S.p.A. is by no means anchored in the past.

Messina has operated liner services with its own Italian registered tonnage since 1921. Operations were centered in La Spezia from March 1977 until November 1996 when the company returned to the Nino Ronco Terminal in Genoa.

Messina has invested substantially to improve the 167,000 sqm. concession at the Nino Ronco location (main hub of all its shipping services). In 2004 it extended to Molo Canepa, a portion of Calata Bengasi and the areas lying behind for a total area of 253,000 sqm. It furnished the terminal with equipment and infrastructure needed for rapid and efficient cargo handling including warehousing and consolidation (a covered area extending over 18,000 sqm.). At the terminal containers, general and rolling cargo, special equipment as well as awkward cargo with excess weight and measurements can be handled.

There are berthing facilities for 5/6 vessels, 4 Ro-Ro ramp facilities, easy and exclusive road-rail connections, full dedicated Customs attendance, a 6,500 sqm. multi-storey car park and a marine and vehicle workshop providing yearly technical assistance and maintenance for landside handling equipment and vessels alike. A further four ship-to-shore container cranes have already been acquired to complement the existing three; the reachstackers and the forklifts will also be increased.

Messina's Nino Ronco facility was the first terminal in Europe to obtain: RINA 18.001:2007 - OHSAS Occupational Health & Safety Management System (first issue 25/10/2001) as well as ISO 14001:2004 - Environmental Management System (first issue 25/11/2004) and ISPS Code security approval issued by Genoa Harbour Office.

The company currently employs 215 staff in the head office while 258 are based on the terminal and a further 550 at sea. Around 45% of container traffic is moved by rail through a network of inland cargo hubs at Milan, Brescia, Vicenza, Arezzo, Jesi and Dinazzano.

Area

Terminal: 253,355 sqm.

Warehouses/district park: 11,000 sqm.

Car park area: 6,524 sqm

Ro-ro storage area: 30,792 sqm.

Stacking area

Storage capacity full containers: 6,579 teus

Storage capacity empty containers: 3,077 teus

Reefer plugs: 24

Dangerous goods area: 305 containers

Equipment

7 ship-shore container gantries

4 yard gantries (rail -mounted)

54 front-end handlers 2-42 t.

9 reachstackers

20 tractors

59 20'/40' trailers and roll trailers

1 diesel-hydraulic locomotive

Quay

Length: 1,687 m.

Berths: 5/6

Depth: 10/12,5 m

Rail facilities

5 on-terminal railway lines, 440 m. each

Area

Terminal: 140,000 sqm.

Covered area 9,000 sqm.

Stacking area

Reefer plugs: 120

Temporary Dangerous goods area: 45 TEUs

Equipment

12 mobile cranes

2 Fantuzzi forklifts

10 forklifts from 2.5 to 10 tons

4 trailers 40 tons

8 MAFI tractors

4 cvs tractors

54 20' tractors

7 40' tractors

Quay

Length: 1,065m.

Berths: 5

Depth: 12/14m.

Rail facilities

- 1,800 m. tracks

Rebora

The Genoa Port Terminal is operated by the Spinelli family.

The completion of the vital strengthening work on the Ponte Etiopia piers, the repaving and extension of the operational area have enabled the terminal to boost the container throughput and also the number of calls.

In addition, as planned, dredging works which will take the depth alongside the quay from the current 12 to 14 m have started.

The extensive phased redevelopment works underway include the completion of the restructuring of the surface area, the extension of the new on-terminal rail links, the redevelopment of the reefer park and the area dedicated to hazardous cargo. Moreover they include the acquisition of an additional 8,000 sqm currently occupied by silos, the refurbishment of the head office and the upgrading of areas dedicated to a wide selection of logistic services.

The full range of cargo services offered at the Genoa Port Terminal, include stevedoring, warehousing, weighing, lashing, packing and repacking, stuffing and emptying of all types of containers, project cargo handling. GPT's portfolio of clients includes major shipping lines.

Grendi

Grendi has been offering sailings for its clients since 1828 and it is ranked as the longest-established freight-forwarding company in Italy.

Grendi shipping line provides a daily service between Genoa and Cagliari, deploying 3 ro ro vessels equipped to carry containers, trailers and heavy-weight cargo. The company operates via concessions two port terminals, 48,000 sqm in Genoa and 35,000 sqm in Cagliari.

In addition to the container services offered to the international shipping lines - dedicated to the fast feeder service between Cagliari and Genoa, and the forwarding of general mixed cargo through the network of Grendi warehouses in Milan, Bologna and Genoa - the company provides a door-to-door North Italy-Sardinia service with containers measuring 24.5 ft, in accordance with EU standards. The new warehouse is due to begin operations by the end of 2010, 10,000 sqm. on a 30,000-sqm site in the Canal Port of Cagliari.

Area

Terminal: 48,000 sqm.

Stacking area

Temporary dangerous goods area: 96 TEUs

Equipment

4 reach-stackers

2 forklifts

6 prime movers
30 jumbo flatcars
20 flatcars

Quay

Length: 500 m.
Depth: 9 m.

Terminal Rinfuse Italia S.P.A.

Terminal Rinfuse Italia, one of the leading companies in the dry bulk port business, operates four port terminals in Genoa, Savona – Vado, and Marghera-Venice, with a total throughput in excess of 7 million tons. The major commodities handled are coal, minerals, scrap, rock salt, fertilizers, kaolin, special sands, bauxite and white powders.

In Venezia and Vado, Terminal Rinfuse Italia also operates high-capacity grain silos, thereby establishing the company amongst the top bulk terminal management groups in the Mediterranean.

Since 1994 the management has invested substantially in the Genoa dry bulk terminal, improving and upgrading the facilities and equipment. The 2000 m of conveyor stacking and reclaimed system and on-dock loading system ensure that the cranes can be employed exclusively for the unloading of the cargo from the ship's hold.

Ponte Rubattino provides clients with a new covered 30,000 m³-facility along the quay which caters for the storage of specific bulk commodities which cannot be accommodated in the open storage areas. In agreement with the Port Authority, the company has installed along Calata Giaccone a new modern warehouse of 40,000 m³, split into separate areas, equipped for the unloading and storage of soya flour. This facility is connected direct to Ponte Rubattino with a 600 m-conveyor rail-loading system. The Ponte Idroscalo quay is also home to the steel coils facility which is equipped with specialized handling cranes. The site offers a range of back-up services.

Porto Petroli Di Genova S.P.A.

The Multedo Oil Terminal covers a total surface area of 124,000 sqm.

It offers four wharves and can accommodate simultaneously 10 ships up to 130,000 dwt. The off-shore facilities unloading platform sited 1.5 miles from the shore in 50 m of water (now damaged and out of work by a recent storm). It is connected to the landside facilities by a 120 cm diameter submerged pipeline, which allows tankers of up to 500,000 dwt to be unloaded. The mooring service provided by Genoa's Oil Terminal is quick and efficient, and guarantees no pollution, maximum safety for the vessel and the platform, and minimal repercussions from adverse weather and sea conditions. All the port offers the most up-to-date firefighting equipment in accordance with the strictest safety standards. Approximately 20 million tons of petroleum products are unloaded every year at the terminal. The pipelines furnish the major oil refineries in Northern Italy and Switzerland. The Genoa Oil Terminal ranks as a key element in the industrialization of the leading Italian economies.

Area

Terminal: 154,000 sqm
Storage capacity open space: 260,000 m³
Covered warehouse capacity: 70,000 m³

Equipment

8 cranes capacity 12/100 tons
3,000 m. fully automated and integrated conveyor stacking and reclaimed system for coal and minerals
3 front loaders
3 forklifts
2 bobcats
3 sweepers
1 mobile charger 2 m³

Quay

Length: 1,200 m.
Depth: 11,58 m.

Rail tracks

6 rail tracks.

Ormeggi Berths	Fondale Depth	Distanza Disco Manifold Distance Manifold Disk	Lunghezza Utile Ormeggio Length of Berth
CALATA ALFA-BETA	16'00" = Mt 04,88		
MOLO OVEST 1	16'00" = Mt 04,88		
MOLO OVEST 2	35'00" = Mt 10,00		
MOLO OVEST 3	35'06" = Mt 10,80		
ALFA LEVANTE	35'00" = Mt 10,36	bracci Mt . 92	Mt . 214
prodotti finiti (finished products)		Mt. 104	
prodotti chimici (chemical products)		Mt. 74	
ALFA PONENTE	35'06" = Mt 10,00	bracci Mt. 106	Mt. 242
prodotti finiti (finished products)		Mt. 118	
prodotti chimici (chemical products)		Mt. 88	
BETA			
Levante (East)	41'06" = Mt. 12,00	Mt. 111	Mt. 222
Ponente (West)	41'06" = Mt. 12,00	Mt. 121	Mt. 242
GAMMA			
Levante (East)	46'00" = Mt. 13,70	Mt. 138	Mt. 276
Ponente (West)	44'00" = Mt. 13,41	Mt. 128	Mt. 256
DELTA			
Levante (East)	46'00" = Mt. 14,02	Mt . 166	Mt. 325

Area

Terminal: 19,843 sqm

Equipment

84 tanks capacity 78,700 m³

4 oil pipelines

14 oil pipelines from warehouse to berths

12 loading stations with 77 pumps

1 nitrogen distribution plant

3 steam generators with a total capacity of 7,200,000 kcal

Quay

Length: 695m.

Depth: 10 m.

Berths: 4

Silomar S.P.A.

The Silomar Terminal is equipped with the handling and storage of vegetable oils and fats, mineral oils and bulk chemical products with a flash point superior to 65 degrees. Due to the highly specialized nature of this trade, the company's main clients are the national and international chemical producers who import raw materials or semi-processed chemicals through the terminal. Silomar was the first terminal in the Port of Genoa to have received ISO9001 and ISO14001 certification. Silomar has recently installed new steel tanks and boosted its storage capacity to today's 78,700 m³. In addition, is underway the construction of a second rail link.

SAAR Depositi Portuali S.p.A.L

The group is one of the leading companies in the Mediterranean regarding to discharging, storage and handling of liquid bulk. SAAR covers 75% of vegetable oil trade, and works with some of the largest and most important Italian and European operators in the liquid food bulk market.

The terminal operator has invested heavily in the facility to build on its strong performance.

The handling process is fully automated, including temperature control, pump operation and unloading. SAAR is equipped to offer a full logistics service to its national and international clients through links

with shipping agents, freight-forwarders, carriers and road-hauliers for a total of approximately 11,000 trucks and 1,500 railways trucks per year. The terminal gained an ISO 9001 certification for quality service management and also an ISO 14001 certification for environmental protection.

Area

Terminal: 32,399 sqm

Equipment

96 tanks capacity 107,000 m³

4 level arms for the simultaneous unloading of four different products through steel pipes

4 electronic scales for the simultaneous loading of tankers

Quay

Length: 695m.

Depth: 12.5/8.5 m.

Berths: 2

Rail tracks

1 rail track

Sampierdarena Olii S.R.L.

This coastal tank deposit, which covers an area of 11,000 sqm, is strategically located along Calata Mogadiscio in Sampierdarena, adjacent to the Customs offices and the S. Benigno and P. Etiopia port gates, and a few hundred meters from the motorway exit. The terminal is equipped to accommodate vessels with a flash point under 63°, in accordance with the Port Master safety regulations, and with a draft of up to 9.50 metres. Sampierdarena Olii offers the following services:

- Loading/unloading and reloading on tank trucks
- Logistic support for both transport by sea and by land on board tankers, tank cars and tank trucks
- Assistance to ships through ship agencies
- Quantity/quality controls of the cargo handled
- Quotations for transport by land, by sea, by tanks container and by rail car.





Area

Terminal: 11,000 sqm

Equipment

Tanks capacity 35,000 m3

Quay

Length: 680 m.

Depth: 9.5 m.

Berths: 4

Rail tracks

1 rail track.

Getoil s.R.L.

This coastal storage area located at Calata Giaccone covers a surface area of 4,200 sqm. It features 8 insulated and heated tanks for a total capacity of 10,000 m3 for the storage of petroleum products, and 4 pipelines which connect the landside facilities to the sea.

The terminal offers chemical laboratories, workshops, auxiliary heating plants, electronically-controlled mixer, loading onto tank trucks, weighing bridges, fire-fighting equipment and an internal rail terminal for the unloading of trains and license for fiscal and customs storage.

Getoil operates in the maritime bunker trade, import and marketing of fuel oil and bitumen.

Area

Terminal: 4,200 sqm

Equipment

8 tanks capacity 10,000 m3

4 oil pipelines

Petrolig S.R.L. – Eni S.P.A.

Ships refuel in the Ports of Genoa, Savona Vado and La Spezia. The quay is equipped with the simultaneous loading of 4 lighters or the simultaneous discharging of ships up to 180 the loading of 2 lighters.

SWOT Analysis results

The results of the SWOT Analysis derive mainly by a survey on logistics firms. In fact, the Genoa case is relevant especially for the role of its logistics cluster in the traffic flows and in the productive process of the chemical industry.

Opportunities and threats

Economic trends: The growth of the sector at a global level and the relevant increase of exports of Italian chemical production represent an interesting opportunity. For the operators in the Port of Genoa logistics cluster and also some other economic trends (Internationalization of markets, Regional economic development, Delocalization processes, etc.) represent a business opportunity. All these trends intensify the transport demand, especially with regions and countries efficiently reachable via maritime and intermodal transport.



Some economic trends such as the reduction of the concentration of traffic flows are very relevant and can have opposite effects on the supply chain of the operators, also in relation with: the degree of concentration of the market, the sourcing strategy (many versus one), the JIT strategies and the outsourcing policy. In fact, all these trends and elements, alone or combined, can have important reflects, for example on the logistics operator and the port chosen by the chemical firm or on the convenience of using the maritime mode of transport.

The recent macroeconomic crisis, the difficult recovery from the crisis and the turbulent international context (especially in the Mediterranean area) can represent a threat for the development of this kind of traffics.

Socio-cultural trends: The Genoa logistics operators pointed out that the environmental sensitivity is the more relevant trend in the chemical business. The environmental sensitivity is assuming a growing importance and has an important role in the chemical industry with opposite effects on the logistics chain:

- The public opinion (and consequently some public entities) can be against the chemicals traffics menacing the development of the logistics dedicated to this niche of products.
- A stronger environmental care and awareness make the traffics safer and represent an interesting business opportunity for qualified operators offering valued added services along the supply chain. The operators stressed that the chemical firms, mainly for environmental reasons, are interested in having



tracked and traced their supply chain; the logistics operators guaranteeing a certified and monitored supply chain to their customers have an important profit opportunity.

Technological trends: The technological trends (in particular Information & Communication Technology and the Innovation in transports) are obviously considered as an opportunity of business development for the logistics operators. For example, in the perspective of an accurate control and monitoring of the supply chain, as described above. With particular reference to the ICTs, the Genoa operators stressed that these can be used to improve the integration and simplification of the authorization process and also the communication between the various private and public entities involved in the transport of chemical goods (especially the dangerous ones). Furthermore, these technologies could be used to improve the monitoring of the supply chain especially from the public side (for safety and security reasons); the public and private infrastructures managers (Port Authorities, Harbor Master, RFI, Motorways concessionaire, ANAS, Inland terminals, etc.) are in fact interested in having a comprehensive visibility of this kind of traffic flows.

Environment and Energy: the New EU legislation regarding chemicals (REACH, CLP) represents an opportunity since it facilitates and has a catalyst action on the mobility of these cargoes, supporting the growth of demand and creating a clearer competitive frame.

Politics and Innovations: The same observations are valid for the International harmonization of traffic regulations and Traffic infrastructures development.

On the other hand, the operators stressed the menace deriving from the slow and complex process of realization of transport infrastructures in Italy. In this perspective, an example are the continuous postponements of the new Genoa-Milan railway (part of the TEN-T Axis 24); the ports of Northern Range and their logistics clusters could be advantaged by this situation.

Another important element concerning the politics is the Land use policy, especially in the Genoa context where spaces are scarce and the cost of port areas is high; this is a critical point since, depending on the policy makers point of view, the policy can be pro or against the development of this kind of traffics in particular or of port activities in general. Also in this matter, the competitive pressure applied by the Northern Range ports is high.

Transport Infrastructures: the Genoa Port is connected to the hinterland by a complex and articulated net of infrastructures. Some points of this net suffer from a situation of congestion, in particular during specific periods of the day and/or of the year. Specifically, some parts of the rail network and the motorways system, mainly because of the obsolescence of the infrastructure, have reached or overtaken the saturation point. Potential delays in the planned infrastructural works (i.e. Nodo Ferroviario di Genova, Gronda e nodo autostradale, Terzo Valico Ferroviario) represent a relevant threat in the development of the traffics.

Making reference to the different modes of transport:

Rail transport presents a series of constraints:

Infrastructure level: as stressed above there are some bottlenecks in the Ligurian rail network. Furthermore, part of the port rail net presents an obsolete layout even if the Port Authority has started a plan to revamp and improve the port rail net and, consequently, to foster rail transport.

Bureaucratic constraints: the rail transport is less flexible also for bureaucracy (i.e. for the authorizations to operate rail services or for the request of the slots). In addition, the communication and documental exchange between the subjects involved in rail transport isn't smooth and could be improved.

Allowed times of transit and stop hours.

Interoperability problems.

Cargo rail transport in Italy is experiencing a period of crisis and the internal market presents a low level of market freedom due to the dominant position of Trenitalia Cargo; furthermore, in Genoa there are some critical points concerning the shunting operations in the port. These elements contribute to menace the Genoa competitiveness with respect to other ports, in particular with the Northern range hubs.

On the other hand, the rail transport is safer and more sustainable than the road transport.

Even road transport is more flexible it presents a series of threats:

- Accident's frequency and also limited preparation of the drivers in case of accidents.
- Sector legislation, in particular the application of the legislation. A better and deeper control is required. This is because of the unfair competition of road transport due to the missed application of the legal framework that obstacles the utilization and the development of rail transport.
- Lack of environmental and safety awareness and education of road operators.

Sea waterways:

- The position of the port of Genoa represents an opportunity since the port is easily reachable by the main Italian productive areas located in Northern Italy. Genoa position could also be strategic to serve the chemical industry in Switzerland (especially the area near Basel).
- Harbors' capacity and efficiency: in terms of ports capacity the port of Genoa can accommodate additional traffics for all the cargo (liquid bulk, dry bulk, containerized, conventional). This element represents a business opportunity for chemical traffic flows. With particular reference to dangerous chemical containers, a few terminals experience a saturation of the dedicated areas during particular periods of the year and for particular IMO classes.

The performances (operational and in terms of prices) of the Genoa terminals are comparable with the ones of the major Italian and European ports.

The operators stressed also that a deeper education of port operators (terminals, agents, forwarders, etc.) in the field of chemicals transport could be a useful opportunity to develop the business.

- Non homogenous application of sector legislation among Italian ports can constitute a threat because it modifies unnaturally the level playing field and the competitive context among the Italian ports.





Intermodal transport:

Legislation: concerning intermodal transport the Genoa operators stressed the opportunities deriving by the application of a uniform international legislation, in particular the IMDG legal framework and the MULTIMODAL DANGEROUS GOODS FORM.

Safety and security: The International standards have been adopted. Emergency management structures, transnational cooperation represent an opportunity since they create a clear and effective competitive frame and foster the sustainability of traffics developments. Especially, the tracking and tracing facilities for cargo units was appointed by the Genoa operators as an opportunity, since the capability of offering a tracked supply chain represents a competitive advantage and a business opportunity.

Industry sector and competition: as stressed in the point concerning the economic trends some issues related to the industry sector and the competition (such as the degree of concentration and the geographical distribution both on the suppliers and on the customer's side) can contribute to determine the logistics operator, the mode of transport, the sourcing strategy and the port chosen. But there is not a single and logic cause-effect chain among these issues (i.e. high degree of concentration → outsourcing strategy → employ of big logistics players → use of maritime transport → access via Northern range ports). Consequently the degree of concentration and the geographical distribution are relevant issues in the logistics chain but can be a threat or an opportunity depending on the choices of the operators involved.

Sometimes the chemical firms (and/or shippers) of small-medium size are less careful in the group of containers/swap bodies/trailers; this can represent a risk since wrong storage and/or the admixture of chemical goods could be very dangerous.

As described above, the International harmonization of legislation for products acceptance and the tracking and tracing of the cargo represent an opportunity. The first one because it creates a clearer competitive environment and the second one because it increases the security and environmental sustainability of the chemical business (see above, in socio-cultural trends) fostering the traffics and creating the condition of offering value added logistics services.

Strengths

Among the main points of strength in the Genoa logistics clusters:

- cluster operators, continuous training on health and safety). The operators stressed that these aspects can be improved.

- the ones related to safety/security (Internal safety procedures, management of dangerous goods, co-operation with national/regional Authorities, participation in responsible care). In particular, a better and smoother cooperation and communication among national/regional Authorities (Port Authority, Maritime Authority, Customs, etc.) can be achieved. Furthermore concerning the management of dangerous good it could be interesting and useful to monitor the flows incoming/outcoming the port, especially on the motorways net (see above).

- the Retroporto strategy. The port of Genoa can trust on a net of inland terminals that can accommodate the traffic flows with O/D the port in the perspective of offering a buffer area and a mix of services complementary to the port of Genoa. In particular, the Retroporto of Rivalta Scrivia represents the most

important infrastructure in the model described above. With reference to Rivalta a particular administrative and operative scheme has been designed by the private and public in order to facilitate the traffics development and to offer additional spaces and services to the operators and clients of the port. Since November 2008, a new freight import cycle has started directly from the Genoa port quays, in particular from Voltri Terminal Europa. The new procedure proposed by VTE gives the possibility to place containers, according to their unloading order, in separate cargo bays, one for each final destination. The functioning of this area makes possible that shuttle trains are formed and sent to Rivalta, where the re-composition to the final destination and the shipment, by truck or rail, is made and where larger spaces are available and it is easier to manage the forwarding priorities.

Moreover, all the Customs clearance operations are carried out in Rivalta area, as relevant Customs procedure simplifications have been introduced. More specifically, the new Customs procedure is applied to containers arriving by sea with a Single Transport Contract, with the indication of “Genova Rivalta Scrivia” as port of discharge and “Rivalta Custom Section” (the Rivalta Custom Section is under the control of Genoa Customs Headquarter). The containers are disembarked at VTE in Genoa Port and then transferred through the shuttle train from Voltri territorial Customs to Rivalta Scrivia one, where they are put into temporary custody warehouses. According to the Customs status of the Rivalta terminal is directly involved in Customs pre clearing procedures at the moment experienced in all the Genoa Port facilities.

An important extension of Rivalta, aimed at creating a new intermodal terminal, is ongoing.

Another inland terminal included in the Retroporto strategy of the port of Genoa is the one planned in Alessandria. The Genoa Port Authority participates in a company having the aim of launching a tender for the construction and management of an inland terminal in Alessandria. The new terminal will occupy an area of almost 250,000 sqm. and will have a handling capacity of 500,000 TEUs per year.

Weaknesses

The most important points of weaknesses are related to the physical constraints of the port of Genoa and to the characteristics of ports, such as :

Inventory level

Inventory cost

Constraints in spaces outside and inside the port for dangerous cargo

High opportunity cost of port spaces

As already pointed out in the opportunities/threats parts, there are some critical points (the close co-existence of the port and the city, land use policies, terminals capacities, external areas dedicated to hazardous cargo, etc.) concerning the issues of spaces dedicated to these traffics (especially the dangerous ones).

Lack of a robust chemical industrial milieu in the port area and in its surroundings. Relevant competitor ports can trust on important industrial districts in the port neighborhood, especially in the chemical sector (i.e. Rotterdam). Most of the heavy and chemical industries in Genoa context have been relocated in the last 30 years. This can represent a point of weakness for the port of Genoa.

The issues related to the space constraints and the land use policy, already described in the previous

parts, contribute to determine this situation and to obstacle the development of particular traffics of chemicals.

The saturation/congestion of some points of the rail and road infrastructural nets connecting Genoa to the hinterland, especially in particular periods of the day and/or of the year.

Other relevant points:

Port Labor system: the port of Genoa has a long tradition in the presence of an important pool of Dockers. The pool supplies the temporary workforce to the various port terminals to carry out port operations, especially during the peaks of workload. Almost every Genoa terminal utilizes the pool which consists of nearly 1,000 workers. The professionalized personnel of the pool guarantees good performances to the terminals and the recent legal framework adopted in the Genoa port to regulate the temporary workforce assures a stable social environment in the port (for instance, some competitors port like Marseilles are deeply affected by social conflicts with the Dockers). On the other hand the high number of the members of the Dockers pool and its key role in the port cycle determine a high bargaining power of the pool.

Green production processes (in the case of the port is more an opportunity): as other measures that foster the sustainability and diminish the risks of the logistic cycle the green production processes are very relevant since the public opinion becomes more favorable to the development of chemicals traffics, creating business opportunities for the port logistics cluster.

Mode of transport (in the case of the port is more an opportunity or a threat). As it has been pointed out in other point of the SWOT Analysis the choices done by the chemical firms and/or by the logistics operators concerning the supply chain can determine the fortune/misfortune of a port and, obviously, the modal choice is one of the most relevant for a port.





Strengths, Weaknesses, Opportunities and Threats of Chemical Logistics in the broader area of Thessaloniki



Thessaloniki Chamber Of Commerce And Industry (TCCI)

in co-operation with



Transeuropean Consultants For Transport, Development
and Information Technology S.A. (Tredit S.A.)



1.Introduction to Region/Country

North Greece is mountainous in its larger part, presenting however many large and fertile plains, lying by its rivers and separated from the long mountain ranges. The subsoil is rich in minerals with ferrous chromate, ferro-nickel-chrom, asbestos and copper, with chromite and magnesite being abundant.

The approximately 2,8 million of inhabitants in Northern Greece represent the 25% of the total population of Greece distributed as follows : 1,9 million in Central Macedonia, 0.6 million in Eastern Macedonia and Thrace and 0.3 million in Western Macedonia.

Food, animals, industrial -raw material, chemical products and similar items, minerals, fuels and lubricants-, liquors, tobacco, olive oil are generally exported from N. Greece.

The Region of Central Macedonia has the second highest contribution in the GDP of Greece, corresponding to 17.5% with approx. 12% of it stemming from the prefecture of Thessaloniki. It also covers 23.9% of national exportation representing 3.4 billion Euros of the overall Greek export activity. Eastern Macedonia Region contributes to the national export product by 4.2%.

(million Euro)

Year	Greece	Central Macedonia	Prefecture of Thessaloniki
1999	134.131	23.415	15.374
2000	140.136	24.469	16.251
2001	146.098	25.511	17.022
2002	151.601	26.581	17.790
2003	158.669	27.776	18.590
2004	165.280	28.865	19.318
% entire Greece (2000-2004)	100%	17,5%	11,7%
% of Central Macedonia region		100%	66,8%

Source: Hellenic Statistical Authority

The gross value added at market prices per activity field is shown in the table below:

Greece

Year	Primary Production	Industry Energy	Construction	Services
2000	6,6%	13,9%	7,0%	72%
2001	6,4%	13,2%	8,2%	72%
2002	5,9%	13,3%	6,2%	75%
2003	5,5%	12,5%	6,5%	75%
2004	4,9%	12,8%	6,6%	76%
2005	4,9%	13,5%	6,0%	76%
2006	3,9%	13,3%	6,7%	76%
2007	3,8%	13,6%	6,0%	77%

Central Macedonia Region

Year	Primary Production	Industry Energy	Construction	Services
2000	8,9%	16,8%	9,3%	65%
2001	8,9%	15,8%	9,9%	65%
2002	8,3%	15,1%	8,1%	69%
2003	7,4%	14,7%	8,2%	70%
2004	7,1%	14,9%	9,1%	69%
2005	7,2%	15,2%	9,4%	68%
2006	5,4%	14,8%	10,5%	69%
2007	5,7%	16,0%	6,2%	72%

The geographic position of N. Greece is very significant as it borders with Bulgaria, FYROM and Albania; it represents a gate between the European Union and the Balkan countries and also a passage among West and East, North and South.

The development of manufacturing is centralized to the big urban centers. Regarding the Greek manufacturing enterprises, two directions are intensively observed simultaneously: Large manufacturing companies with their production distributed in the Greek, European or international market and small companies characterized mainly by their local range of activities.

Northern Greece has:

- 2 Universities with totally 5 chemistry related departments located in Thessaloniki and Xanthi and
- 2 Technological Educational Institutes with totally 4 chemistry related departments located in Thessaloniki and Kavala,
- 1 National Center for Research and Technology with 4 chemical institutes and 1 institute of Transport,

- 1 National Agricultural Research Foundation with 2 relative institutes both located in Thessaloniki,
- 2 Regional Offices of the Geological and Mineral Research Institute (Thessaloniki and Xanthi),
- Several Entrepreneurship support Institutions (e.g. Business and technological development center, Investor's reception center, Development agencies),
- Chambers of Commerce and Industry, in each Prefecture
- Associations located in Thessaloniki (e.g. Hellenic association of chemical industries, Federation of Industries of Northern Greece, Greek International Business Association) and
- Several Business Organizations located in several towns of the region
- Innovation and technology transfer institutions in Thessaloniki (e.g. 1 Technological and Scientific park 1 incubator and 1 park of high technology enterprises)

The strategic location of Thessaloniki's port between East and West, gives a dynamic character to the wider region rendering it to a natural gate to the Balkans and a nodal point for the transit trade of the hinterland.

Thessaloniki is the metropolis, a business and trade center and the second largest city in Greece where about 60% of the 2 million inhabitants of the Central Macedonia Region live there. Moreover, it owes its strategic significance to its geographical location regarding Southeast Europe. Thus, the Region of Central Macedonia is the second most populated region in Greece, following Attica, and the city of Thessaloniki is the largest urban centre in northern Greece.

11% of the turnover of the manufacturing sector, 7.2% of the construction, 11% of the wholesale and retail trade and 13% of the country's industrial enterprises' investments correspond to Thessaloniki.



2. Description of the Chemical Industry in Greece

The Greek chemical industry is relatively small compared to other EU member states and mainly consists of downstream users of chemicals rather than chemicals' manufacturers. The vast majority of Greek chemical companies are SMEs.

The chemical industry of Greece accounts for 7.74% of the country's industrial production and the overall turnover of the sector is EUR 2.5 billion. The chemical industry accounts for 15% of the total exports of Greece. Hellenic Petroleum S.A. (HELPE) is the largest industrial company of the sector, with a turnover of approximately EUR 1.2 billion.

The chemical industry is very demanding in terms of its research and production phase. The majority of raw materials are imported from abroad.

The chemical industry in Northern Greece is concentrated around the big urban centers, with the city of Thessaloniki being the most dominant. In regards to raw materials, the chemical industry of northern Greece can be divided into several categories:

Fertilizer industry: Nitrogen, Phosphorous, potassium, calcium, magnesium, sulphur from macro-nutrients (that represent more than 0,1% of dry plant tissue) and boron, copper, iron, manganese, molybdenum, zinc from the micro- nutrients (sometimes called trace elements, that are present in much smaller amounts) are normally available from the soil. The fertilizer industry is primarily concentrated to the production of fertilizers aimed at supplying nitrogen, phosphorus and potassium in a suitable form for application to agricultural lands.

Organic chemicals: dealing with the production of a great variety of products that includes many kinds of plastics, paints, substrates, polymers, synthetic fibers, varnishes, constructional items, drugs, surface coatings, solvents, detergents, insecticides, herbicides, explosives and countless specialty chemicals based on the chemistry of carbon.

Plastics: dealing with the production of synthetic or semi-synthetic organic solids used in the manufacture of industrial products. Plastics are typically polymers of high molecular mass. They can be cast, pressed, and extruded into a variety of shapes such as films, fibers, plates, tubes, bottles, boxes and much more.

Food chemicals: referring to food additives to act as colorants, preservatives, antioxidants, flavor enhancing, nutrients, sweeteners.

Oil refineries: dealing with the conversion of crude oil into high-octane motor fuel (gasoline/petrol), diesel oil, liquefied petroleum gases (LPG), jet aircraft fuel, kerosene, heating fuel oils, lubricating oils, asphalt and petroleum coke.

There are several other chemical companies in Northern Greece dealing with the production of detergents, pharmaceuticals, foodstuffs, rubbers and others.

International trade

Imports of chemicals in capital (Mio eur)

Description	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
Organic chemicals	496,4	549,2	524,0	616,2	679,8	721,7	842,3	860,7	862,6	814,4	739,5
Inorganic chemicals	122,4	135,5	149,1	122,2	111,5	126,0	118,5	137,8	165,2	123,1	127,6
Dyeing, tanning, coloring materials	263,3	277,3	285,9	301,9	287,9	314,9	320,0	339,7	314,0	251,1	246,9
Pharmaceutical, medical products	1334,8	1491,4	1778,0	2047,0	2239,2	2820,0	2948,5	3340,6	3662,3	3946,0	3561,5
Essential oils, resinoides, flavors, embellishments, polishers, cleansing preparations	580,9	601,8	649,8	723,1	722,9	748,1	786,2	851,5	945,3	862,6	770,3
Industrial fertilizers	117,1	124,4	103,5	107,6	145,7	138,6	151,8	150,7	378,4	132,6	181,8
Primary plastics	587,7	593,8	565,6	592,3	609,9	714,7	799,8	928,1	921,6	632,9	737,9
Non primary plastics	228,6	233,4	255,9	267,1	288,2	310,1	343,3	399,7	396,0	305,9	293,3
Chemicals and non specified products	484,1	541,5	474,9	563,2	587,3	640,0	616,2	689,1	706,2	640,0	618,6
TOTAL	4215,3	4548,3	4786,9	5340,6	5672,4	6534,1	6926,6	7697,9	8351,6	7708,6	7277,4

The above table shows a tendency of increase in the volumes of imported chemicals over the years 2000-2008 followed by a decrease in 2009 and even to a greater extent in 2010.

Imports of chemicals in quantities (Thousands tons)

Description	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
Organic chemicals	364,3	453,1	473,0	616,5	615,9	556,3	611,3	638,2	551,9	488,2	486,5
Inorganic chemicals	420,3	492,8	484,4	403,4	367,9	397,4	341,2	338,1	385,8	382,7	484,5
Dyeing, tanning, coloring materials	118,4	119,5	125,9	137,6	141,2	134,9	147,4	170,0	125,7	95,8	90,9
Pharmaceutical, medical products	23,7	20,1	23,6	26,6	81,4	28,5	64,2	36,3	45,8	45,0	40,8
Essential oils, resinoides, flavours, embellishments, polishers, cleansing prep	228,4	217,9	192,5	286,8	316,7	280,3	288,2	305,4	331,7	291,0	287,2
Industrial fertilizers	787,0	777,4	635,1	681,7	833,1	701,2	734,3	622,2	778,1	490,0	677,3
Primary plastics	554,4	608,9	588,7	613,7	673,1	612,5	625,8	748,0	701,4	616,1	587,1
Non primary plastics	75,9	117,1	87,8	129,1	120,1	115,8	185,2	147,5	182,1	114,7	113,9
Chemicals and non specified products	223,0	229,2	220,6	239,1	281,9	244,8	274,4	362,7	288,4	267,6	250,5
TOTAL	2795,4	3036	2831,6	3134,5	3431,3	3071,7	3272	3368,4	3390,9	2791,1	3018,7

As shown, the values of quantities show a variation with the highest point being in the year 2004, whereas the lowest value is observed in 2009. 2010 shows an increase reaching the level of 2001.

Exports of chemicals in capital (mio eur)

Description	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
Organic chemicals	49,9	32,7	42,5	46,8	31,8	37,0	39,4	42,3	40,2	34,2	34,1
Inorganic chemicals	18,0	11,5	13,3	13,8	13,9	18,5	15,2	18,4	17,4	22,7	39,3
Dyeing, tanning, coloring materials	57,1	59,5	62,6	102,0	113,6	134,2	138,2	131,4	109,8	102,2	116,5
Pharmaceutical, medical products	283,5	417,5	550,2	608,7	690,1	1046,5	906,5	947,8	868,5	927,0	1011,4
Essential oils, resinoidesz, flavours, embellishments, polishers, cleansing preparations	182,2	188,8	210,3	226,3	216,7	251,1	337,5	380,9	368,3	323,6	308,2
Industrial fertilizers	55,8	39,0	40,6	48,0	47,5	53,8	42,6	49,2	88,9	35,6	55,7
Primary plastics	96,1	110,3	150,7	204,6	233,1	264,6	323,6	371,2	384,9	298,8	404,8
Non primary plastics	155,1	174,0	191,9	184,4	190,2	235,4	252,7	296,5	275,5	233,0	258,9
Chemicals and non specified products	106,9	107,4	95,4	104,9	111,0	124,6	123,6	136,9	159,3	116,0	134,9
TOTAL	1004,6	1140,7	1357,5	1539,5	1647,9	2165,7	2179,3	2374,6	2312,8	2093,1	2363,8

As shown in the table above, there is generally a constant increase of the corresponding value of the exported chemical related materials mainly between the years 2000-2007 and besides the exception of years 2008 and 2009 where a slight decrease was observed, in 2010 the total value has reached this of 2007.

Exports of chemicals in quantities (thousands tons)

Description	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
Organic chemicals	87,2	39,0	51,1	46,4	43,6	35,0	40,1	54,9	38,6	70,5	37,2
Inorganic chemicals	120,6	61,8	71,9	92,4	310,6	103,4	81,2	94,8	5,9	125,7	363,1
Dyeing, tanning, coloring materials	32,7	39,4	43,2	58,6	69,2	80,0	84,3	74,6	66,8	61,7	65,8
Pharmaceutical, medical products	5,1	7,6	10,9	14,2	18,5	22,8	116,9	17,2	18,6	22,8	26,1
Essential oils, resinoides, flavors, embellishments, polishers, cleansing prep	85,6	85,2	96,8	97,5	106,4	119,8	151,5	231,4	160,3	147,5	161,4
Industrial fertilizers	357,7	255,3	273,1	412,9	359,8	340,7	224,9	244,2	214,1	140,5	215,1
Primary plastics	102,0	120,7	186,1	266,8	265,2	269,1	295,6	321,0	337,6	365,7	387,5
Non primary plastics	77,2	88,6	98,7	105,9	117,5	115,4	114,1	131,4	109,3	99,8	105,9
Chemicals and non specified products	870,6	918,0	705,5	848,6	818,1	948,9	1047,7	1216,0	1282,8	825,0	1050,8
TOTAL	5738,7	5617,6	5541,3	5949,3	6116,9	6045,1	6168,3	6399,5	6250	5877,2	6432,9

As it may easily be seen, the sequence of the quantities does not demonstrate the same flow with the corresponding values of capital over the years. It might be assumed though, that quantities have shown a small variation over the years with an increasing trend.



Geographic brake down of chemicals' import (Capital %)

Description	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
E.U 24 (1)	83,3	82,2	81,8	82,2	81,3	83,1	83,1	81,7	79,8	80,8	78,0
Rest of Europe	6,4	6,6	7,4	7,4	8,1	7,2	6,7	7,4	9,3	8,7	9,9
Balkans(2)	1,9	2,2	1,7	1,5	1,6	1,8	2,1	1,9	2,2	1,8	2,9
Middle East (3)	1,6	1,5	2,7	2,8	3,1	2,1	2,5	2,4	3,5	2,0	3,4
Africa	0,8	0,9	0,3	0,5	0,6	0,6	0,9	0,9	0,2	0,6	0,1
Other countries	1,2	1,5	1,4	2,0	1,3	1,7	1,3	2,0	1,7	1,6	1,4
NAFTA (4)	4,1	4,5	3,8	2,7	3,0	2,2	2,2	2,1	1,6	2,9	2,4
India Sri Lanka	0,2	0,3	0,4	0,4	0,5	0,5	0,5	0,6	0,7	0,6	0,7
China Hong Kong	0,4	0,4	0,6	0,6	0,6	0,7	0,7	0,9	1,0	1,0	1,0

Regarding the above table, Europe seems to have a relatively constant % participation in the import grand total of Greece which slightly decreasing during 2008 and 2009, following the international financial crisis.

Geographic brake down of chemicals' export (capital %)

Description	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
E.U 24 (1)	53,7	62,4	65,8	67,8	67,3	72,6	67,6	69,6	66,8	63,6	72,9
Rest of Europe	10,5	5,4	5,1	4,7	4,4	4,0	4,3	4,6	3,6	4,0	2,5
Balkans (2)	16,5	15,2	15,0	15,5	16,6	10,1	18,7	16,5	19,7	22,3	15,5
Middle East (3)	8,1	7,2	5,6	4,5	4,3	4,6	4,9	3,4	3,9	4,2	3,9
Africa	2,8	3,3	2,9	2,6	2,7	4,5	1,7	2,6	2,7	2,2	1,8
Other countries	3,4	2,7	2,0	2,0	2,2	1,9	1,3	1,3	1,4	1,4	1,3
NAFTA (4)	3,4	2,5	2,6	2,4	2,1	1,9	1,5	1,6	1,6	1,5	1,5
India Sri Lanka	0,01	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,3	0,1
China Hong Kong	1,7	1,2	1,0	0,5	0,3	0,3	0,2	0,3	0,3	0,5	0,6

Generally, European Union is the major exports' target for Greece followed by the Balkan countries, which specifically during 2008 and 2009 showed increased participation mostly due to the European Union.

Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Rumania, Slovakia, Spain, Sweden, United Kingdom

Bulgaria, Albania, Serbia, Montenegro, Slovenia, Turkey, Moldavia, Bosnia, Herzegovina, Kosovo, FY-ROM, Croatia

Egypt, Iran, Sudan, Algeria, Morocco, Iraq, S. Arabia, Yemen, Syria, Israel, Jordan, United Arab Emirates, Lebanon, Palestine, Kuwait, Oman, Qatar, Bahrain

U.S.A, Canada, Mexico



3. Description of Transport Infrastructure

3.1. Introduction

In this section it will be provided an overview of the existing transport infrastructure of the city of Thessaloniki and the wider region. It describes the current situation in regards to the road and network, ports/ maritime transport, air transport, as well as logistics/ intermodal freight centers.

3.2. Road network

The strategic road network of Thessaloniki consists of the inner ring road, the outer ring road (which is at the planning stage), the connecting parts between the ring roads, the sections of the main national road axes (PATHE and Egnatia Odos), the motorway network connecting Thessaloniki with the urban centers of Central Macedonia and the neighboring regions and the remaining road network. The road network of the region of Central Macedonia accounts for 4415 km, which is the third highest in the country while it is actually the first region in terms of total length of motorways which sum up to 246 km.



Figure 1: The Road network of the Region of Central Macedonia

(source: SIMCODE IGT project)

Egnatia Motorway, which has a total length of 670 km, expands from the east to the west of the country (figure 2), runs through the region of Central Macedonia and has a vertical axis connecting to Bulgaria.

Furthermore, Egnatia Motorway also plays the role of a collective road transport axis for the Balkans and South East Europe since it is the most southern nodal point of the Trans-European Transport corridors IV (Berlin - Sofia - Thessaloniki), IX (Helsinki ending at Alexandroupolis), X (Vienna - Belgrade - Thessaloniki). In general, Egnatia Motorway is connected by means of 9 Vertical Axes as parts of the TEN-T Corridors, thus providing connections between Greece, the Balkans and Europe. These vertical axes connect Egnatia Motorway to the borders with Albania (towards Tirana), to western Bulgaria (towards Sofia), to eastern Bulgaria (towards Burgas) and to FYROM (towards Skopje).



Figure 2: The Egnatia Motorway

(source: <http://www.egnatia.eu/>)

The TEN PATHE Motorway provides the connection of the region and northern Greece in general, to Athens and the southern part of the country. The PATHE Motorway is the ending point of the Pan-European Corridor X that connects Greece with FYROM. The crossing point between the PATHE and Egnatia Motorways is located in the region of Thessaloniki. Figure 3 displays the interconnection of the PATHE and Egnatia Motorways with the TEN-T network. Works are still being carried out in order to complete the Egnatia Vertical Axes as well as the upgrading of the PATHE network in order to overcome specific bottlenecks.



Figure 3: Overview of interconnections of the PATHE and Egnatia Motorways with the TEN-T network

(source: <http://www.egnatia.eu/>)

3.3. Ports

The port of Thessaloniki, which is located at the west side of the city, is the second largest port in Greece in terms of freight throughput and the most important international port in northern Greece. It is classified as a category A port in accordance to EU standards and has also been classified as a Port of National Importance in the National Port Policy Framework which was published in 2006.

Apart from serving the freight demand of the city, and of the neighboring regions, the port is also a key gateway for transit freight flows to/from Balkan countries to the north (mainly FYROM, south Serbia and southwest Bulgaria) and has the potential to play the role of a transport hub for destinations in the Black Sea. It has a hinterland of approximately 600km radius that expands up to Belgrade and Sofia through rail and road corridors.

The port has a total of 26 berths with an overall length of 6,200 meters. The draught of the berths varies from 8.00 to 12.00 meters. The berths are dedicated to handle specific traffic.



Figure 4: Layout of the port of Thessaloniki

(source: Deliverable 1, East Med MoS project)

The port of Thessaloniki is equipped with modern mechanical equipment for handling all kinds of cargo, general, bulk and containers. Within the area of the port there are 600,000 sqm of indoor and open storage areas. The Container and the Conventional Cargo Terminal are the two freight terminals within the area of the port, of 254,000 and 1,000,000 sqm total surfaces respectively. At the same time there is a Passenger Terminal with modern infrastructure to meet with the port's constantly increasing passenger traffic.

The port of Thessaloniki is directly connected to the national road network infrastructure (PATHE and Egnatia Motorways); it is also connected to the Trans-European Corridor X (Salzburg- Ljubljana- Zagreb- Beograd- Nis- Skopje- Veles- Thessaloniki). Furthermore, the nearest airport and train station are situated 16 km and 1 km respectively away from the port which is linked by rail.

The port of Thessaloniki has planned a series of infrastructure works and equipment modernization in order to upgrade its services. Some of the most important plans or undergoing works involve the construction of the extension of the 6th pier, the dredging in front of the quays, the development of a Logistics centre etc.

In the region of Central Macedonia there are also two other ports (N. Moudania and Stavros) which has only a local importance. The second most important port of the wider area is the port of Kavala, which serves primarily the region of Eastern Macedonia and can act complementarily to the port of Thessaloniki. Although it is not connected to the railway network it has direct access to the Egnatia Motorway and is located at a more advantageous position than Thessaloniki concerning freight movements to southern Bulgaria.

In accordance to TEN-T classified as category A ports are seaports of international importance with terminals that handle a total annual volume of cargo of at least 1,5 mil. tones or 200,000 passengers and are connected with the TEN-T land transport network.

Within the passenger port of Kavala there are a total of 8 berths with an overall length of 1,498 meters, while the draught of the berths varies from 4 to 10 meters. At the same time, the commercial port of Kavala has 1 quay with an overall length of 400 meters and 11.5 meters draught. Kavala's Port terminal is equipped with relatively adequate infrastructure for the handling operations in regards to bulk, Ro-Ro and container traffic.

In the recently concluded TEN-T funded study entitled "Elaboration of a Master Plan for the development of Motorways of the Seas for the Eastern Mediterranean region", the ports of Thessaloniki and Kavala were included in the same geographically defined cluster of ports. A potential MoS connection for container transportation linking this port cluster to the island state of Cyprus was identified on the basis of traffic flow forecasts with time horizon being the year 2015, which can be seen as a purple line depicted on the figure 5.

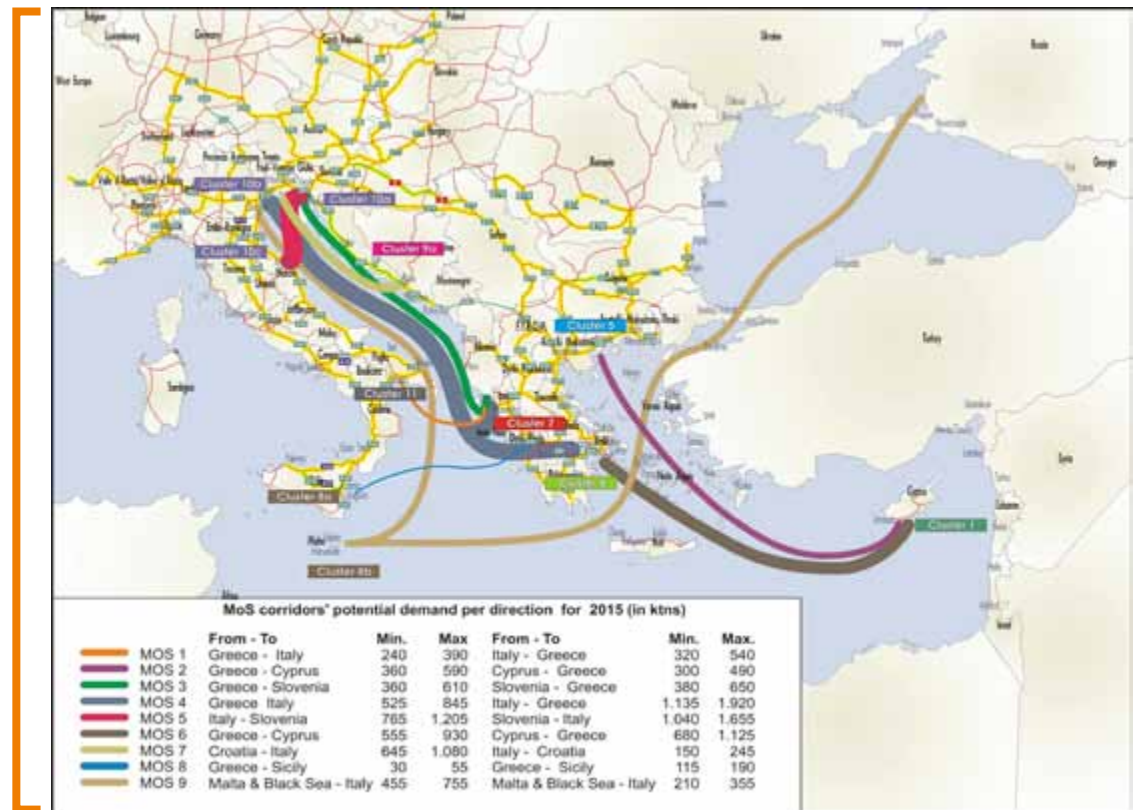


Figure 5: MoS corridors' potential demand per direction for 2015 (in ktns)

(source: Deliverable 5, East Med MoS project)

Figure 6: The Greek railway network

(source: <http://www.bueker.net/trainspotting>)



3.4. Rail network

Thessaloniki is the most important nodal point of the national railway network running through northern Greece. The region's rail network runs from east to west connecting the region of Eastern Macedonia and Thrace with Western Macedonia; with Bulgaria and FYROM (Pan European Rail Corridor X) in the north; and with central Greece, Athens and Peloponnese in the south, with the wider area of Thessaloniki being a main node in this network. The Greek railway system is presented in figure 6.

There are 530.3 km of rail lines in the region with 114 km being double. Although the average density of railway lines for the region is high compared to the country average, this average is very low when compared to European standards, thus displaying low availability of railway infrastructure in general.

The main railway corridor is the one connecting Thessaloniki to Athens and international rail movements of the region are served via its northern border crossing to Bulgaria and FYROM and Turkey in the east.

In the wider area of Thessaloniki there are two main railway freight centers. The Merchandise Station, located in the area of the old railway station (very near to the centre of Thessaloniki and only a few meters away from the port of Thessaloniki). Also the marshalling yard for the distribution and arrangement of wagons which is connected to two orbital terminals at the areas of Sindos and Anghialos which serve the industrial zone. There is a single line connecting the Merchandise Station to the port of Thessaloniki though it is foreseen that the railway connection with the port will be significantly enhanced following the expected developed of a freight centre at its 6th pier.

3.5. Airports

There is one international airport in the region of Central Macedonia, the "Macedonia" airport which is located approximately 16,2 km east from the city centre of Thessaloniki. The location of the airport in relation to the city's industrial/ commercial centers and transport nodal points is illustrated in figure 7. The airport is connected to the motorway network through roads of national and regional importance. This state owned airport serves primarily passenger traffic for national and international (mainly European) destinations. It has a passenger and freight terminal but freight transport flows are rather limited.



Figure 7: The main industrial/commercial areas and nodal points of the city of Thessaloniki

(source : SIMCODE IGT project)

The only other significant airport of the wider area is “Megas Alexandros” airport of Kavala, which acts complementarily to “Macedonia” airport and is mainly of regional importance serving primarily national flights and few international flights based on seasonal demand for passenger transportation. It is only connected to the national road network (Egnatia Motorway) and is approximately 200 km from the city of Thessaloniki.

3.6. Logistics and Intermodal Freight Centers

In the wider region of Thessaloniki, numerous companies that provide logistics services have their basis and in general it can be said that there is ample supply of storage areas and capacity. The main existing and foreseen logistics facilities are depicted in the figure 8 that follows.



Figure 8: Existing and foreseen logistics facilities in the wider region of Thessaloniki

The main existing logistics areas are:

- The Industrial area of Sindos which has attracted a significant number of companies that provide logistics services (most of them are connected to the railway network and can plan intermodal transports). Within this industrial area there are also storage areas that fulfill the needs of large commercial companies.
- The area of Kalohori, within which facilities of several transport and logistics companies exist but in general involve relatively small-sized storage areas (smaller than 6.000 sqm. of sheltered facilities) with few exceptions. This does not have a railway connection and in its part in proximity to the west gate of the port of Thessaloniki there are several small-sized areas where mostly empty containers are stored.
- The area of Gefyra, which is located on the road connecting Thessaloniki to the town of Edessa, at a distance of approximately 20 km from the city of Thessaloniki. In this area there is a possibility of a railway connection since the Greek Railways Organization (OSE) is constructing a new line.
- The area of Oreokastro, where there are also logistics facilities of a number of companies. The area does not have a railway connection.

Concerning future plans, the development of a new and modern intermodal freight centre is planned by the Greek Railways Organization near the city of Thessaloniki and more specifically at the premises of an old military camp, whose location is being depicted at point E of the figure 8. It is foreseen that the freight centre will be connected also to the port of Thessaloniki, thus allowing the exploitation of inter-modal connections (road, rail, sea) and facilitating the strengthening of the role of the city and region as a transit node gateway both for South East Europe and the Balkan Peninsula.

The development of a logistics centre is also planned within the area of the port of Thessaloniki. Furthermore, in the proposed urban development plan of the municipality of Echodorou is expected the development of Logistics Zones west of the Industrial area of Sindos.

3.7. Pipelines

The national network of high pressure pipelines (70 bars) that transports natural gas from two entry points at the Greek borders to the three companies in the country providing natural gas can be seen at the figure 9 below. The first one is Promahonas at the Greek-Bulgarian borders and the other one is Kipoi at the Greek-Turkish borders. The one gas company is based in Thessaloniki.

The Trans Adriatic Pipeline (TAP) AG is a proposed pipeline project. The 520km-long pipeline will start in Greece near Thessaloniki, cross Albania and the Adriatic Sea and come ashore in Italy near Brindisi, allowing gas to flow directly from the Caspian basin and Middle East into European markets.

In Thessaloniki there is a refinery of the hydroskimming type, which is the only refinery in Northern Greece region and has the capability of supplying both the local market and the Balkan mainland with all types of fuel. Besides the atmospheric distillation unit, it also has units for naphtha reforming and isomerization, kerosene and diesel hydrodesulphurization, gas desulphurization and elemental sulphur recovery.

It has two tank truck loading stations with a total of 41 loading docks and a train loading station with 5 loading docks. It also has oil storage areas of a total loading capacity of 1,161,000 m³.





Figure 9: National pipeline network

(Source: www.promitheas.org.gr)

It is noted that the refinery is being upgraded, by debottlenecking distillation capacity, adding a 15kbpd continuous catalytic reformer (CCR). This €200m project will support regional gasoline and diesel consumption while the storage facilities of the refinery will also be increased by 240,000m³.

The refinery in Thessaloniki operates in conjunction with those of Aspropyrgos and Elefsina in southern Greece as one integrated production unit. The moorings and the island for loading at sea, the large storage areas and the existing pipeline interconnection system, permits the movement and exchange of products between the Group's (Hellenic Petroleum) three Greek refineries. Furthermore, it permits the crude oil supply of OKTA refinery in FYROM, which Thessaloniki refinery is linked to by a pipeline. A petrochemicals' production unit also operates in the refinery's area.

4. Description of Chemical Logistics in the Region/Country

There are several chemical companies in Northern Greece for various products e.g. fuels, fertilizers, detergents, pharmaceuticals, foodstuffs, rubbers and other. Most of them are small to medium size companies located in the industrial areas near the urban centers or along the national roads.

The current situation for chemical logistics has the same characteristics with the national one; mainly sea and road transportation and declining rail transportation. The inadequacy of the railway network to satisfy transit cargos and the interconnection to the inland network, results to a limited access to the railway.

The transport of chemicals, including dangerous chemical substances can be done also by pipelines. In Greece, pipelines are mainly used for transport of crude oil and gases.

This kind of transport can be regarded as the safest way of transport of these substances. Air and rail-way transport are of minor importance mainly because of the frequency of usage and the transported amounts.

4.1. International Trade of Chemicals

(N.Greece's capital expressed as % percentage of the country's capital)

	EE 24 (1)	BALKANS (2)	REST EUROPE	MIDDLE EAST (3)	AFRICA	NAFTA (4)	OTHER COUNTRY	INDIA SRI LANKA	CHINA HONG KONG
2000	7,5	2,4	0,5	0,4	0,4	0,3	0,3	0,1	0,3
2001	8,5	2,4	1,0	0,3	0,5	0,1	0,3	0,1	0,2
2002	9,2	2,6	0,9	0,4	0,5	0,1	0,2	0,1	0,3
2003	10,1	2,4	0,6	0,4	0,6	0,2	0,2	0,1	0,2
2004	10,9	2,7	0,7	0,4	0,7	0,2	0,3	0,1	0,2
2005	9,1	2,7	0,7	0,4	0,7	0,1	0,3	0,2	0,0
2006	8,2	2,7	0,7	0,7	0,7	0,1	0,1	0,1	0,2
2007	8,0	2,4	0,7	0,4	0,9	0,2	0,3	0,1	0,2
2008	7,4	2,8	0,7	0,6	1,1	0,1	0,2	0,1	0,1
2009	6,6	2,3	0,6	0,6	0,5	0,1	0,1	0,1	0,1
2010*	6,3	2,7	0,9	1,1	0,5	0,1	0,1	0,0	0,1

The EE 24 presents the greatest share in the distribution of the country's capital regarding the international trade of chemicals, followed by the Balkan countries while all the others have a small participation.

4.1.1. Import of chemicals according to transport modes

(Thousands tons imported in the region and quota in % of the country's import of chemicals)

YEAR		SEA	ROAD	RAILWAY	AIR	OTHER
2000	Ths tons	397	146	69	0,6	0,5
	%	14,21	5,22	2,47	0,02	0,02
2001	Ths tons	449	201	82	0,3	3,0
	%	14,79	6,61	2,69	0,01	0,10
2002	Ths tons	502	230	27	0,5	0,1
	%	17,72	8,11	0,95	0,02	0,00
2003	Ths tons	504	276	40	0,5	0,15
	%	16,08	8,81	1,28	0,02	0,00
2004	Ths tons	498	320	69	0,7	0,2
	%	14,51	9,32	2,00	0,02	0,01
2005	Ths tons	399	328	84	0,5	0,4
	%	12,99	10,67	2,73	0,02	0,01
2006	Ths tons	463	320	25	0,3	0,2
	%	14,15	9,78	0,77	0,01	0,01
2007	Ths tons	536	298	11	0,2	2,0
	%	15,92	8,86	0,33	0,01	0,06
2008	Ths tons	491	331	20	0,4	0,2
	%	14,48	9,75	0,58	0,01	0,00
2009	Ths tons	440	247	12	0,2	0,5
	%	15,75	8,84	0,41	0,01	0,02
2010* ?	Ths tons	412	239	13	0,9	0,2
	%	13,65	7,91	0,42	0,03	0,01

Transport by sea seems to be the most preferable mode presenting a small variance over the years 2000-2010 while road has the second position with relatively rising values.

4.1.2. Export of chemicals according to transport modes

(Thousands tons exported from the region and quota in % of the country's export of chemicals)

YEAR		SEA	ROAD	RAILWAY	AIR	OTHER
2000	Ths tons	335	99	0,6	0,2	0,02
	%	5,84	1,73	0,01	0,00	0,00
2001	Ths tons	244	100	1	0,4	0,01
	%	4,35	1,78	0,02	0,01	0,00
2002	Ths tons	279	131	2	0,5	9
	%	5,04	2,36	0,04	0,01	0,16
2003	Ths tons	446	184	1	0,4	16
	%	7,50	3,09	0,02	0,01	0,27
2004	Ths tons	417	203	0,5	0,2	4
	%	6,82	3,31	0,01	0,00	0,06
2005	Ths tons	376	233	75	0,3	0,06
	%	6,23	3,85	0,00	0,01	0,00
2006	Ths tons	220	220	3	0,1	20
	%	3,57	3,57	0,05	0,00	0,32
2007	Ths tons	307	153	7	0,2	0,02
	%	4,80	2,38	0,11	0,00	0,00
2008	Ths tons	364	91	0,01	0,2	0,00
	%	5,82	1,45	0,00	0,00	0,01
2009	Ths tons	311	79	0,0	0,4	11
	%	5,29	1,35	0,00	0,01	0,18
2010*	Ths tons	255	110	0	0,04	11
	%	3,97	1,72	0,00	0,00	0,17

Once again the preferable transport modes are sea and road but the other transport modes occasionally show an increase.

The above presented import results differ significantly in comparison to the export ones.

As the railway service stated, several kinds of chemicals are transported by train. The reasons are less transport costs for long distances, less weight and chemical risk, which contribute to the preference of the mode.

Railway transport of chemicals from N. Greece

Weight (tons)

Description	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Gas hydrocarbons	1,9	0,4	16,0	12,2	10,7	12,6	12,7	10,2	3,8	2,7
Essential oils and perfumery products	2,1	5,3	1,8	0,4	1,3	0,2	3,1	0,5		0,03
Salt, sulphur, gypsum, asbestos, cement	1,9	1,0	318,3	331,9	39,8	87,4	188,6	213,8	120,3	6,4
Metals and metalliferous ores and articles	103,9	200,7	308,0	258,6	382,7	708,7	1.043,6	768,9	699,0	734,5
Ammonia	67,0	14,5	26,6	53,3	61,7	1,0				
Inorganic chemicals. Acids	3,6	13,0	3,6	6,3	4,3	5,7	26,4	29,2	36,0	26,2
Various chemicals	14,8	18,2	10,6	5,4	7,0	8,4	10,3	6,3	5,2	4,8
Lignite	0,4		6,6	14,6	11,4	34,5				
Fertilizers	19,7	31,1	13,3	5,4	10,2	27,5	23,9	24,6	8,6	7,9
Oils and fats	12,8	13,3	13,3	9,4	6,0	18,1	11,4	13,7	10,3	3,9
Fuel oil, crude oil, naphtha	718,3	287,5	68,6	28,9	33,6	23,1	36,8	26,7	35,1	25,0
Minerals and salts	71,2	76,4	36,9	1,5	1,9	2,8	3,5	,4	1,3	1,1
Organic chemicals	10,8	5,0	7,0	19,8	16,2	9,7	25,9	24,0	7,6	1,9
Fossil fuels, mineral oils and distillation products, bitumen	90,7	59,4	188,6	47,2	50,3	117,7	216,1	263,7	152,1	227,4
Petroleum	110,1	119,8	174,5	191,0	162,9	157,0	182,2	195,3	261,4	197,2
Plastics	1,9	8,7	4,9	5,5	13,9	15,4	23,9	29,8	20,0	17,0
Explosives and flammable	2,7	1,4	0,04		0,08	0,3	0,1			0,05
Detergents and soaps	1,6	4,6	2,4	0,4	0,6	32,8	23,6	21,9	19,6	21,3
Scrub	165,9	176,0	187,6	191,8	316,2	244,8	323,7	179,3	213,0	189,1
Pharmaceuticals		0,03	0,09	0,11	0,11	0,12	0,2	0,2	0,1	0,2
TOTAL	1401,3	1036,3	1388,7	1183,7	1130,9	1507,8	2156,0	1808,5	1593,4	1466,7

During the years 2007 and 2008 quantities transported by the railway have significantly increased, fact that is mainly attributed to the pricing policy implemented, which improved image, competitiveness, flexibility of payment ways and terms of the sector. Yet, the preference for the mode is still secondary as shown below.

4.2 . Description of Chemical Industry and Logistics in Thessaloniki

Thessaloniki is a metropolitan center with multi-cultural character and the comparative advantage of the location offers multiple opportunities and perspectives nationally and internationally in terms of trade, culture, business and science. Therefore, several enterprises are attracted to be established in this area among others, because the access to the international market and specifically in South East Europe is easier. The port of Thessaloniki is a European port located in a strategic site between East and West; so it can be described as a natural gateway to the economic activities of the inland markets beyond Greece, namely the Balkan area and the wider hinterland.

The port is a vital element of the country's economy while it also plays a substantial role in the effort of Northern Greece to be established as the economic centre of the Eastern Mediterranean.

4.2.1. Distribution of chemical companies in thessaloniki

Number of companies

Description of profession	2011	2010	2009	2008	2007
Manufacture of coke and refined petroleum products	2	2	2	2	2
Manufacture of refined petroleum products	3	3	3	4	3
Manufacture of fuels and lubricants	6	5	5	4	5
Manufacture of industrial gases	1	1	1	1	
Manufacture of basic chemicals, fertilizers and nitrogen compounds	3	2	1		
Manufacture of plastics and synthetic rubber in primary forms	1	1	2	1	1
Manufacture of pesticides and agrochemical products	5	5	5	5	5
Manufacture of paints and pigments varnishes and similar coatings, tinting ink and mastics	6	5	3	3	4
Manufacture of detergents, soaps, cleaning and polishing products	5	5	5	5	5
Manufacture of chemicals and chemical products	11	10	8	8	8
Manufacture of polymers, resins and epoxy resins			3	1	1
TOTAL	43	39	38	34	34
Description of profession	2011	2010	2009	2008	2007
Wholesale of plastic polymers	1	2	3	1	
Wholesale of fuels and lubricants	2	2	2	2	2
Wholesale of coal	1	4	3	3	3
Wholesale of coke, asphalt		1	1	1	1
wholesale of other chemicals (phosphorous, metals, elastic, rubbers)	7	4	9	6	5
Wholesale of tanning products	1	1	1	1	1
Wholesale of pressurized air, industrial gases	2	2	2	1	1
Wholesale of timber	3	2	2	2	2
wholesale of enzymes and biotechnological items	4	2	2	2	2
wholesale of minerals	5	2	1	1	1
Wholesale of pharmaceutical and disinfectants ¹	6	7	6	4	4
Wholesale of cleaning, cosmetic, domestic and essential oils	8	7	7	6	6
Wholesale of agricultural pesticides and herbicides	15	13	16	10	8
Wholesale of synthetic resins and plastics primary and scrub	21	19	17	17	12
Wholesale of fertilizers and agrochemicals	50	45	39	40	37
Wholesale of paints, pigments varnishes and similar coatings, printing ink and mastics	112	97	85	78	73
Wholesale of chemicals and industrial chemicals	110	109	97	101	89
TOTAL	348	319	293	276	247



The economic activity in Thessaloniki, as in Greece, is generally characterized by an intense dualism. From the one side there are a small number of medium sized and a large competitive companies which are rationalized, cooperate with companies inside and outside Greece and use new information and communication technologies e.t.c. From the other side there is a vast majority of small to medium sized companies, regarding their labor cycle, which base their survival on their flexibility to adopt new processes, on multitask personnel, and on low labor cost.

The chemical companies-members of the Thessaloniki Chamber of Commerce and Industry are manufacturing companies and wholesalers, offering the necessary technical support when needed- of several categories of chemicals, as described in the table above. Their sizes vary from small and medium size (1-50 employees) to medium-large ones (50-500 employees).

4.2.2. Import of chemicals according to transport modes
(Thousands tons imported in Thessaloniki and quota in % of N. Greece)

YEAR		SEA	ROAD	RAILWAY	AIR	OTHER
2000	Ths tons	173	94	58	0,4	0,4
	% N. Greece	28,3	15,3	9,5	0,1	0,1
2001	Ths tons	156	115	64	272	3
	% N. Greece	21,2	15,6	8,7	0,0	0,4
2002	Ths tons	218	140	20	0,4	0,1
	% N. Greece	28,7	18,5	2,7	0,1	0,0
2003	Ths tons	252	193	28	0,5	0,1
	% N. Greece	30,7	23,5	3,4	0,1	0,0
2004	Ths tons	198	215	58	0,6	0,1
	% N. Greece	22,3	24,2	6,6	0,1	0,0
2005	Ths tons	210	207	68	0,4	0,4
	% N. Greece	25,9	25,5	8,4	0,0	0,0
2006	Ths tons	243	172	12	0,2	0,2
	% N. Greece	30,1	21,3	1,4	0,0	0,0
2007	Ths tons	312	167	6	0,2	0,3
	% N. Greece	36,8	19,7	0,7	0,02	0,04
2008	Ths tons	278	199	10	0,4	0,0
	% N. Greece	33,1	23,7	1,1	0,04	0,0
2009	Ths tons	264	142	11	0,2	0,4
	% N. Greece	37,7	20,4	1,6	0,02	0,1
2010*	Ths tons	242	134	11	0,4	0,2
	% N. Greece	36,3	20,2	1,7	0,1	0,03

4.2.3. Export of chemicals according to transport modes

(Thousands tons exported from Thessaloniki and quota in % of the country)

YEAR		SEA	ROAD	RAILWAY	AIR	OTHER
2000	Ths tons	94	72	0,05	0,2	0,02
	% N. Greece	21,7	16,7	0,01	0,1	0,01
2001	Ths tons	68	65	0,04	0,3	0,01
	% N. Greece	19,7	18,7	0,010	0,099	0,002
2002	Ths tons	50	93	2	0,5	8
	% N. Greece	11,8	22,0	0,5	0,1	2,1
2003	Ths tons	124	127	0,5	0,4	16
	% N. Greece	19,1	19,7	0,1	0,1	2,5
2004	Ths tons	102	138	0,1	0,2	4
	% N. Greece	16,3	22,0	0,0	0,0	0,6
2005	Ths tons	96	158	0,04	0,3	0,04
	% N. Greece	15,8	25,9	0,0	0,0	0,0
2006	Ths tons	48	145	3	0,1	0,4
	% N. Greece	10,5	31,4	0,6	0,0	0,1
2007	Ths tons	98	88	7	0,1	0,02
	% N. Greece	20,9	18,9	1,5	0,00	0,0
2008	Ths tons	172	51	0	0,1	0
	% N. Greece	37,9	11,3	0,0	0,03	0,00
2009	Ths tons	194	48	0	0,1	0,01
	% N. Greece	48,3	12,0	0	0,02	0,00
2010*	Ths tons	171	78	0	0,04	0
	% N. Greece	45,4	20,7	0,0	0,0	0,00

For both activities, import and export, the preferable transport mode is sea and road; railway having a slight participation particularly in exports, though in imports the railway transported quantities of chemicals are greater, probably due to the convenience coming up from the specific cargo type or the origin.

Thessaloniki's port handles over 16.000,000 tons of cargo per year (out of which 7,000,000 dry cargo and 9,000,000 liquid fuel cargo), 370,000 TEUs containers, 3,000 ships and 220,000 passengers.

In 2010, 13.089 containers with chemicals were unloaded and 10.237 were loaded from Thessaloniki's port including dangerous chemicals of several categories, described in the following table.

Dangerous chemicals imported/exported from the port of Thessaloniki

(number of containers)
Year 2010

Description of class	Import/ Unload	Export/ Load
Gases: Compressed Liquefied or Dissolved under pressure	1	
Flammable gases	50	10
Non-flammable gases	28	3
Flammable liquids	229	156
Low flash-point group of liquids (flash-point below -18C)	1	3
Flammable solids	3	
Flammable liable to spontaneous combustion	65	
Substances which in contact with water emit flammable gases	32	1
Oxidizing substances (agents) and Organic peroxides	1	
Oxidizing substances (agents) by yielding oxygen increase the risk and intensity of fire	149	7
Toxic substances	80	1
Infectious substances	1	
Corrosives	172	22
Miscellaneous dangerous substances & articles	241	10
TOTAL	1053	213

** For this year the demonstrated data correspond to an 11 months period*

Data bases- Sources

- <http://www.un.org>
- <http://www.statistics.gr>
- <http://www.certh.gr>
- <http://www.ebeth.gr>
- <http://www.pressinaction.gr>
- <http://www.ecogreens.gr>
- <http://www.emetris.gr>
- <http://www.researchandmarkets.com>
- <http://www.icap.gr>
- <http://www.rcm.gr>
- Hellenic association of chemical industries
- Thessaloniki Chamber of Commerce and Industry
- Thessaloniki Port Authority S.A.
- TRAINOSE S.A. (Hellenic Railways)
- Hellenic Institute of Transport

Results of Individual Interviews with Chemical Companies, Logistics Corporations, Institutions/ Organizations

The following section summarizes the results of individual interviews conducted with the most significant chemical related companies, public organizations and associations.

- The interviewed companies and institutions were:
- Loufakis S.A. (Production And Distribution of Chemicals for Several Sectors)
- Isomat S.A. (Production And Distribution of Building Chemicals)
- HB BODY S.A. (Production And Distribution of Automotive Refinishing Chemicals)
- Nitrofarm S.A. (Production And Distribution of Agrochemicals)
- Port Authority of Thessaloniki S.A.
- Trainose S.A. (Hellenic Railways)
- Palaplast S.A. (Production And Distribution of Plastics)
- Hellenic Petroleum S.A.
- ELTON S.A. (Distribution of Chemicals For Several Sectors)
- General Chemical State Laboratory
- Hellenic Association of Chemical Industries
- Institute of Transport (National Center for Research and Technology)
- Region of Central Macedonia

5. SWOT Analysis

5.1. Introduction to SWOT Analysis

SWOT analysis is a method for the identification of internal STRENGTHS and WEAKNESSES, external THREATS and OPPORTUNITIES in the context of the realization of a particular project.

SWOT analysis is a widely acknowledged strategic tool and constitutes an important element of strategic (long term) planning.

5.2. SWOT Analysis within LOSAMEDCHEM

The general questionnaire for SWOT analysis, created within the project, focuses mainly on the logistics of chemical substances, transportation flows, types of chemical transport and other questions relevant to the logistics of chemical substances.

This questionnaire was addressed to chemical plants, logistics' corporations and institutions/ organizations related to the field of chemical logistics and it was answered during personal interviews with competent executives of the mentioned organizations.

5.3. Structure of SWOT Analysis

SWOT analysis was divided into two main sections. External threats and opportunities were examined in the first part, while internal strengths and weaknesses were screened in the second part. The word "external" refers to a factor from the external environment of the company, which cannot be influenced by the interviewed in the existing situation. "Internal" refers to a factor, which can be influenced by the company itself. The SWOT questionnaire was divided into subcategories (e.g. Economic trends, Social-cultural, Technological trends).

These subcategories were separated into particular factors (e.g. Internationalization of markets in subcategory Economic trends), which the respondent should classify as a strength or weakness, threat or opportunity.

5.4. Evaluation of the SWOT Analysis

The frequency of choice of a specific evaluation in the SWOT questionnaire was determined (evaluation S-strength, W-weakness, T-threats, O-opportunity) for each factor (e.g. Internationalization of markets).

6. Output from the SWOT Analysis

With respect to the number of evaluated parameters, only the factors with the satisfactory frequency of choice regarding the number of respondents will be presented below.

6.1. External opportunities and threats

A. Economic Trends

Internationalization of the markets is considered a great opportunity by the majority of the respondents (industries and organizations) for expanding in new markets, in conjunction with the geographical advantage of the region, combined with the rate of information exchange and the possibilities offered for development. Under the perspective of further development and expansion, the intensified competition is medium to this direction but it could also be a threat to their acquirement. Regional and worldwide economic development was perceived as a great opportunity to promote their outlets. From the point

of view that chemical industry is a system with a strong know-how component and therefore experts' intensified, the level of wages is not considered a dominant parameter; on the contrary the preference of recruiting better labor quality was expressed. Therefore, delocalization is only a short-term opportunity which furthermore changes as labor cost increases continuously in the previously considered "cheap" countries as well.

B. Socio-cultural trends

Taking into consideration the multicultural character of the region, especially Thessaloniki due to its geographic location, the demographic change does not have an impact to the local chemical industry. However besides the experts' surplus and their knowledge, which is advantageous, the integration of those handled as "low cost" workers is difficult. Companies focus first and foremost on the attitude of the employees, but an adequate level of the existing skills is considered a prerequisite.

Environmental sensitivity is an opportunity for large companies, for developing new products and entering new markets or inhibiting the expanding of less "green" products or services. On a long-term horizon it is foreseen that this factor will facilitate the "clearing up" of the market, but for other companies, which are unavoidably engaged in less "green" technologies or products and for small ones, it is a threat.

C. Technological trends

Chemical industry is a know-how intensive field. The degree of influence of the factors, related to the technological trends, is perceived by the majority of the interviewed as an opportunity. However, informatics is not the main parameter for every single interviewed, whereas every kind of innovation in transports and warehousing is of particular importance and a substantial opportunity to improve every day's operational needs and to provide a competitive advantage to the economy in general and to every single company separately.

D. Environment and energy

Availability of energy sources combined with consequently high energy costs constitutes a huge threat for companies, which would automatically be converted into an opportunity when renewable and eventually cheaper ones replace the traditional ways. The legislation is generally considered as a threat. However, many companies have already taken measures to provide protection for the environment and deal with new environmentally friendly products and technologies are, therefore, a step ahead. Management of by-products is an opportunity as it might, with the adequate legislation framework, strengthen the operation of specific transportation modes, protect the environment and exploit the usage of secondary raw materials. Nevertheless, all companies and organizations agree to the necessity of the best managing of by-products, which will subsequently lead to greater environmental performance improvements.

E. Politics and innovation

The implementation of international traffic regulations and the development of infrastructures present



great opportunities for all, as they reduce the time-consuming procedures and also serve small companies. Such measures equalize the conditions of competition and increase the level of safety in transportation, in combination with the upgrading of the infrastructures. Freight costs are reduced because of the intense competition but the variety of items (raw materials, final products, fuels etc) transported are increased. The land use policy however, is perceived rather as a threat if it changes for those already liable to it. However, for some it is considered to be a stabilizing factor for the future. There are no national financial subsidies at the moment, but if applied they are expected to make a significant difference and are perceived as a huge opportunity.

F. Transport infrastructures

Railway

Regarding rail transport, in terms of location of terminals, infrastructure level, bureaucratic constraints, interoperability problems and quality of services provided, all interviewed companies/ organizations/ institutes unanimously stated that the usage of the railway is really poor because terminals are incorrectly located and are diminishing in numbers. Furthermore, there is a lack of organization and thorough knowledge of the legislation, long delays, non-availability of proper carriage wagons, high freight cost. However, all agree that the specific mode plays an important role internationally for many basic industries, both for exports and imports and even for those cargo flows transported by rail to and from the nation's sea ports. Most of them did not know the existing relevant legislation of this transport sector, since they have not been able to use this mode.

Road

Given the aforementioned situation with the railways, road transportation seems to be the solution, though the road network is considered to be equally divided to threat or opportunity, mentioned that it has not yet reached a satisfactory level and is subjected to several regulation constraints. Being the most frequent transport mode, road toll issues are considered as an important threat increasing freight costs coupled with factors such as the frequency of accidents occurring and the high levels of traffic congestion. Besides that, pooling arrangements can cause operative problems, being a factor of threat.

Sea

Though the geographical spread of sea ports in the region is satisfactory, specifically for the port of Thessaloniki, being located within the urban area, inconvenience is caused to a certain degree and is therefore a threat for some. However, the majority of the interviewed are satisfied with its location, as Thessaloniki port has its own portal to the inner land transport network. Efficiency and capacity on the other side, in combination with the workforce relations, tend to be a huge threat. The terminals' distribution is poor, considering the increasing number of vessels and the lack of hinterland interconnections in particular to rail transport, often result in bottlenecks. The sector's legislation is considered to be neutral, but sometimes turns out to a threat due to the existing organization and coordination level. Yet, maritime transports along with road are the two most favorable transport modes for the chemicals companies of the region.

Intermodality

Though N. Greece and specifically Thessaloniki has a comparative advantage due to its geographical location and the existence of a very functional port, there are not any national intermodal hubs in the region which is considered as a great threat. The transshipment efficiency is low and is accomplished mainly through the road network. Intermodal coordination can be really improved by the contribution of ICT technologies, which are already used by international transport companies located in the region. Private intermodal hubs exist in the premises of Helpe, which has a refinery, very close to Thessaloniki, for road and rail transportation.

Pipeline

The region's pipeline network serves only fuels. Gas is also transferred through pipeline. If a comprehensive pipeline network is developed and its usage is extended to serving other liquid chemicals as well, it will be an opportunity and it will decrease the cost, the warehousing and the accidental danger. Private pipelines, industrial property of Helpe, carry crude oil directly from the private dock and distribute it to the other branch points of the group. The same applies for final and semi-final products.

Safety and security

International standards since they are adopted, create a necessity of adjustment and have a significant opportunity for the future and for the reliability levels of each company. In some cases, they improved the relationships between employees. The emergency management structures are considered by the company's environment, to be necessary and are or believed to be well adopted. Great importance is given to the factor of tracking and tracing, as all stated that this possibility is a great advantage, which unfortunately does not exist, with the exception of some shipping companies. Transnational cooperation is also an advantage as management practices override national cultural differences for safety and security.

G. Industry sector and competition

Suppliers, customers, access to the market

The degree of product standardization, differentiation and the importance of the industry sector represent a great opportunity for all chemical plants and related organizations. The need for a wide variety of products implies a suppliers' specialization. The potential of forward and backward integration is considered an asset not only for reducing costs but also for facilitating direct contact with the customers. Economies of scale represent for all companies a significant opportunity. Many examples of combined cargos of raw materials in large volumes for the chemical industry, delivered directly by sea or train from distant regions have shown a reduction in transportation costs.

Import-export procedures

Explicit conclusions for the cooperation with Authorities cannot be made. For most companies this is a neutral factor, for the rest it is equally a threat or an opportunity. On the other hand, international har-

monization of legislation for products acceptance represents a substantial opportunity, as it facilitates and determines the procedure, the quality and the documentation in absolute terms.

6.2. Internal strengths and weaknesses

Factors discussed in this part of the SWOT analysis were very significant to the respondents, who sincerely identified their weaknesses and had already premeditated plans for future actions. The chemical industry has prepared a vision of how it will meet its competitive challenges.

A. Procurement

For countries not possessing their own sources, like Greece, procurement is a threat if it is not well coordinated and organized. European standards are very specific for particular products leading to a very narrow field of choice of suppliers. Besides that, credit issues have risen today. Therefore, the procurement lead time, the suppliers' availability/reliability, the quality of product and packaging, the payment conditions and the function of logistic chain and the transit time are very well organized, planned and set for the majority, without taking risks of non availability. Generally, the sourcing strategy (many versus one) adopted is to have at least 2 suppliers carefully selected in terms of reliability, quality and price.

B. Warehousing

There are strong tendencies to minimize warehouse stocks, always in balance with the production's needs. Critical or distantly originated materials have to be stocked in order to avoid stock out and delivery problems. Inventory management is required within multiple locations of a supply network to protect the regular and planned course of production against the random disturbance of running out of materials. The prediction is strong up the point of the supplying chain always in combination with safety stock factors. Chemical logistics is at a very high level in this regard. Safety stock level is for most of the respondents a vital issue that is handled with careful planning and monitoring. In combination though, with the above mentioned reduced availability of free choice of suppliers for specific products, the relative companies are forced to maintain increased stock levels. The strategy of just-in-time and outsourcing policy does not really exist for the majority of the respondents. Green warehousing is not a standard policy, but warehousing is performed according to the national regulations and the suggested handling and storage ways.

C. Production logistics

As chemical industry is the industry of know-how, various models of production processes have been adopted or implemented rendering flexibility to a prerequisite within the production and consequently a strong point as well. The upgrade of the machinery contributes to this. Production costs are considered as a strength and weakness depending on the particularities of each company and are mostly focused on the energy costs, while scrap rates are low because the evolved processes minimize them in order to reduce production costs.

D. Distribution and transport

The respondents of chemical and logistic companies and transport national organizations are interested to deliver goods on time. There are however, some difficulties originating mainly from hellenic railways and maritime infrastructure and the port of thessaloniki that is, like most mediterranean ports, located inside the urban center. Great efforts are made regarding the optimization of payload but some respondents believe there are still margins for improvement. The freight costs are high as there are not many alternative modes of transfer and for delivery reasons many companies maintain their own trucks. In contrast, all refinery output is sent to other sites through pipelines, railway and road, a fact that offers to the company alternative solutions.

E. Planning and controlling

The accuracy and flexibility in delivery planning together with errors' analysis and control and the quality assurance procedures are factors of significant importance. Therefore great efforts are made to improve them since they are considered today as clear strengths for most of the companies. Suppliers of services of railway and maritime transport, however, consider that all sub points of planning and controlling mentioned above, are either in initial stage, needed to be further improved or not yet adopted as procedure.

F. Order processing

Generally, the availability to guarantee and order fulfillment time are regarded as strengths for almost all companies but for those few directly affected by reach regulation, specific stringencies are observed (delays of deliveries, particular deficiencies). On the other hand, the two main hellenic transport service providers (olth and trainose) are not in a position to specify the level service to be provided or to estimate the specific fulfillment time for it beforehand.

G. Safety and security

Safety and security are fundamental for the chemical industry and transportation and are therefore the first to be developed, discussed and taken care of. Most of the addressed companies participate in Responsible Care programs, even if they are not mandatory, stating that with the coexistence of continuous training, they significantly improved their environmental, health, safety and security performance advancing the management of chemical products and processes and obtained a management system that functions according to the industry's professional standards.

H. Information and communication technology in company logistics

For companies, both manufacturers, transport/ logistics providers and forwarders, management supporting systems ERP/ MRP and supply chain tracing systems are important and they have achieved to reach a high level of performance and usage of such technological applications. They take great advantage of the EDI utilization. With the aim of constantly providing superior services to their customers by means of logistics optimization, many companies have upgraded their internal software systems

and auditing tools leading to faster response to customers' needs. The introduction of new or the improvement of the already existing internal procedures and programming systems (in some cases SAP as well), were considered fundamental for longitudinal improvement of the performance of products distribution system. On the other hand these factors are necessary but not crucial for the transportation process as the main obstacles in this process arise from factors already explained.

I. Procedures regarding company logistics

Strength for all sectors in the chemical industry is the personnel recruitment strategy followed because experience, knowledge and expertise play a key role. So participation in seminars, conferences and forums are perceived as short- and long- term "investments" on their human resources capital.

7. Needs for Future Actions and Improvements - Conclusions

Every program, including the operational process, the management plan and development characteristics, has its strengths and weaknesses, opportunities and threats. Consideration of the processes involved in the carriage of chemicals can lead to improved safety. SWOT analysis is intended to maximize strengths and opportunities, minimize external threats, transform weaknesses into strengths, and to take advantage of opportunities along with minimizing both internal weaknesses and external threats.

Strengths <ul style="list-style-type: none"> • Quality of product/ packaging • Lead time for raw materials/ intermediate products • Inventory management • Flexibility within production • Accuracy and flexibility in supply planning • Internal safety procedures 	Opportunities <ul style="list-style-type: none"> • Internationalization of the markets • Regional economic development • Innovation in all sectors • International harmonization of traffic regulations • Financial subsidies regarding traffic • Importance of the industry sector • International standards adopted
Weaknesses <ul style="list-style-type: none"> • Just-in-time strategy • Outsourcing policy • Freight costs 	Threats <ul style="list-style-type: none"> • Lack of adequate transport infrastructures especially for rail transport • Maritime transport is satisfactory but improvements are required • No existing intermodal hubs • Bureaucratic constraints • Quality of transportation services • Interoperability problems

In regard with the current SWOT analysis the main characteristics according to the specific elements are shown below.

The chemical industry faces considerable economic, environmental and social challenges during the 21st century. Major forces for changes include the increased globalization of markets, the social demand for improved environmental performance, the need for an increased profitability and capital productivity, the higher customer expectations and the changing workforce requirements.

To put this vision into a working format they are needed a number of future actions in areas defined as crucial to the progress of the chemical industry.

7.1. Chemical Producers Sector

Innovation is the key for a sustainable and healthy chemical industry.

Public and private authorities should strengthen innovation clusters, facilitating cooperation across sectors and borders.

The public sector should provide more effective support to the private sector in its R&D efforts.

Companies should review and upgrade their R&D plans, issue that requires closer cooperation with universities and research centers.

Improvement of technology will minimize energy and production costs. The usage of renewable energy sources and by-products management will safeguard sustainable development, health, protection of the environment. However, it requires appropriate regulation to guarantee success and chemical safety.

From the side of state, simplification of the legal framework regarding the chemical companies and products will boost innovation and development.

The ability to transfer chemicals safely and efficiently is a vital competitive factor.

Local logistics require more support and investment from public authorities and private sector stakeholders.

The integration of chemical production sites into logistics clusters requires fewer transport bottlenecks. Progress is needed in intermodal platforms, efficient rail freight, road congestion and harbor's capacity.

7.2. Road Sector

To optimize payload and reduce transport needs, with indirect positive effect to environment, there are necessary new roads' construction and improvement on traffic safety and road quality. The location and the structure of road network should be further extended and vertical axis should be also completed.

7.3. Railway Sector

The freight railroad industry plays an important role in the nation's economy as a mainstay of transportation for many basic industries and, increasingly, for exports and imports.

Train is the medium with the lowest impact to the environment. Railways are a safe land transportation system if compared to the other forms of transportation. Railway transportation is capable of high levels of cargo utilization and energy efficiency, but is less flexible as train stations are closing instead of building more.

The railway network expansion is the unique opportunity to connect the region with Eastern Europe and



the Balkans, since due to its geographical location it represents the path for distribution in Europe. For transportation of chemicals, railway is internationally the most indicated mode, being the safest and cheapest for long distances and heavy cargos.

To encourage the usage of rail instead of road, intensified investments from the side of state should take place to improve the poor operation of the sector. Endorsement of ITC systems will improve tracing and tracking operations and delivery time, whereas electrification provides many advantages mainly for the environment. The introduction of higher speed trains, block-trains and suitable wagons enables the choice of transport. The legal framework should subsidize the railway indirectly, point out its advantages and give the freedom of action and initiatives.

7.4. Sea Waterway Sector

Some of the suggested actions are the improvement of the “bottleneck” currently existing from the port to the hinterland in combination with the railway network expansion, the establishment of warehouses in the area of the port to store transit cargos and the simplification of the regulations.

7.5. Intermodal Sector

Thessaloniki is the recommended site for building intermodal hubs, having the advantage of its geographical location and therefore the access to Europe’s hinterland. This would enhance the international trade between East and West. However, the government’s support to this plan is necessary.

8. Literature

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Analysis of the infrastructure network in Slovenia and report on SWOT analysis

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1. Executive Summary

The logistics network in Slovenia is based on a motorway, an expressway system, and on a railway network.

Highways, which were built during the last 15 years, form the backbone of the road network and enable efficient connections within the country and with the international road connections (the network of E-roads, Pan-European corridors V and X). The public railway network consists of main roads which represent a part of several international railway connections (Pan-European corridors V and X, and E-railways for example), and regional roads.

In the last decade, from 2000 to 2009, the traffic (passenger and freight) in Slovenia has increased in all modes of transport. In freight transport the volume of freight transported and ton-km performed has also increased.

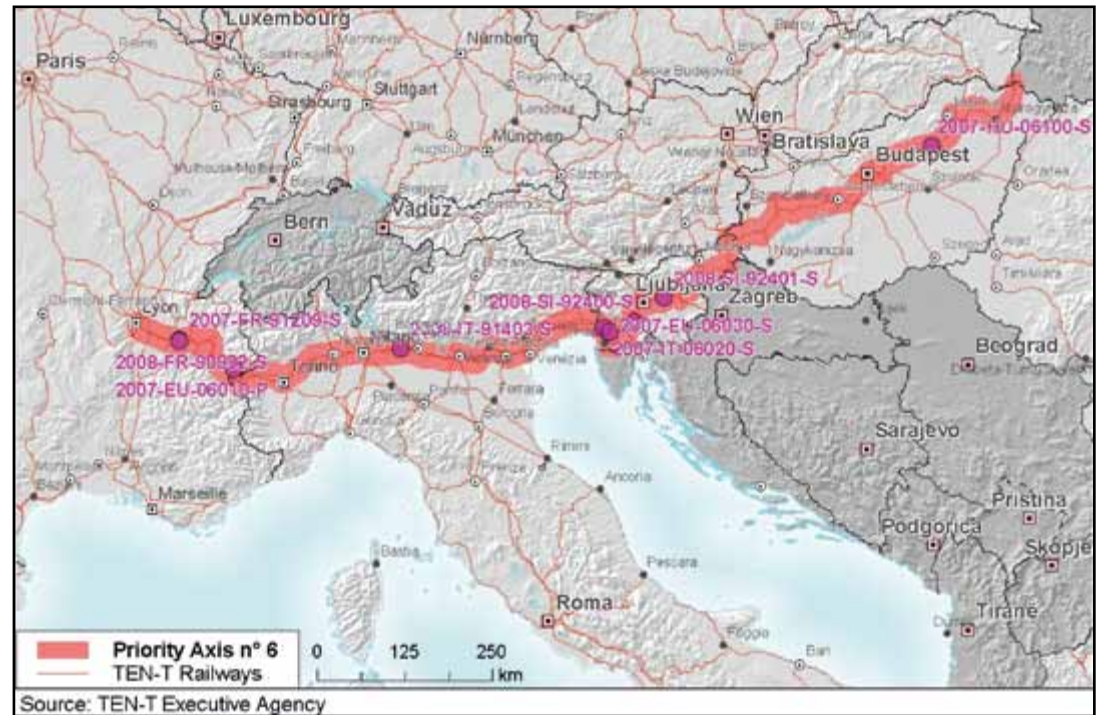


Figure 1: Location of the study area (Slovenia at the crossing of Pan – European Corridors V and X)

Compared to the year 2000 the transport of freight by road was higher by 30% and in sea by 85 % in the year 2009. The rail freight transport had decreased by 4 % expressed in tons and increased by 2% expressed in ton-km. Airport traffic (loading and unloading of freight to/from aircraft) had decreased by 9%.

After Slovenia has entered the EU in 2004 an increase in the volume of land freight transport was recorded, especially in the period 2006–2008. In the period 2001–2008, the freight loaded on railways in Slovenia and transported to the other European countries recorded positive growth. Unfortunately the growth was not as high as in the road transport.

The port freight traffic in Slovenian ports has increased substantially during the last 15 years; the Port of Koper is the only and busiest port with more than 99% share of the total port traffic. Roughly one third of the freight in the Port of Koper is handled for the Slovenian market, while most is headed as transit to foreign countries, located in the ports' hinterland area.

The public railway infrastructure is getting worse every year. This is mainly due to insufficient financial assets required for its development, maintenance and modernization. Because of that, bottlenecks are becoming an important issue. Permanent bottlenecks which are linked to required infrastructure modernization and are present on routes with prevailing long-term guaranteed freight potential, and temporary bottlenecks which are connected with current freight potential and linked to operational solutions.

Bottlenecks identified in the port of Koper are two types: the utilization of handling facilities and storage areas which are close to the capacity limits, and the port connection to inland infrastructure network (a direct highway connection to the port entrance is missing, while the existing single track line between Koper and Divača is inadequate).

2. Introduction

During the last 15 years the volume of transport on Slovenian transport network increased considerably not only in passengers but also in freight transport. The passenger transport has particularly increased the cars in the national road, followed by the air passenger traffic. Freight transport the road traffic has increased the most, mainly due to the increased international freight flows in directions of the Corridor V and Corridor X (which happened following the accession of several eastern European countries to EU and an increase in international trade exchange). The actual development of infrastructure was rather uneven, as during the last 15 years most of the activities were taken place in the area of a highway infrastructure, which was to provide an effective integration for Slovenia in the international transport infrastructure connections. There was actually no development and construction of a rail infrastructure as the activities were limited only to minimum maintenance work. These two modes of transport, which their efficiency depends directly on the extent and the condition of infrastructure, are of crucial importance for the efficiency of the national freight and passenger transport as well as for the international transport, especially the freight transit. Slovenia is geographically located on the crossing of natural routes connecting west with east as well as north and northeast with southeast areas of Europe; and north Adriatic with central Europe. The significance and prospective of the location are further emphasized by placing several important transport connections over the Slovenian territory. The most important one are **corridor V and corridor X**, which actually cross the city of Ljubljana. Such a transport location requires establishment of an efficient transport network, while on the other hand provides conditions for a further increase of the freight traffic (particularly transit).

Objective development of transport infrastructure is of crucial importance for planning and limitation of traffic, on a national as well as on an international level, and particularly in transit. These activities should be consistent with the principles of sustainable development and transport.

3. The Slovenian Logistics Network and its Utilization

3.1. Road Infrastructure Characteristics

The total length of the Slovenian road network was 38,900 km. In table 1 are the actual lengths of the road network in Slovenia.

Table 1: Characteristics of Slovenian road network in 2009

Road category	Length in km
Highways	657
Express ways	105
Main roads	819
Regional roads	5,120
Local roads	13,837
Public roads	18.383

Source: *Direkcija Republike Slovenije za ceste*

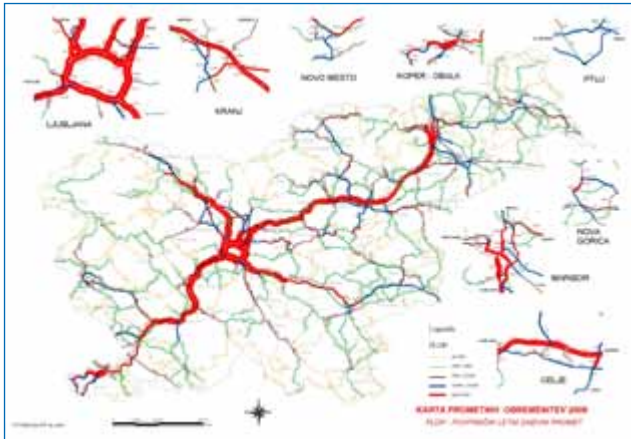
Motorways and expressways are the main traffic roads of the Slovenian road network. They enable efficient connections on the national and international level such as the network of E-roads, road connections within **Pan-European corridors V and X** and the rest of EU networks.

The current status of the motorway system in Slovenia is presented in Figure below.



Figure 2: Slovenian motorway system in 2009

Source: DARS



The volumes of traffic and traffic loads are shown in figure 3.

Figure 3: Volume of traffic on Slovenian road network

Source: Direkcija Republike Slovenije za ceste

From 2006 the share of passenger cars in total kilometers driven has been constantly decreasing (from 81% in 2006 to 78.3% in 2007 and 77.3% in 2008), due to the higher rate of increase in goods vehicle traffic (heavy goods vehicles as well as trucks and trailers), which reached a share of 21.8 % of total highway and expressway traffic in Slovenia in 2008.

3.2. Characteristics of Rail Infrastructure and its Utilization

In 2009, there was 1,228 km of railway tracks on the public railway infrastructure network in Slovenia of which approx. 898 km is a single track and approx. 331 km double track lines. The Slovenian public railway network consists of main and regional roads. Main roads represent a part or parts of several international railway connections (PEN Corridor V and X, and E-railways for example).



Figure 4: Railway network in Slovenia

Source: Slovenska železnice

The maximum allowed vehicle and load dimensions, on all railway roads enable rail transport in line with the international loading (clearance) gauge, loading gauge SZ1 and loading gauge for combined transport GA and GB (lines suitable for combined transport are also properly coded).

Most of the railway roads in Slovenia open for transit traffic, fulfill the criteria of the D3 line category (axle load – 22.5 t/axle; longitudinal load – 7.2 t/m), which is also declared to be the normal category for public network lines in Slovenia.



Figure 5: Number of tracks on the Slovenian railway network

Note: Red line – double track; Black line – single track

Source: Slovenske železnice



Figure 6: Axle load limitations on Slovenian railway network

Note: Red line (22,5 t/axle); Yellow line (20,0 t/axle) Blue line (18 t/axle); Grey line (16 t/axle)

According to speed, railway lines can be classified as roads for high speed or conventional roads. All railway roads in Slovenia are classified as conventional roads. The electrification system of the Slovenian railway lines is 3 kV DC, except at the junction points with railway infrastructure of foreign countries:

25 kV AC, frequency 50 Hz (Croatia),

15 kV AC, frequency 16 2/3 Hz (Austria).



Figure 7: Electrification of the Slovenian railway network

Note: Grey line (diesel traction); Red line (3 kV); Blue line (15kV); Yellow line (25 kV)

Technical characteristics of the main lines are presented in the Table 2 below.

Table 2: Characteristics of the Slovenian railway network – main lines

Source: Slovenske železnice

Table 2 shows the employment rate of singular lines therefore bottlenecks can be derived from it.

No.	Railway route/ section	Line code	No. of tracks	Section length	Traction system	Max. axle load	Line capacity	
							Capacity (train paths/24 hours)	Capacity employment rate (%)
1.	Dobova-Ljubljana							
	Dobova d.m.-Dobova	E70; Corridor X	2	2.3	25 kV	D3 (225 kN; 72 kN/m)	Ljubljana-Dobova=292; Lj-Zidani most=300	Lj-Dobova=27; Lj-Zidani most=51
	Dobova-Zagorje	E70; Corridor X	2	65.6	3kV	D3 (225 kN; 72 kN/m)	Ljubljana-Dobova=292; Lj-Zidani most=300	Lj-Dobova=27; Lj-Zidani most=51
	Zagorje-Ljubljana	E69, E70; Corridor X	2	46.6	3kV	D3 (225 kN; 72 kN/m)	Ljubljana-Dobova=292; Lj-Zidani most=300	Lj-Dobova=27; Lj-Zidani most=51
2.	Ljubljana izklj.-Jesenice d.m.							
	Ljubljana-Lj. Šiška	E65; Corridor X	1	1.6	3kV	D3 (225 kN; 72 kN/m)	76	81
	Ljubljana šiška-Lj. Vižmarje	E65; Corridor X	1	4.8	3kV	D3 (225 kN; 72 kN/m)	76	81
	Ljubljana šiška-Jesenice	E65; Corridor X	1	58.1	3kV	D3 (225 kN; 72 kN/m)	76	81
	Jesenice-Jesenice d.m.	E65; Corridor X	2	7.1	15 kV	D3 (225 kN; 72 kN/m)	76	81
3.	Zidani most izklj.-Šentilj d.m.							
	Zidani most-Šentjur	E67, E 69; Corridor X	2	3.,6	3 kV	C3 (200 kN; 72 kN/m)	Maribor-Šentilj=62; Zidani most-Maribor=185	Maribor-Šentilj=69; Zidani most=65
	Šentjur-Maribor Tezno	E67, E 69; Corridor X	2	53.2	3 kV	D4 (225 kN; 80 kN/m)	Maribor-Šentilj=62; Zidani most-Maribor=185	Maribor-Šentilj=69; Zidani most=65
	Maribor Tezno-Šentilj	E67; Corridor X	1	19.6	3 kV	C3 (200 kN; 72 kN/m)	Maribor-Šentilj=62; Zidani most-Maribor=185	Maribor-Šentilj=69; Zidani most=65
4.	Pragersko izklj.-Središče d.m.							
	Pragersko-Središče d.m.	E69; Corridor V	1	51.9	diesel	C3 (200 kN; 72 kN/m)	55	89
5.	Ormož izklj.-Hodoš d.m.							
	Ormož-Murska Sobotaz	Corridor V	zz1	38.5	diesel	C3 (200 kN; 72 kN/m)	34	88
	Murska Sobota-Hodoš d.m.	Corridor V	1	30.7	diesel	D4 (225 kN; 80 kN/m)	34	88
6.	Ljubljana izklj.-Sežana d.m.							
	Murska Sobota-Hodoš d.m.	E 65, E 69,E 70;Corridor V	2	116.8	3 kV	D3 (225 kN; 72 kN/m)	135	62
7.	Pivka izklj.-Ilirska Bistrica d.m.							
	Pivka-Ilirska Bistrica d.m.	E 65	1	24.5	3 kV	C2 (200 kN; 64 kN/m)	63	54
8.	Divača izklj.-Koper							
	Divača-Prešnica cep.	E 69, Corridor V	1	16.5	3 kV	D3 (225 kN; 72 kN/m)	66	88
	Prešnica cep-Koper	E 69,Corridor V	1	31.5	3 kV	D3 (225 kN; 72 kN/m)	66	88

Important shunting stations which must be mentioned are:

- Shunting stations: Ljubljana Zalog, Maribor Tezno, Celje tovarna and Koper tovarna.
- Stations where container terminals are located: Celje tovarna, Luka Koper, Ljubljana Container terminal and Maribor Tezno (tracks at these stations are not part of the public railway infrastructure).
- Stations suitable for loading and unloading of cars: Koper, Jesenice, Maribor, Most na Soči, Podbrdo, Bohinjska Bistrica.
- Stations opened for combined transport ("piggy-back"): Ljubljana Moste and Maribor Tezno (tracks at these stations are not part of the public railway infrastructure).



Figure 8: Utilization of railway lines in 2009

Source: Slovenske Železnice d.o.o.

3.3. Intermodal Infrastructure Characteristics

Intermodal infrastructure in Slovenia consists of a network of intermodal terminals specialized for a certain type of intermodal transport, regarding the handling techniques and the intermodal loading units. For the combined transport of road vehicles (accompanied and unaccompanied) two terminals are available – in Ljubljana (Moste) and Maribor (Tezno). Both terminals are owned and operated by Slovenian Railways. Intermodal (container) terminals are located in Ljubljana, Maribor, Celje and in the Port of Koper. The container terminal in the Port of Koper is the biggest intermodal terminal in Slovenia.

3.4. Analysis of Road Transport and National Freight Flows

Freight traffic represents an important share (from the view of the effect on the total traffic flow) of the total road traffic. The volume of the freight traffic has increased considerably since Slovenia's entry to the EU. The biggest increase has been recorded in the direction of two important international connections crossing Slovenian territory, Corridor X and Corridor V. The figure n.9 represents the share of freight traffic among the total traffic on Slovenian roads in 2009.

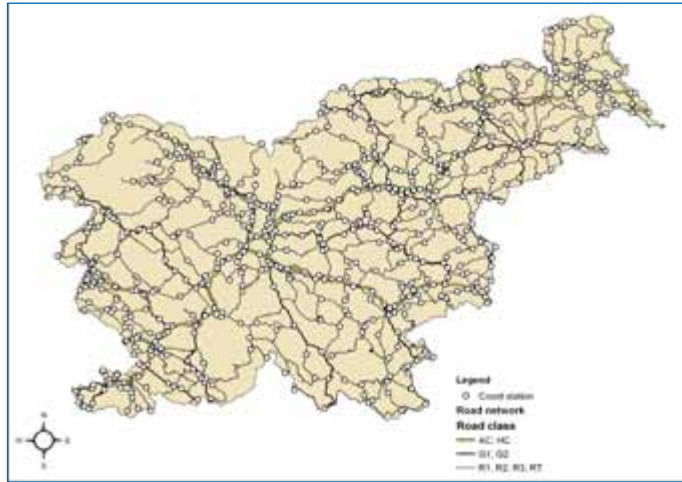
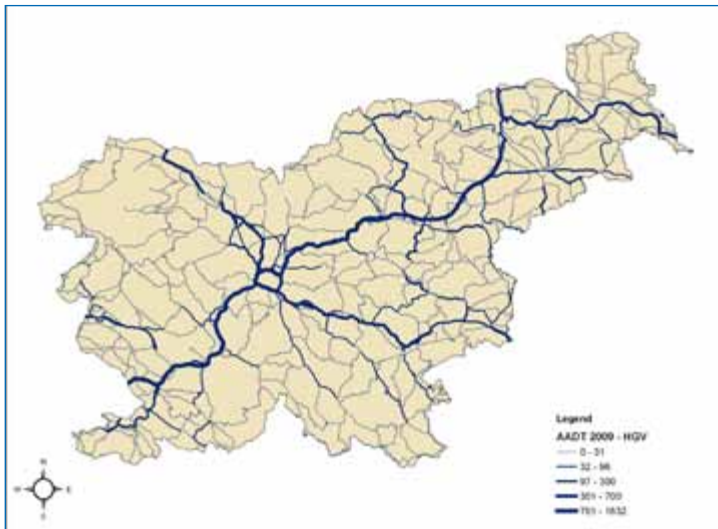


Figure 9: Spatial distribution of traffic count location on the road network in 2009



In the figure we can see that most of the traffic is carried by motorways, highways and major roads. Those roads together represent the 21% of the total network's length, yet carry more than 64 % of the total traffic (2009). Highways and motorways together represent 8.7% of the total road network, while carrying 44% of the total traffic (2009).

The traffic of HGV on Slovenian roads in 2009 is presented in the following Figure below; from the map it is evident that most of the goods vehicles traffic is on the course of the two Pan-European corridors, V and X.

Figure 10: Traffic (AADT) of heavy goods vehicles (HGV) in 2009

4. Analysis of International Freight Flows

The analysis of the freight flows in road transport gives an overview of the transport carried out by road vehicles with all goods of at least 2 tons of load capacity, and registered in the Republic of Slovenia (national carriers). The analysis covers road freight flows in transport of freight from Slovenia to other countries as well as from other countries to Slovenia, from 2001 to 2009.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change in 2001-2008	Change in 2008-2009
To countries											
Foreign countries – TOTAL	3,218	3,221	3,408	3,909	4,883	5,719	6,316	7,004	5,939	11.8%	-15.2%
Austria	276	276	320	570	517	673	860	1,000	899	20.2%	-10.1%
Belgium	23	25	27	41	50	78	56	72	48	17.7%	-33.3%
Bosnia and Herzegovina	44	63	68	58	72	43	24	88	-	10.4%	-
Croatia	511	663	607	457	595	497	668	541	436	0.8%	-19.4%
Czech Republic	58	26	25	58	44	37	53	80	50	4.7%	-37.5%
France	137	155	173	249	299	328	244	323	297	13.0%	-8.0%
Germany	663	627	664	664	816	907	964	1,112	894	7.7%	-19.6%
Hungary	182	69	238	186	157	210	147	245	207	4.3%	-15.5%
Italy	850	858	817	1,006	1,487	2,115	2,202	2,332	1,978	15.5%	-15.2%
Netherlands	39	26	37	59	60	75	102	136	160	19.5%	17.6%
Poland	51	50	57	84	80	79	97	141	101	15.6%	-28.4%
Romania	-	-	-	39	75	34	66	96	56	25.3%	-41.7%
Russian Federation*	43	28	46	47	61	55	92	82	-	9.7%	-
Serbia	-	-	-	-	-	-	194	248	211	27.8%	-14.9%
Serbia and Montenegro	99	130	142	146	207	167	-	-	-	11.0%	-
Slovakia*	-	-	14	-	57	-	87	72	110	38.8%	52.8%
Spain	44	61	28	68	81	100	94	84	113	9.7%	34.5%
United Kingdom	104	55	53	76	93	160	158	162	98	6.5%	-39.5%
Other EU Member States	27	45	50	47	78	84	123	79	81	16.6%	2.5%
Other countries	41	35	-	45	53	59	86	106	138	14.5%	30.2%

Table 3: Road freight transport - loaded in Slovenia by country of unloading (in 1000 tons)

* annual average change is calculated according to data availability except the period 2001-2008

In years from 2001 to 2008 the amount of freight loaded in Slovenia and carried abroad by road vehicles was growing on a regular basis. The majority of freight transported was destined to hinterland countries, Italy, Austria, Germany and Croatia.

In * annual average change is calculated according to data availability except the period 2001-2008 can be seen that the average annual growth was around 12%, with the highest share of transport recorded by Slovakia and western Balkan countries. These countries represent markets that are below European's average development rate in comparison to most other EU countries, and in the future is expected further growth of freight transport in these directions.

Year 2009 shows negative growth numbers, which are the result of the financial crisis.

Almost 6 million tons of freight, in 2009, was carried by national carriers from Slovenia to other European countries.

Around one third of all goods carried by road were unloaded in Italy, 15% in Germany and Austria, 7% in Croatia and 5% in France.

The growth that the railway sector had recorded was considerably lower compared to that of the road transport.

In 2009, there was a considerable decrease in cargo load (26%), almost twice as much as in the road sector (15%).

Historically the most important markets in out band rail freight transport are those of the neighboring or hinterland countries of Austria, Hungary and Italy, followed by Slovakia, Croatia, Germany, France, Serbia and Poland.

In inbound rail freight traffic there are also some traditional markets identified, represented by Austria and Hungary, followed by Czech Republic, Germany, Slovakia, Croatia and Italy. The Balkan countries also represent an important market share, especially countries from the territory of the former Yugoslavia (Croatia, Bosnia and Herzegovina, and Serbia).

Comparing numbers of freight volumes transported by rail and by road, certain unsteadiness can be noticed. There was a constant growth from 2001 to 2008 in the road transport.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2008	2008-2009
Countries of loading - TOTAL	4,113	4,786	5,167	4,742	4,825	5,230	4,648	4,349	3,298	0.8%	-24.2%
Austria	1,505	1,828	1,860	1,849	2,036	2,272	2,065	2,097	1,295	4.9%	-38.2%
Belgium	34	29	34	24	21	17	22	30	41	-1.8%	36.7%
Bosnia and Herzegovina	27	97	118	104	95	139	99	54	39	10.4%	-27.8%
Bulgaria	0	-	2	1	8	25	31	15	1	-	-93.3%
Croatia	258	244	224	282	296	365	252	191	170	-4.2%	-11.0%
Czech Republic	547	598	854	549	493	388	489	476	395	-2.0%	-17.0%
France	136	127	117	127	74	22	25	19	5	-24.5%	-73.7%
Germany	264	281	319	331	384	426	329	364	291	4.7%	-20.1%
Greece	0	-	-	3	1	3	2	2	0	-9.6%	-100.0%
Hungary	802	667	687	804	888	898	561	492	531	-6.7%	7.9%
Italy	296	322	275	183	107	131	135	113	65	-12.9%	-42.5%
Luxembourg	1	1	1	0	1	1	2	3	1	17.0%	-66.7%
Macedonia	1	-	0	5	5	10	26	4	0	21.9%	-100.0%
Montenegro	-	-	-	-	-	-	0	1	4		300.0%
Netherlands	2	5	4	2	5	2	2	1	1	-9.4%	0.0%
Norway	-	-	-	-	-	-	-	-	0		
Poland	32	41	51	115	91	70	56	42	17	4.0%	-59.5%
Romania	10	16	14	10	4	4	2	3	0	-15.8%	-100.0%
Serbia	-	-	-	-	-	-	148	115	39	-22.3%	-66.1%
Serbia and Montenegro	26	140	96	106	53	107	-	-	-	-	-
Slovakia	164	369	483	228	245	334	380	278	363	7.8%	30.6%
Spain	6	6	8	6	2	0	0	0	0	-100.0%	-
Sweden	0	5	4	6	5	8	14	14	9	18.7%	-35.7%
Switzerland	4	12	16	2	9	1	8	28	20	32.0%	-28.6%
Turkey	-	-	-	0	3	4	0	8	12		50.0%
Turkey	48	48	60	32	17	20	32	42		-1.9%	
Ukraine	-	-	-	0	-	1	20	3	-	-	-100.0%

Table 4: Railway freight transport – freight unloaded in Slovenia by country of loading (in 1000 tons)

Source : Statistični urad Republike Slovenije

Types of goods are defined by the Goods Nomenclature for Transport Statistics (NST/R) till 2008. In 2008 this classification was replaced by a new goods classification NST, 2007. The following 10 groups of goods are defined for the purpose of analyses:

	International transport - goods loaded in Slovenia			International transport - goods unloaded in Slovenia			Transit		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Type of goods - TOTAL	5,029	4,892	5,558	4,825	5,230	4,648	3,110	3,311	3,750
Cereals	7	6	1	145	287	130	92	136	333
Potatoes, other fresh or frozen vegetables and fresh fruit	0	0	0	0	0	0	0	0	0
Live animals, sugar beet	0	0	0	69	36	0	0	0	0
Wood and cork	110	124	202	685	808	697	562	614	935
Textiles and waste, other raw animal and vegetable materials	0	0	0	0	0	0	3	2	2
Foodstuffs and animal fodder	31	48	34	81	46	30	214	233	190
Oil seeds and oleaginous fruits and fats	2	1	0	21	14	10	4	4	7
Solid mineral fuels	383	268	429	68	63	114	17	17	21
Crude petroleum	0	0	0	0	0	1	0	0	0
Petroleum products	108	113	188	177	184	88	157	184	192
Iron ore, iron and steel waste and blast furnace dust	2,166	1,968	2,078	369	399	342	614	558	451
Non-ferrous ores and waste	32	37	27	0	0	0	0	1	0
Metal products	57	27	140	623	774	820	490	466	430
Cement, lime, manufactured building materials	15	19	16	34	32	65	53	51	50
Crude and manufactured minerals	203	174	160	305	306	323	33	27	28
Natural and chemical fertilisers	0	0	1	81	98	68	97	124	119
Coal, chemicals, tar	0	0	0	1	0	0	0	2	30
Elementary chemicals, chemical products	370	368	371	139	88	81	170	158	70
Paper pulp and waste paper	25	16	11	217	187	179	52	24	26
Vehicles and transport equipment, machinery, apparatus, engines or not assembled, and parts thereof	181	186	230	196	209	183	88	78	107
Manufactures of metal	0	0	0	0	0	0	2	1	0
Glass, glassware, ceramic products	33	36	40	17	6	8	44	50	43
Leather, textiles, clothing, other manufactured articles	74	75	98	142	152	129	78	130	158
Other non-mentioned product	1,232	1,425	1,534	1,455	1,540	1,379	339	452	558

Table 5: Railway goods transport by type of goods (NST/R) and type of transport (in 1000 tons)

Source: SURS

In table 7 are highlighted in bold chemical products.

Slovenian Railways own and operate three combined transport terminals in Slovenia: in Ljubljana, Maribor and Celje.

Combined/intermodal transport today represents more than 20 % of the freight (more than 3.8 mil. tons per year) transported by the Slovenian Railways (Slovenske Železnice). Roughly two thirds of the freight is transported in containers, while the rest is transported by other means of intermodal transport.

Most of the freight is handled by the Slovenian Railways at the Ljubljana Container terminal. Much less freight is handled at the terminals in Maribor and Celje. In recent years the Ljubljana terminal recorded a throughput of more than 90,000 TEU per year, which is actually a small volume compared to the throughput of the container terminal in the Port of Koper; which was more than 470.000 TEU in 2010.

The recorded throughputs of the three combined transport terminals in the last years are as follows (see also Figure below):

A.2007: CT Ljubljana: 64,427 TEU, CT Maribor: 7,587 TEU, CT Celje: 4,994 TEU,

B.2008: CT Ljubljana: 97,639 TEU, CT Maribor: 9,632 TEU, CT Celje: 6,290 TEU,

C.2009: CT Ljubljana: 80,337 TEU, CT Maribor: 12,163 TEU, CT Celje: 8,174 TEU.

5. Traffic in the Port of Koper

5.1. Freight Flows and its characteristics

The Port of Koper is operated by the company Luka Koper d.d. It operates 11 specialized terminals which are suitable for almost all type of goods.

The freight handled can be classified into five groups, characterized by cargo characteristics (way of manipulation and transportation) as follows: dry bulk, general, liquid cargo, cars and containers.

Traffic throughput grew in the port at a yearly rate of 5.9% until 2009, where the growth was 8%. The highest growing rates had cargos like containers and cars, while other cargos grew at a smaller rate.

In the years 2008 and 2009 approximately two thirds of cargo handled in the Port of Koper was transit cargo. However the structure of cargo flows changed somewhat during these two years. Containers and liquid cargos increased their share; cars maintained the same share, while dry bulk and general cargos dropped their shares in 2008. In 2009 the share of cars dropped, together with dry bulk cargos, and, on account of this, liquid and general cargos as well as containers increased their share.

Till the year 2008, container transshipment achieved record values, as the highest number of container units (TEU) was transshipped as many as 353,880. The annual growth of container transshipment amounted to 16%, and the port thus kept its leading position in comparison to the neighboring northern Adriatic ports. This was especially positive given the fact that containers represent a very desirable type of freight in ports.

In 2009, container transshipment decreased somewhat, to 343,165 container units (TEU). In view of the economic crisis, the 3% decrease in the container transshipment scope was a good and encouraging result both in comparison with other ports in the northern Adriatic as well as with the northern European ports.

Cargo group	Period	2009
Containers (TEU)	Loaded	13.7%
	Unloaded	14.8%
	Total	14.2%
Cars (piece)	Loaded	41.8%
	Unloaded	11.3%
	Total	14.2%
Containers (t)	Loaded	11.4%
	Unloaded	14.0%
	Total	12.4%
Cars (t)	Loaded	12.7%
	Unloaded	10.7%
	Total	10.5%
Other general cargoes (t)	Loaded	7.8%
	Unloaded	13.3%
	Total	7.5%
Dry bulk cargoes (t)	Loaded	11.8%
	Unloaded	4.5%
	Total	4.9%
Liquid cargoes (t)	Loaded	-
	Unloaded	5.3%
	Total	5.1%
TOTAL (t)	Loaded	7.9%
	Unloaded	5.6%
	Total	5.9%

Table 6: traffic throughput growing rates from 1996 to 2009

The minimum decrease of the container transshipment scope was definitely influenced by the construction of the new operative shore with hinterland surfaces and the acquisition of four new post-panamax container cranes, which provided conditions necessary to establish the new direct shipping link to the Far East. The new railway connections of the port with the hinterland markets and the new shipping links with the eastern Mediterranean were also important.

The growth rate for containers was quite higher compared to other cargo groups (general cargoes, liquid cargoes, cars), which recorded modest growing rates. In 2000 containerized cargo represented about 10% of the total throughput in terms of volume, while in 2010 this cargo group recorded 23% share of the throughput - around 3 million tons of cargo. The container traffic registered a positive growth rate even in 2009; less than previous years, while all other cargo groups registered negative growth.

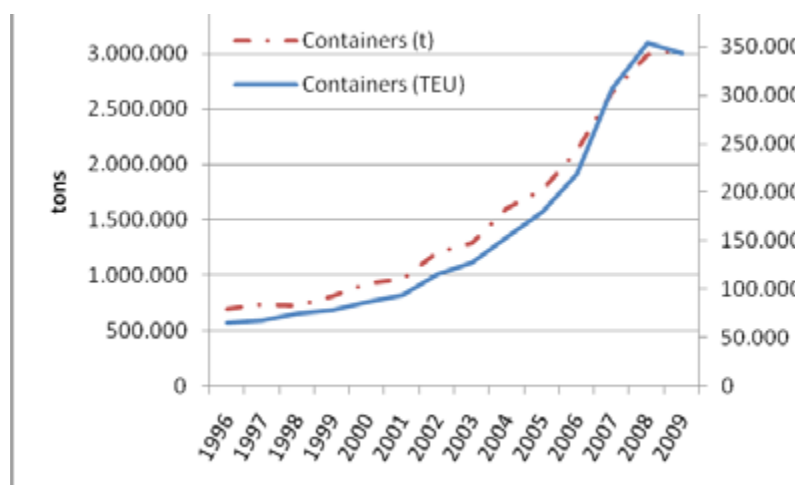


Figure 11: Port of Koper Container traffic in years 1996 - 2009 (tons, TEU)

Source: Luka Koper

6. Analysis of Slovenian Transport Network Bottlenecks

From 1991 only reconstructions and modernization of tracks were carried out on the Slovenian public railway infrastructure. It mostly maintained the status quo and transportability, while there were no major updates and new constructions (the only exception was the building of a new rail link between Slovenia and Hungary). A presentation and assessment of the situation in the Slovenian transport infrastructure is given within the Operational Program of Environmental and Transport Infrastructure Development for the 2007-2013 Period¹, a 2008 document, the aim of which was to ensure conditions for growth by providing sustainable mobility, for improvement of the environment's quality and for the construction of adequate infrastructure.

6.1. Public railway infrastructure situation

Due to insufficient funding the railway network is in its worst condition ever. Until now only 25% of the National Program of the Slovenian railway Infrastructure Development was adopted.

The railway tracks in Slovenia suffer from evident:

- damage and defects on tracks, catenaries, signaling and safety devices, points which results in the introduction of lower speeds.

Such a condition of the railway infrastructure has resulted in:

- Axle and speed load restrictions: Inadequate maintenance and slow modernization of the railway infrastructure, with increased route loads due to the extending scope of transport
- Decrease of the railway transport scope: Due to the poor infrastructure condition, the already less competitive railway transport services are moving even further away from the requirements and needs of their users
- By-passing Slovenian lines: Due to the inadequate allowed axle loads certain freights are already being directed to transport routes passing Slovenia (which, of course, means losing freight) or box cars in certain directions of main routes are loaded by 15% less than admissible in view of their load capacity (e.g., Zidani Most-Šentilj and Pragersko-Murska Sobota)
- Speed constraints: With the existing condition of the infrastructure, transport safety can only be ensured by restricting speed which results in increased railway transport delays and lower average commercial speeds
- Influence on the intermodal transport: the above mentioned conditions also influence the running of intermodal transport the freights transported and are also restricted by admissible axle load
- Increased train delays: Within the public railway infrastructure network in Slovenia, the situation in freight transport presents the greatest problem.

¹ The Operational Programme of the Environmental and Transport Infrastructure Development for the 2007-2013 period is an implementation document of the Republic of Slovenia for the period extending from 2007 to 2013, which determines legal obligations and the rights to implement the EU's cohesion policy in Slovenia. It is Slovenia's and the EU's joint programme document adopted after harmonisation with the European Commission, with the partners implementing and financing it together.

A first analysis of the Slovenian public railway network is showing that the infrastructure has to be modernized as soon as possible in order to ensure safe, reliable and modern transport conditions to all users.

6.2. Identified Infrastructural Bottlenecks

The Network Statement of the Republic of Slovenia for 2010 issued by the Slovenske železnice company, distinguishes between permanent and temporary bottlenecks. Permanent bottlenecks are present on routes with prevailing long-term guaranteed freight potential and linked to infrastructure modernization. Temporary bottlenecks are connected with current freight potential and linked to operational solutions.

Bottlenecks have been located on the following track sections:

1. - Ljubljana – Jesenice;
2. - Pragersko – Ormož;
3. - Maribor – Prevalje;
4. - Ljubljana – Kamnik;
5. - Jesenice – Nova Gorica;
6. - Divača – Koper;
7. - Novo mesto – Metlika;
8. - Ljutomer – Hodoš.

Permanent bottlenecks are mostly present on the following track sections:

- Divača – Koper,
- Ljubljana – Jesenice and
- Pragersko – Ormož – Ljutomer – Hodoš.

From the aspect of international railway links, especially in the direction northern Adriatic–Baltic, important bottlenecks appear on the following routes (key characteristics are presented in the Table below):

- Koper – Ljubljana – Slovenian/Austrian border (Villach),
- (Zagreb/HR) – Zidani Most - Maribor – Slovenian/Austrian border (Graz),
- Zidani Most – Ljubljana.

Section	Bottlenecks	Negative Consequences
Ljubljana – Divača	passenger train max speed = 100 km/h	lower train speed expected year of saturation = 2012
Divača – Koper	single track	lower train speed
	max gradient 25 ‰	expected year of saturation = 2012
	min radius 250 m	
A/SLO border – Zidani Most	max axle load = 20 tons	train load capacity underutilization
	single track between A/SLO border –Maribor (16 km)	
Zidani Most – Ljubljana	max speed on Ljubljana – Zidani Most section = 120 km/h	lower train speed
		expected year of saturation = 2012

Table 7: Railway bottlenecks and negative consequences on major international connections

Source: Updated data from AB Landbridge Project

The improvements planned for the technical characteristics of the railway infrastructure are:

- provision of admissible axle load of the minimum D3 category (225 kN/axle and 72 kN/m) across the entire network of the main routes in Slovenia,
- construction of the new Divača – Koper railway link,
- increase of the highest allowed route speed along main routes coinciding with corridors V and X to 160 km/h, with admissible and substantiated deviations,
- further modernization of the signaling-safety and telecommunications devices along corridor V.

With the above mentioned steps the modernization should bring:

- an increase in route transport electricity,
- an increased level of transport safety,
- more effective transport management,
- lowered operating expenses,
- an introduction of interoperability.

6.3. Road Network Bottlenecks situation

In previous years, the Republic of Slovenia invested mostly in the construction of a motorway network, while investments in the national road network were practically non-existent or implemented in a substantially lesser volume. Based on this, bottlenecks related to the road infrastructure can be divided into two groups: From the year 1998 traffic by road increased substantially which caused various problems on the network and as a consequence bottlenecks were formed.

Despite the motorway network being extended for the most part, we are still facing bottlenecks due to constant and high levels of traffic growth. The main and regional roads have not been dimensioned and constructed for the current traffic volume that is persistently increasing. So the traffic density as well as the traffic loads are rising which both result in road surface damage. There are still motorway sections under construction in 2010 and present bottlenecks due to missing sections of the motorway network are shown in Table and Figure below.



Table 8: Motorway sections in construction – bottlenecks in 2010

Name of the motorway leg	Name of the section	Length in km	Opened for traffic
Podravje leg	Gorišnica – Ormož section	10.4	After 2013
Primorska leg	Connection to the Port of Koper, phase 1, Ankaran access road	1.5	End of 2010
	Koper – Izola	5.2	Beginning of 2013
	Connection to the Port of Koper, phase 2	1.4	2012
Gorenjska leg	Peračica – Podtabor section	2.4	2011

Source: DARS



Figure 12: Motorway sections under construction (bottlenecks) in 2010

With the already poor condition of the roads, the key problems of the road network are:

- insufficient capacity of existing roads in the direction of future/new motorways:
- expected increase of international (transit) transport towards the southeast upon further expansion of the EU to the east and further into the Balkans or after the restoration of economic flows,
- reduced connections capacities to peripheral regions with central Slovenia and poor links between these areas and international highways (to the TEN network).

- expected increase of international (transit) transport in the direction southwest – northeast,
- bottlenecks on roads leading through urban centers – this is related to poor safety conditions.

The elimination of bottlenecks by constructing and modernizing road links on development axes will result in:

- improving capacity on these axes as well as direct economic effects among users (lower transport costs),
- indirectly improvement of economic competitiveness in these areas and consequently the favorable influence on regional development,
- enabling utilization of potentials offered by the area in terms of settlement, infrastructure, manufacturing and supply activities.

Construction of the new transverse development transport axis and modernization of the existing ones also means connecting regional centers with Austria, Italy, Slovenia and Croatia, and enables the establishment of links of freight and passenger road transport in all regions on this axis to the main European transport directions.

7. Pipeline network in Slovenia

Slovenia, being a small country does not have a widespread network of pipelines. In the figures below are shown the Slovenian pipelines

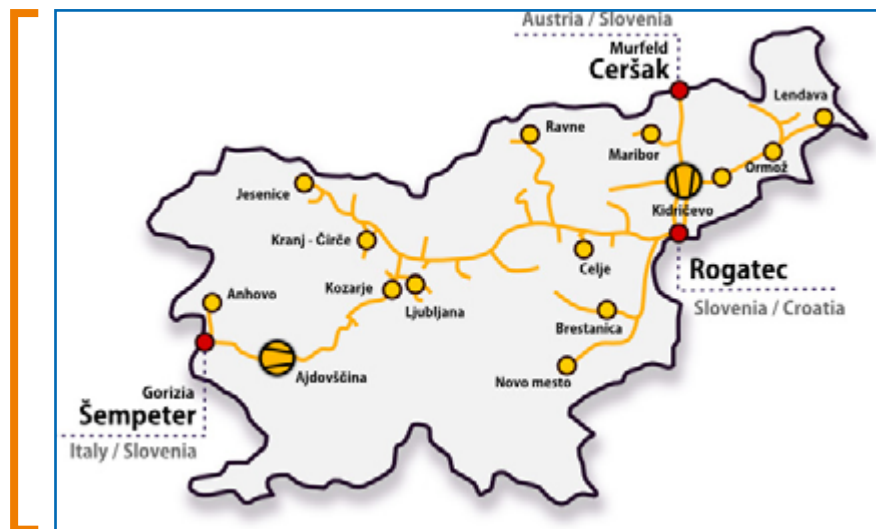


Figure 13: Gas pipeline of company Geoplin (source: www.geoplin.si)



Figure 14: Oil pipeline (source: <http://www.janaf.hr>)

The oil pipeline is only reaching the city of Lendava where is located the only Slovenian refinery.



Results of SWOT Analysis

1. General information about the questionnaire

The questionnaire was sent to all companies, members of the Association of chemical and pharmaceutical industry, and of the Traffic association, both within the Chamber of commerce and industry of Slovenia. 12 companies responded to the questionnaire.

1.1. Number of employees:

From 5 (logistic services) to 8569 (pharmaceuticals), average number 1013

1.2. Orientation and ownership:

All of them: export oriented, predominantly Slovenian ownership

1.3. Sectors

Industry and services (NACE codes):

C20.130	Manufacture of other inorganic basic chemicals
C20.160	Manufacture of plastics in primary forms (2 companies)
C20.290	Manufacture of pesticides and other agrochemical products (2 compan.)
C20.300	Manufacture of paints, varnishes and similar coatings (2 companies)
C20.530	Manufacture of essential oils
C21.200	Manufacture of pharmaceutical preparations
C22.100	Manufacture of plastic plates, sheets, tubes and profiles
H52.2.2	Service activities incidental to water transportation

2. External opportunities and threats

What are the external opportunities or threats particularly capable of influencing chemical industry in the Mediterranean area? The number fraction of companies is expressed in percent (%), unweighted for their largeness.

2.1. Economic trends

Item	Opportunity	Threat	Neutral
Internationalization of markets	84	8	8
Intensified competition	42	58	
Regional economic development	67	8	25
Regional wage level dynamics	33	25	42
Moving of production	33	17	50
Other:			

Internationalization of markets and regional economic development are considered as opportunities, while intensified competition is regarded as the only serious threat.

2.2. Socio-cultural trends

Item	Opportunity	Threat	Neutral
Demographic changes	25	8	67
Intercultural competencies	33		67
Existing skills of employees	75		33
Millieu sensitivity (see item 2.4, too)	17	33	50

Three out of four companies believe that the existing skills of employees are their main opportunity. The other items are predominantly neutral.

2.3. Tehnological trends

Item	Opportunity	Threat	Neutral
Information & Communication Technology, ICT	92		8
Innovations in transport	100		
Innovations in warehousing	92	8	
Other:			

The technological development with all the cited three elements will be the main driving force in future, giving the companies opportunities for growth.

2.4. Environment and energy

Item	Opportunity	Threat	Neutral
Availability of energy sources	50	33	17
Carbon dioxide emission laws	17	25	58
Energy costs	8	84	8
New EU legislation about chemicals (REACH, CLP)	25	42	33
Management of side products	33	17	50
Waste management	33	42	25
Water usage	16	42	42
Life cycle assesment of chemicals	42		58
Use of sustainable development (SD) indicators (environmental, economic, societal development)	50		50
Reporting on SD results	17	8	75

Energy costs are by far the main threat to companies, followed by the new EU legislation on chemicals, waste and water management. On the other hand, the availability of energy sources, the use of SD indicators, and the LCA are regarded as opportunites for half of the firms.

2.5. Politics and innovations

Item	Opportunity	Threat	Neutral
International harmonisation of traffic regulations	83		17
Transport infrastructure development and priorities	83		17
Land use policy	17	33	50
National/regional financial subsidies regarding traffic/transportation	67		33
Other:			

International harmonisation of traffic rules, and transport infrastructure development are considered of top importance, followed by financial subsidies for transportation. No special threats are reported, only one third of companies worry about the influence of land use policy, only.

2.6. Transport infrastructures

2.6.1. Railway transportation

Item	Opportunity	Threat	Neutral
Railway traffic share to increase	42	16	42
Location of terminals	42	8	50
Infrastructure levels	50	33	17
Bureaucratic constraints		67	33
Interoperability problems		42	58
Quality of services	67		33
Sector legislation and procedures	8	42	50
Other:			

Railway traffic is expected to increase by nearly half of the companies. Quality of services and infrastructure levels are considered as opportunities, while bureaucratic constraint is the main threat. The participants are neutral regarding interoperability problems, location of terminals, sector legislation and procedures.

2.6.2. Road transportation

Item	Opportunity	Threat	Neutral
Road traffic share to increase	25	58	17
Location and structure of the road network	58	17	25
Road toll issues	8	84	8
Congestion levels		100	
Interoperability/international standards	42	25	33
Accident frequency		58	42
Sector legislation and procedures	17	33	50
Other:			

Road transportation is expected to be reduced considerably because of congestion levels, road tolls, and accident levels. Location and structure of the road network is regarded as the main opportunity.

2.6.3. Sea waterways

Item	Opportunity	Threat	Neutral
Sea traffic share to increase	33		58
Location of ports	42	8	50
Harbours' capacity and efficiency	50	8	42
Relations between the professional groups working in the port	17	8	75
Distribution of terminals	33	8	59
Hinterland interconnection	59	8	33
Sector legislation and procedures	8	33	59
Other:			

Sea waterways are considered to be an opportunity by only one third of participants –most of them are neutral to its increasing share. Hinterland connection and capacities of harbours together with their location are listed as opportunities, while distribution of terminals, sector legislation and procedures are not very important.

2.6.4. Intermodality

Item	Opportunity	Threat	Neutral
Location, structure and services of intermodal hubs	50	17	33
Transshipment efficiency	66	17	17
ICT within intermodal transport	58		42
Other:			

Intermodality is regarded as pretty important, mainly because of the transshipment efficiency. ICT within intermodal transport will be more important than location, structure and services of intermodal hubs.

2.6.5. Pipelines

Item	Opportunity	Threat	Neutral
Structure of the pipeline network		25	75
Capacity and efficiency of the pipeline network		25	75
Classes of products using pipelines		8	83
Transnational interconnection	17	8	75
Other:			

Pipeline transportation is not important to the companies involved.

2.7. Safety and security (at national/regional level)

Item	Opportunity	Threat	Neutral
International standards adopted	75		25
Emergency management structures	58	17	25
Transnational cooperation	57		33
Tracking and tracing facilities for cargo units	83		17

Transportation safety and security are very important to the companies. The most important items are the tracking and tracing facilities, followed by international standards, emergency management and transnational cooperation.

2.8. Industry sector and competition

2.8.1. Suppliers

Item	Opportunity	Threat	Neutral
Degree of product standardisation	83		17
Potential for forward integration	83		17
Area of concentration/geographical distribution	42	25	33
Other:			

Degree of product standardisation and potential for downstream integration will be the main opportunities regarding suppliers.

2.8.2. Customers

Item	Opportunity	Threat	Neutral
Degree of concentration	33	33	34
Potential for backward integration	75	8	17
importance of the industry sector for customers	67		33
Other:			

Upstream integration potential and industry sector availability are considered as the main opportunities for customers.

2.8.3. Access to market

Item	Opportunity	Threat	Neutral
Economy of scale	75	17	8
Brand identity	75	8	17
Product differentiation	67	16	17
Availability of product substitutes	33	59	8
Other:			

Access to market is of top importance for the participants within the scale of economy, and brand identity is the most important, followed closely by product differentiation. Availability of product substitutes is the main and only serious threat for them.

2.8.4. Import-export processes

Item	Opportunity	Threat	Neutral
Cooperation with governmental bodies	75	8	17
International harmonisation of laws on product acceptance	58	17	5
Other:			

Both, cooperation with governmental bodies and international harmonisation of laws in product acceptance are important for import-export processes.

3. What are internal strengths/weaknesses of your company?

N.B. 1: These factors can be influenced by YOUR company.

N.B. 2: For each of the following items say if, according to you, it represents a strength, or a weakness, or it is neutral to your business.

3.1. Procurement

3.1.1. Export/import processes

Item	Strengths	Weaknesses	Neutral
Lead time for raw materials / intermediate products	50	42	8
Suppliers' availability/reliability	75	17	8
Sourcing strategy (many vs. one)	92		8
Quality of product/packaging	75		25
Payment conditions	42	42	18
Logistic chain and transit times	67	33	
Other:			

The strenghts of the companies are the sourcing strategy, suppliers' availability and reliability, yuality of products and packaging, logistic chain and transit times. There are no large weaknesses, or neutral positions.

3.2. Warehousing

Item	Strengths	Weaknesses	Neutral
Stock level safety	75	17	8
Inventory level	75	17	8
Inventory cost	42	25	33
Just-in-time strategy	67	8	25
"Green" warehousing	42	16	42
Outsourcing policy	42	8	50
Other:			

The strenghts far outweigh the weaknesses, again – including stock level safety, in-ventory level, and just-in-time strategy. The other three strenghts are at the 42 % level.

3.3. Production logistics

Item	Strengths	Weaknesses	Neutral
Complexity of production processes	75	17	8
Flexibility within production processes	84	8	8
Production costs	42	42	16
Scrap rate	33	25	42
"Green" production processes	58	8	34
Other:			

The strenghts are the production processs – they are flexible, complex, and "green". Production costs are the only item, close to weakness.

3.4. Distribution and transport

Item	Strengths	Weaknesses	Neutral
Delivery time and performance	100		
Payload optimization	75	8	17
Mode of transport	75		17
Sustainable transport	66	17	17
Freight costs	50	50	
Other:			

All the items belong to the strenghts of the companies in dwescending order. The only exception being freight costs with 50 % strenght, and 50 % weakness.



3.5. Planning and controlling

Item	Strengths	Weaknesses	Neutral
Accuracy and flexibility in supply planning	75	17	8
Forecasting with customers	84	8	8
Accuracy and flexibility in delivery planning	66	17	17
Error analyses and control	75	17	8
Quality assurance procedures	75	17	8
Other:			

All the items belong to the strength of companies – the highest ranking is the one forecasting with customers, and the lowest is the accuracy and flexibility in delivery planning.

3.6. Order processing

Item	Strengths	Weaknesses	Neutral
Available to promise	100		
Order fulfilment cycle time	92	8	
Flexibility with order processing	100		
Other:			

The order processing items are practically 100 % strengths.

3.7. Safety/security (at company level)

Item	Strengths	Weaknesses	Neutral
Internal safety procedures	83	17	
Management of dangerous goods	92		8
Cooperation with national/regional authorities	75	8	17
Participation in Responsible Care programmes	83		17
Continuous training on health and safety	92		8
Other:			

Safety and security items are without doubt strengths of the companies involved.

3.8. Information and Communication Technology in company logistics

Item	Strengths	Weaknesses	Neutral
ERP/MRP system in inventory management	58	17	25
Supply chain tracing/controlling	66	17	17
EDI utilization	50	17	33
Satellite telemetry	17		83
Other:			

The ICT items are on the side of strenghts, with the exception of satellite telemetry, and also EDI utilization which are evidently not present in the companies, yet.

3.9. Procedures in company logistics

Item	Strengths	Weaknesses	Neutral
Recruitment strategy	75	8	17
Definition of the key responsibilities of employees	84	8	8
Recruitment of specialized staff	83	17	
Continuous professional training and HR development	100		
Other:			

Procedures in company logistics belong undoubtedly to the strenghts of companies.

Conclusions

Technological and economic trends offer opportunities to Slovenian companies (with an exception of intensified competition), while socio-economic are neutral, with the exception of very positive employees' skills. Environment and energy trends are not regarded either as strong opportunities or threats with the exception of energy cost; some more time will be needed for them to come in forefront. Many priorities are expected to come from politics: international harmonisation of traffic regulations, transport infrastructure development, and national or regional financial subsidies.

Road traffic is expected to reduce its share while the railway one will increase. The water transportation will not be more important in future. With the exception of some ores (phosphates) and minerals (alumina), the raw materials are imported from partners in European countries. It is unlikely for chemicals from Germany to be transported by waterways, e.g. from by barges to Rotterdam, and by ships to Koper, followed by railway and road transportation to plants. The same is true for the products – it is costly and time consuming to transport medicals or paints to Poland or Russia by sea. But the railway is promising more, especially if its infrastructure will be improved (modernisation of Slovenian Railways, a second track from Koper port, electrification of the rails to Hungary, introduction of ICT), its transportation velocity increased, intermodality and warehousing increased. The railway transport is also safer than the road one.

Growth of chemicals production and usage in Asia, Southern America, Africa, and Mediterranean in particular is increasing much faster than in Europe and Northern America. It offers opportunities for the development of Slovenian chemical and pharmaceutical industries. In these cases a combination of overseas and railway transportation is promising, especially when fuel prices and the climate change problems will continue to increase. Infrastructure and railway connections with hinterland, bureaucratic and inflexible organization of work, and trade unions behaviour have to be improved. Chemical companies in harbours should be developed, cooperation of ports instead of their competition should be established, and administration and customs procedures harmonized.



An Analysis of Strengths, Weaknesses, Opportunities and Threats within the Chemical Transportation and Logistics Sector in the Maltese Islands

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Part 1 Study Background and Context

1. Study Aim

1.1. The aim of the SWOT analysis is to provide the Local Councils Association with an analytical framework that:

- establishes a National context for the transportation of chemicals in Malta and Gozo;
- identifies and articulates primary potential threats which could result in risk to safety, security and the logistical supply chain;
- identifies and articulates primary vulnerabilities within the transportation supply chain;
- identifies and articulates strong points of the transportation supply chain infrastructure;
- Identifies and articulates opportunities that may arise from an analytical evaluation of the National transportation supply chain.

This information is intended to enable LCA to better engage with decision makers in designing and adopting the relevant protective, preventive and preservative strategies in securing Malta's primary transportation nodes and hubs and protect the larger Maltese Community and the environment.

2. Study Scope and Objectives

2.1. A comprehensive SWOT evaluation is the point of departure for successful security, safety and logistics assessments; periodic evaluations and resulting policy planning and implementation. Its primary purpose is to provide a context-specific backdrop to any subsequent safety, security and logistics risk management processes.

2.2. Overall, the SWOT assessment should be analysed, evaluated and interpreted taking into account the identified weaknesses within the chemical logistics transportation chain.

2.3. The SWOT assessment will:

Serve to inform policy and decision making at the executive levels of the Local Council Association in order to engage more effectively with the relevant stakeholders and interested parties in terms of policy and planning;

Provide a contextual backdrop for guidance to duly authorised interested parties in assessing and evaluating chemical safety, security and logistics risks in the context of the Maltese transportation chain;

Provide a pen picture of factors relating to risk criticality in the respective transportation hubs and nodes in order to inform future security, safety and logistics strategy policy and planning;

Provide a basis for future re-assessments and evaluations of safety, security and logistics within critical transportation hubs and nodes.

3. Countering the Global Threat to Transportation Security – A Historical context.

3.1. The modern-day transportation environment is arguably amongst the most vulnerable to high impact security breaches which carry an in-built catastrophic potential. Security experts point that the transportation industry must be adequately and robustly protected if the quality of life in societies is to be preserved. International shipping is increasingly becoming a source of concern in terms of its vulnerability to global terrorism. Moreover safer security management practices are considered essential if the prevention of terrorism, piracy, organized crime, severe environmental degradation and general criminal activity within National waters is to be reduced to acceptable levels. Given Malta's dependencies on the marine transportation node and a total lack of supplies by rail, security of its air, maritime supply chain is of paramount national importance and will receive the bulk of the focus within this study, with specific emphasis on the transportation of chemicals.

3.2. The International Maritime Organisation's (IMO) mandate empowers it with the responsibility to make travel and transport by sea as safe as reasonably possible. In the immediate aftermath of the tragic events forced upon world trade on the 11 September 2001 via the United States of America, the IMO embarked on wide consultation with interested stakeholders within the Transportation industry on the need to review existing measures to combat acts of violence and crime at sea. When the IMO 22nd Assembly met in London in November 2001, the decision was taken to hold a Conference on Maritime Security the following year, in December 2002. The specific purpose of the conference was to clearly spell out the IMO's intent of adopting new regulations to enhance ship and port security and avert possibilities wherein shipping became the target for international terrorism.

3.3. This decision followed the adoption of a resolution put forward by Secretary General O'Neill himself, entitled Review of measures and procedures to prevent acts of terrorism which threaten the security of passengers and crews and the safety of ships. The resolution called for a review of the existing international legal and technical measures to prevent and suppress terrorist acts against ships at sea and in port and improve security aboard and ashore. The aim was to reduce risks to passengers, crews and port personnel on board ships and in port areas and to the vessels and their cargoes, including chemical cargoes and supplies.

3.4. An Inter-sessional Working Group on Maritime Security (IWGMS) produced a series of recommendations which were further elaborated by the May 2002 meeting of the Maritime Safety Committee (MSC 75) as well as other IMO bodies. A second ISWG was held in September 2002, and the MSC met again for its 76th session in December 2002, concurrently with the Diplomatic conference on Maritime Security which adopted the new measures to enhance maritime security¹.

4. The International Ship and Port Facility Security [ISPS] Code – The Birth of International Maritime Security Regulation.

4.1. In December 2002, IMO member governments formally adopted various security amendments to the SOLAS convention of 1974, including the two-part International Ship and Port Facility Security Code (known as the Code or ISPS Code). The Code, is intended and designed to pre-empt high impact events from leaving their catastrophic imprints on the global shipping industry, and applies to designated Port Facilities, passenger ships and cargo ships greater than 500 gross tons, and mobile offshore drilling units.

4.2. Under the Code, Designated national port Authorities are required to collate formal assessments

and security plans for all designated port facilities within the respective territories – referred to in ISPS as Port Facility Security Assessments (PFSA) and Port Facility Security Plans (PFSP) – and also to ensure that duly designated Port Facility Security Officers (PFSOs) as well as port facility security personnel are trained up to the standards stipulated by the Code. Where necessary the security assessments and plans produced are to be utilised as the basis for restructuring security management, security forces and operational performance in accordance with the aims and provisions of the Code.

4.3. Note: within ports, it is realistic to find that a number of facilities which are vital to the overall safety and security of the supply chain are actually un-designated for some reason or other – mostly on technicalities. Furthermore, because the Code is mandatory only to ports and port facilities, it effectively excludes other vital elements within the supply chain. As shall be argued later in the study, this is a potentially problematic exclusion and for this purpose, the term installation is utilised within the study to refer to both designated port facilities as well as to non-designated facilities and logistical installations.

5. EU [Maritime] Transportation Security Policy

5.1. The EU's policy on maritime transportation security is encapsulated in regulation (EC) No 725/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, of the 31st March 2004 on enhancing ship and port facility security. The main points of policy have been extracted from the document and interpreted for the purpose of informing the present threat assessment.

5.2. The point of departure of the EU's maritime transportation security policy asserts that intentional unlawful acts – particularly and specifically acts of terrorism – constitute the gravest of threats to the ideals of democracy and freedom and to the values of peace and stability, and therefore threaten the essence of the Union.

5.3. The Community's shipping, citizens and environment require ongoing protection from the threats of intentional unlawfulness such as terrorism, piracy or similar.

5.4. The Commission recognises that, in relation to the transportation of dangerous cargoes, particularly chemical and radioactive substances, the potential² consequences of the threats posed by intentional unlawful acts for Union citizens and the environment are very serious.

5.5. The EU has communicated its intent regarding Part B of the ISPS Code, which is classified as Guidelines by the IMO under SOLAS XI-2 and which comprises a number of recommendations. The EU has made certain Sections of Part B mandatory within the Community in order to make uniform progress towards achievement of the security objective described in recital 2.

5.6. The Commission acknowledges the legislative process completed by the IMO as evinced and embodied within the promulgation of the ISPS Code. In its commitment to improve the efficiency and applicability of the provisions of the Code, the EU also intends to clarify the scope of certain mandatory provisions in Part A of the Code, as well as render certain recommendations in Part B mandatory within the Community.

In practical terms this implies that designated port facilities are obliged to implement particular sections of Part B. in their respective assessments and plans. The following Sections in Part B of the ISPS Code are obligatory in relation to port facilities:

- 1.16 (Guidance in relation to port facility security assessments);





- 4.1 (protection of the confidentiality of security plans and assessments);
- 4.14, 4.15, 4.16 (contact points and information on port facility security plans);
- 4.18 (identification documents);
- 15.3 to 15.4 (minimum standards for the port facility security assessment);
- 16.3 and 16.8 (minimum standards for the port facility security plan);
- 18.5 and 18.6 (frequency of security drills and exercises in port facilities and for port facility security officers);
- Notwithstanding the provisions of paragraph 15.4 of Part A of the ISPS Code, the periodic review of the port facility security assessments provided for in paragraph 1.16 of Part B of the ISPS Code shall be carried out at the latest five years after the assessments were carried out or last reviewed.

5.7. The Commission encourages member States to achieve the fundamental security objective described in recital 2 above by the adoption of appropriate measures in the field of maritime transportation policy. This happens by establishing joint standards for the interpretation, implementation and monitoring within the Community of the provisions adopted by the Diplomatic Conference of the IMO on 12 December 2002 [See par. 3.2 above] and by conferring on the Commission implementation powers to adopt detailed provisions towards the achievement of stated objectives. It should be noted that the EU views the above without prejudice to the legal provisions promulgated by individual Member States in the field of national security and other measures which might be taken on the basis of Title VI of the Treaty on European Union⁹.

5.8. The EU advises that safety and security should be enhanced not only for ships operating in international shipping and the port facilities which serve them, but also on board vessels operating domestic services within the Community and their port facilities, in particular passenger ships, on account of the number of human lives which such trade puts at risk.

5.9. The Commission asserts that, in order to promote security within intra-Community short-sea traffic, the Member States should be asked to conclude, in the light of regulation 11, those special measures that are essential to enhance maritime transportation security under the SOLAS Convention. In particular, agreements on security arrangements for scheduled maritime traffic within the Community on fixed routes using dedicated port facilities should be sought and concluded, without compromising the general standard of security sought.

5.10. The Commission acknowledges that the permanent application of all the security rules provided for in (EC) No 725/2004 to port facilities situated in ports which only occasionally serve international shipping, might be disproportionate. Individual Member States should determine, on the basis of the safety, security and logistics risk assessments, which ports are concerned and which alternative measures provide an adequate level of protection. Effectively this implies that the Designated Authorities of Union States should plan security strategies designed to render entire Ports compliant, as opposed to individual port facilities.

5.11. The Commission emphasizes that Member States should vigorously monitor compliance with security rules and regulations by ships intending to enter a Community port, whatever their origin.

There shall be an appointed 'Competent Authority for Maritime Security' within each Member State, which Authority is responsible for coordinating, implementing and monitoring the application of the security measures laid down in EU Regulations as they apply to ships and port facilities. This authority should require each ship, intending to enter the port, to provide in advance information concerning its international ship security certificate and the levels of safety at which it operates and has previously operated, and any other practical information concerning security.

5.12. Member States have some (limited) jurisdiction in granting exemptions from the systematic requirement to provide the information referred to in recital (11) in the case of intra-Community or domestic scheduled shipping services, provided the companies operating such services are able to provide such information at any time on request by the competent authorities of the Member States.

5.13. Competent authorities for maritime transportation security of the Member States may carry out security checks within their respective ports in accordance with national policies and procedures.

5.14. In view of the number of agencies likely to be involved in the implementation of safety and security measures, the Commission recommends that each Member State should appoint a single competent authority responsible for coordinating and monitoring the application of shipping security measures at national level. Member States should put in place the necessary resources and draw up a national plan for the implementation of this Regulation in order to achieve the security objective described in recital 2. In particular Member States should establish a timetable for the early implementation of certain measures in accordance with the terms of Resolution 6 adopted by the Diplomatic Conference of the IMO on 12 December 2002. **The effectiveness of the checks on the implementation of each national system should, and is likely to be the subject of future inspections supervised by the Commission. This has practical implications, for instance, both in terms of the structure of the National maritime transportation incident response plans as well as general planning. As an example, alignment is required between Transport Malta's designated role and function at the hub of maritime transportation policy within the Ministry for Competitiveness and Communications [The National Focal Point for Maritime transportation Security] and, for instance, the CPD and AFM's respective roles in crisis management, Command, Control and Communications and the protection of critical infrastructures.**

5.15. The Commission considers that the effective and standard application of measures under this policy raises important questions in relation to funding. The guiding principle regarding funding of certain additional security measures is that funding ought not to give rise to distortions of competition. To this end, the Commission had recommended that a study be commissioned intended to specifically address the way financing is shared between public authorities and port operators. The results of this study, it is suggested, are of interest to the LCA and should be obtained and reviewed.^{iv}

5.16. The Commission had asserted that measures needed to implement this Regulation should be adopted in accordance with Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission.

5.17. The Commission had considered that the objectives of Regulation EC/725/2004 could not be sufficiently achieved by the Member States and could therefore, by reason of the European scale of this Regulation, be better achieved at Community level. The Community had advised that it would likely adopt appropriate measures, in accordance with the principles of subsidiary^v and proportionality as set

out in Article 5 of the Treaty. Thus ensuring that this Regulation does not go beyond of what is necessary in order to achieve its objectives.

5.18. In consideration of the above, the Commission adopted EC/725/2004 as the basis of the EU's maritime transportation security policy, and had stated the following Primary Objectives:

- The main objective of the Regulation is to introduce and implement Community measures aimed at enhancing the security of ships used in international trade and domestic shipping and associated port facilities in the face of threats of intentional unlawful acts.
- The Regulation is also intended to provide a basis for the harmonised interpretation and implementation and Community by monitoring special measures in order to enhance maritime transportation security. This was adopted by the Diplomatic Conference of the IMO on 12 December 2002, which amended the 1974 International Convention for the Safety of Life at Sea (SOLAS Convention) and established by the International Ship and Port Facility Security Code (ISPS Code).

6. Transport Malta – Custodian of the National transportation supply chain

6.1. The Malta Maritime Authority was legally established in 1991 as a Government Agency with a distinct and autonomous corporate structure. Vested with comprehensive regulatory powers TM's principal function is to supervise the organisation of Malta's primary maritime services, enabling ports, merchant shipping and yachting centres to operate within a centralised framework.

The Malta Maritime Authority is committed to ensure that the necessary tools are put in place for the effective management of shipping and the protection of the (Maltese) environment. As a small Island State our responsibilities may seem to be disproportionate to our resources but we have to take up this challenge. It is no easy task but with the help of our twinning partners and EU funds such tools will be put in place in order to safeguard our waters, our population and our reputation.

(The Hon. Minister for Transport and Communications, Mr. Censu Galea : DOI; 2003).

6.2. The Malta Maritime Authority continually developed and supported policies and initiatives conducive to shipping best practice in accordance with the functions and duties stipulated in the Malta Maritime Authority Act (XVII) of 1991.

6.3. The Authority's principal role was to create a climate that further enhances Malta's maritime standing and associated business activities. It aims to develop and promote Malta as a maritime centre of international repute that is capable of providing a comprehensive package comprising a range of maritime services. The primary functions of the Authority include:

- The efficient operation and further improvement of ports and yachting centres;
- The registration of ships and administration of the services defined in the Merchant Shipping Act;
- Overall control for the preservation of good order in territorial and internal waters in Malta, in the ports, including land and sea approaches;
- The human resource development of port personnel and seafarers;

- The prevention and control of pollution of ports;
- The provision of appropriate safety measures related to ports and shipping;
- The overseas promotion of Malta as a maritime centre;
- Advice to Government on matters relating to Maritime activities and its development.

6.4. In 2009, following extensive reform in the transportation sector in line with harmonisation with EU policy, the Malta Maritime Authority, the Department of Civil Aviation and the Malta Transport Authority were merged into one Directorate – Transport Malta.

6.5. Clearly the legal mandate had cogent implications on security within Malta's coastal littoral, ports and harbours and the advent of the ISPS Code brought about additional responsibilities on the Authority. By its nature, security relies on multi-functionality to be effective, and as the Designated Authority by Contracting Government, Transport Malta must now countenance the provisions stipulated in the Code, Part A; Sect. 4 in ensuring that Malta's major Ports, logistical installations and individually designated port facilities operate securely and in full compliance with the provisions of the Code, EU and National legislation.

6.6. Furthermore, TM must provide the necessary leadership to ensure that port facilities comply with legislation, to construct context-specific assessments based on reliable threat information, to maintain feasible operational plans and train security personnel in accordance with the standards and performance criteria stipulated in the legislation and required in the present operational environment. With the recent promulgation of national maritime transportation security legislation – L.N. 484 of 2004 – Transport Malta's leadership role assumes a new dimension and TM has been propelled to the forefront of protecting critical National assets, preventing high impact threat events and preserving a stable and secure base for maritime transportation operations vital to the economy.

6.7. Transport Malta resides within the Focal Point of the National efforts to control and co-ordinate the security efforts in Malta's Ports, logistical installations and individual port facilities each of which own various tangible and intangible assets that render them capable of generating and maintaining consistent performances within the local economy; these assets must be preserved and protected. By its nature, the maritime transportation operational environment is replete with occupational hazards, environmental risks and potential security threats that must be managed in a proactive manner. Major security breaches or high impact events are to be prevented or, as a minimum, their consequences are to be minimised by attempts at a priori interventions.

6.8. It is well worth remembering an often repeated phrase in risk management circles: "If you consider that prevention can be expensive, think about the costs of a serious accident or security incident!" In most respects, therefore, the introduction of the ISPS Code as well as ensuing European and National maritime transportation security legislation are welcomed, arguably overdue developments in maritime transportation security management. A proactive Authority should seek to inculcate fresh security cultures and assist port facilities to reap tangible returns on investments in security through loss prevention, accident avoidance and prevention of major incidents.

7. Designated Port Facilities in Malta

7.1. On the 20th January 2004, Transport Malta issued a “NOTICE TO ALL PORT FACILITIES” notifying eleven local port entities of their official designation as Port facilities for the purposes of the ISPS Code as defined by Part. A; 3.1.2 of the Code. In technical terms, the absolute majority of designated port facilities^{iv} are located within the ports of Valletta and Marsaxlokk. On the 01st July 2004 the ISPS Code came into effect internationally. In December 2004, local legislation was promulgated under L.N. 484 of 2004 (Sect.4), and EC.

7.2. The Port Facilities which periodically engage in activities at the ship to shore interface with vessels classified under the Code and for which a (PFSA) and (PFSP) are therefore a statutory requirement are shown in Table 1 below:

Valletta Grand Harbour	
VISET terminal – Pinto Wharf	Bezzina Ship Repair – Coal Wharf
Cargo Handling Company Ltd. – Deep Water Quay and Laboratory Wharf	Central Cement Silos – Fuel Wharf
MOBC, Falzon Group and Enemalta – Flagstone Wharf	Enemalta – Ras Hanzir Dolphin
Enemalta – Church Wharf	Laboratory and Magazine Wharves – (Transport Malta controlled areas)
Cassar Ship Repair – Church Wharf	Dock yard Facilities – French Creek
Central Cement – Coal Wharf	Rinella Creek – Tank Cleaning Farm
Grand Harbour Marina – Vittoriosa Creek	Kordin Grain Terminal – Magazine Wharf
Marsaxlokk Harbour	
Enemalta – Delimara Power Station	Enemalta – Offshore dolphin platform
San Lucian Oil Company – Terminal and offshore anchorage point	Enemalta – Gas Division offshore anchorage point
Enemalta – Petroleum Division jetty	Malta Freeport – Including OilTanking Malta areas of operations.
Oil Tanking Malta operations	None
Mgarr and Cirkewwa Harbours	
Gozo Channel Company Ltd – Cirkewwa Ferry Terminal	Gozo Channel Company Ltd – Mgarr Ferry Terminal

7.3. Non-designated Facilities Clearly there are other entities and port operations that, while not designated as Port Facilities under the structures of the Code, should formally evaluate security within the respective facilities in the context of their location within the respective Ports:

- The yacht marinas at Pieta', Msida and Ta' Xbiex;
- Pieta' Gozo Channel quay;
- Portomaso marina;
- Hal Far Logistics Centre.

8. Safety and Security Risk in Logistical Installations.

8.1. Having established and demonstrated the overwhelming maritime centrality of the supply chain in Malta, it is highly relevant, to extend this into the remaining elements of the chain. Maltese ports [and the Malta International Airport, to a far lesser extent] are hubs of the supply chain. Risk evaluations should now extend downstream into the various nodes and terminal activities. In this respect, the concepts expounded in ISO 28001 become vitally important. In this respect the LOSAMEDCHEM studies can make a highly valuable contribution in raising awareness in an energizing stakeholder dialogue.

8.2. It is well worth keeping in mind that the respective Port Facility Security Assessments (PFSAs) for designated port facilities have been documented separately as part of the ISPS compliance procedures; each assessment being fundamentally a risk analysis of all aspects of the respective facilities' operations at the ship to shore interface. Each Installation security assessment would have included a determination of the potential nature, likelihood of occurrence and magnitude of impact of future security breaches of a serious nature.

8.3. On completion of each risk analysis, a Facility Risk Profile detailing the level of safety, security and logistics risks at the particular location should also have been documented, and a prioritized series of recommended security countermeasures should be listed. These recommended countermeasures should then have been addressed within (reasonable) implementation timeframes.

8.4. Safety and Security risk assessments should form the basis of subsequent Installation Security Plans which, only in the case of designated port facilities, were mandated by the ISPS Code and subsequent legislation. Security plans should address the operational and physical security measures which the Installation shall adopt to operate securely at Security Level 1 as defined and required by the Code. Additional security measures to move to and operate at security level 2 when instructed to do so by Transport Malta. The security plans will also include possible preparatory actions the respective Port facilities could consider taking to ensure a prompt response to the instructions that may be issued at Security Level 3.



9. Key Definitions

9.1. In this section, a common methodology for assessing risk to safety and security in the logistical supply chain is explored. The LOSAMEDCHEM project is a good opportunity to introduce more careful analysis of safety and security as these affect the transportation and chemical sectors as well as the wider Maltese and Gozitan communities.

9.2. The Code stipulates that, in carrying out PFSA's the following risk parameters shall be identified and evaluated at each Installation:

- Assets – [as defined by ISPS Part A; Sect; 15.5.1.] – Every Installation owns and operates a wide array of people, properties, inventories, information and processes that require protection if the facility is to operate at all. Collectively these are termed assets and may be operationally tangible or even intangible in some cases.

- Threats – [as defined by ISPS Part A; Sect; 15.5.2.] – A threat is loosely described as an indication of an impending loss event. For the purposes of compiling PFSA's, assessors often rely on a qualitative estimate of probability to assess the possibility of a particular event occurring at specific facilities. This is acceptable. However, for the purposes of National Maritime Transportation Security Threat Assessment an identified threat event should attempt to account for the intent and manifest capability of a known adversary to complete the act in a Maltese port. The threat assessment is a problematic aspect of any security assessment, as indeed world events have shown in the past few years. The National Emergency Response and Security Agencies (NERSA) should remain cognizant of this fact and ensure that appropriate and timely guidance is communicated to port facilities through Transport Malta. ***For example, based on appropriate intelligence, Transport Malta might consider posting appropriate guidance to port facilities and port operators on its website in relation to handling illegal immigrants within port areas during periods when the problem becomes acute.***

It is vitally important, however, that within the overall context of security risk assessments, threats evaluations are not limited solely to the criminal or terror dimension but rather safety and accident prevention should also be accounted for.

- Vulnerabilities – [as defined by ISPS Part A; Sect; 15.5.4.] – Any weakness in security countermeasures constitutes a vulnerability in the context of an Installation's overall security effectiveness. While common sense should prevail in assessing an Installation's security system, assessors should adopt a critical if objective view of deployed countermeasures and should not demonstrate diffidence in commenting on effectiveness or in recommending cost-effective alternatives. Security countermeasures

are also to be recommended in accordance with Part A; Sect; 15.5.3 of the Code.

9.3. In completing security risk assessments, assessors should base their approach on the following tried and proven criteria:

Extensive observation of the location, by day and night, with a view to understanding the nature of berthing operations and determining the nature of security threats that might potentially accrue within the respective locations;

In-depth discussions with key personnel from within the Installation, as well as advice from Transport Malta security officials as appropriate in order to establish a number of contextual criteria;

A documented qualitative risk analysis of ship to shore operations based on carefully defined risk parameters within the context of the specific Installation being assessed.

9.4. Arguably, therefore, an established and internationally recognised methodology for executing security risk assessments is in place. Indeed the same theme and techniques have been taken up by the assessment methodology described in ISO 28001. This is an important factor as it relates to opportunities for improvement as well as good practice, which is the next stage of the LOSAMEDCHEM project.

9.5. The safety, security and logistics risk assessment should be constructed around well established and widely accepted risk formulae:

$$\text{Risk} = \text{Impact} \times [\text{Threat} \times \text{Vulnerability}]$$

Fig. 1a – Risk Formula 1.

Where the expected Impact is represented directly by an anticipated (cost of) loss of assets at risk, the following formula becomes more relevant:

$$\text{Risk} = [\text{Asset Value}] \times [\text{Threat} \times \text{Vulnerability}]$$

Fig. 1b – Risk Formula 2.

This formula is useful in a number of ways – principally because it contains the three main components of the assessment as required by the Code – and should be utilised as an analytical framework for security risk assessments. However, in as much as the quantification of any potential threat and known vulnerability in numerical terms is problematic at best a second, additional approach based on the Probability of an identified threat and its Impact should be considered for the purpose of expressing

identified safety, security and logistics risks in more quantifiable terms, allowing the analyst to apply judiciousness in representing potential outcomes:

$$\text{Risk} = \text{Impact} \times \text{Probability}$$

Fig. 2 – Risk Formula 3.

(Adapted from Roper, 1999)

For example, within a particular port area, a specifically identified mode of attack against a particular Installation, or security breach threatening a logistical installation, would be evaluated directly from the frequency with which particular ship-to-shore interfaces occur. The anticipated impact from such a threat event is expressed as a measure of expected costs resulting from security breaches which might translate into serious incidents or even deliberate hostile attacks. In other words, security vulnerabilities play a very important role in determining the feasibility of a potential attack and may even suggest what form an attack might take. Therefore careful and objective appraisal of vulnerabilities in the logistical chain is a key component in determining risk mitigation strategies at port level and countermeasures down to Installation level.

10. Safety, security and logistics-risk Mitigation Strategies

10.1. Broadly speaking, risk mitigation strategies available within general risk management practice fall under the following five categories (STAAR):

- Spread of risk – an approach built on the heuristic principle of not storing all of one's eggs in a single basket. For obvious reasons, this technique has very little practical application within mainstream security management and is therefore of very little value to individual assessors and safety and security managers in the context of protecting their respective facilities. The principle does, however, have value in relation to the siting of assets – including operational activities – of critical significance within the chemical logistics supply chain;
- Transfer of risk – a risk management technique closely linked to the insurance practice and subcontracting of certain hazardous tasks, this technique has little practical application to an assessor and / or safety and security manager but should not be dismissed out of hand completely as a viable option in certain specific circumstances;
- Avoidance of risk – occasionally it may be possible to avoid a particular activity if the probability of a specific identified threat occurring is deemed too high or the expected magnitude of impact from the event is judged unacceptable;
- Acceptance of risk – to operate at all, it is inevitable that facilities shall have to accept a measure of risk, commensurate with what is technically referred to as core risk. To be deemed acceptable, such residual risk must be controllable and capable of being reduced over time;
- Reduction of risk – techniques which reduce core risks to acceptable, controllable levels constitute the core of safety, security and logistics risk management within individual logistical hubs and the respective facilities.

10.2. The overall aim and intent of a Security And Safety Risk Assessment is to shed light on identified safety, security and logistics risks at a specific Installation location in order to determine the most appropriate, realistic and cost-effective counter-strategies in relation to the prevention of serious security breaches, protection of critical assets, and preservation of core operational activity. This effect can be achieved by deploying security countermeasures and through the implementation of management strategies capable of lowering the probability of occurrence and / or minimising impact exposure in relation to specific threats by various techniques; this concept is often referred to as target hardening.

10.3. Logistical facilities should ensure that security countermeasures are deployed in depth and must be conceived, selected and systematically deployed in a manner that interrupts the hypothetical event trajectory⁷ of potential breaches of security. This technique is intended to ensure that a failure in one or two measures would not necessarily cause an irreversible breach or incident. Security countermeasures typically fall under the six classes as follows:

- Physical Security Countermeasures;
- Electronic Systems;
- Guarding;
- Signage and Lighting;
- Emergency Response Arrangements and
- Security Policy and Procedures.

“Belts and Braces”

*Classically, security is based on the principle of creating a concentric series of obstacles – technically known as **“countermeasures” – deployed around assets. This principle is known as Protection in Depth** and is based on the premise that an adversary could not – or should not be able to – gain access to valuable operational assets by merely overcoming or circumventing one or two obstacles.*

*Realistically, and too often in practice, managements eschew this principle on the (false) belief that “too many” countermeasures are costly and operationally restrictive. In other words they view security as being “Over the Top” or an unnecessary investment in **“Belts and Braces”** as some call it.*

To be fair this perception of security as being unjustifiably costly and ultimately not sufficiently effective has some basis of truth when considered against a backdrop of reactive guarding (at high cost), a vast and apparently never-ending array of hardware solutions constantly bombarding the market, training costs, time spent on policies, procedures and plans and the statutory demands placed by legislation.

The essential point is to convince management within the respective port facilities that there are benefits to be gained from managing security properly which extend beyond the apparently intangible effects of vulnerability reduction. Installation operators should understand that there is a way of planning their facility security programs properly and professionally, with additional potential benefits to be accrued from improved surveillance. These improvements could be the possibly reducing manning costs, the improved facility management, health and safety and generally speaking the better control and operational governance.

10.4. For assessment purposes, individual threat events should be identified and a probability of occurrence rating – based on “What if?” scenario visualisations – determined with the following criteria or similar:

Rating	Probability Factor	
A [10]	Virtually Certain to Occur	<p>Given that no meaningful changes in the present security countermeasures are implemented, an identified threat event will almost certainly occur. For example, given no changes in manning levels or quality and operational effectiveness of the guarding component at a particular Installation, unauthorised access to a berthed vessel will become possible, with potentially disastrous consequences.</p> <p>Expectancy: 10 to 100 events per year in the installation or within the transportation supply chain; might occur daily or weekly.</p>
B [8]	Highly Probable to Occur	<p>The identified threat event is more likely to occur than not to. For example, uncontrolled access to an unsecured logistical installation will most certainly invite crime, disorder, environmental degradation and general abuse. An event may also be rated as Highly Probable if the same or similar consequences are likely to result from an accident at the location.</p> <p>Expectancy: 1 to 10 events per year in the installation or within the transportation supply chain; might occur monthly.</p>
C [5]	Moderately Probable to Occur	<p>The event is more likely to occur than not to occur. Given the scope and intensity of operations at the particular logistical installation, the probability of the identified threat occurring is moderate.</p> <p>Expectancy: 1 event per year in the installation or within the transportation supply chain; might occur seasonally or annually.</p>
D [3]	Less Probable Chance of Occurring	<p>The event is less likely to occur than not to occur at all. This does not imply impossibility, merely improbability. Adequate target hardening measures should be able to prevent such threats from occurring or to at least maintain or lower this rating level.</p> <p>This rating is the recommended benchmark for prevention at Security Level 1.</p> <p>Expectancy: Less than 1 event every 10 years in the installation or within the transportation supply chain; might occur every five years.</p>
E [1]	Unlikely to Occur	<p>Insufficient data may be available to support a judicious evaluation. However there is no historical evidence to support or suggest that the event can be realistically expected to occur at any point in the immediate future. Such threats should still remain periodically reviewed and assessed in the same manner as all other threats.</p> <p>Expectancy: Not expected to occur in the installation or within the transportation supply chain; might occur once in a lifetime.</p>

Fig. 3 – Probability Matrix.

10.5. In the event that a deliberate security breach causes an identified potential threat event to become real, its consequences should be evaluated and rated according to the following criteria or similar:

Rating	Consequences	Impact Descriptor
10	Critical	An event of this kind would result in loss of life, significant operational disruption, destruction and untold environmental damage in the logistical installation and its immediate environs, and may affect the long-term continuity of logistical operations. The event would demand a Port Security Level 3 and the National Emergency Response and Security Agencies would become actively involved.
8	Very Serious	The event would result in major damage to and loss of valuable operational assets; serious environmental degradation requiring extensive repairs and a consequent impairment of operational capacity for some time. The event would definitely require a Port Security Level 2 and probable preparatory measures for Security Level 3.
5	Moderately Serious	The event would have a noticeable impact on operational capacity and is likely to damage asset value. It would require immediate attention of Transport Malta executive officials and is likely to require a Port Security Level 2.
3	Relatively Unimportant	Consequences are minor and any loss, damage or other effects would be absorbed within normal operations without causing undue disruption, destruction, damage or harm. This is the recommended tolerance threshold for Logistical operations at Security Level 1.
1	Of little or no Consequence	Such an event would be acceptable within the normal scope of operations at the Installation or within the transportation supply chain and is unlikely, on its own, to increase the overall risk factor.

Fig. 4 – Criticality Matrix.



10.6. Once identified security threats are rated for magnitude of impact (Matrix – 1) and probability of occurrence (Matrix – 2) each result should be classified a Risk Matrix, such as the one detailed below:

Risk & impact rating	Catastrophic (10)	Very Serious (8)	Moderately Serious (5)	Relatively unimportant (3)	Of little or no consequence (1)
Virtually certain (A-10)	Unacceptable Risk	High Risk (80)	High Risk (50)	Moderate Risk (30)	Low Risk (10)
Highly Probable (B-8)	High Risk (80)	High Risk (64)	Moderate Risk (40)	Low Risk (24)	Low Risk (8)
Moderately probable (C-5)	High Risk (50)	Moderate Risk (40)	Moderate Risk (25)	Low Risk (15)	Low Risk (5)
Less probable (D-3)	Moderate Risk (30)	Low Risk (24)	Low Risk (15)	Low Risk (12)	Low Risk (3)
Unlikely (E-1)	Low Risk (10)	Low Risk (8)	Low Risk (5)	Low Risk (3)	Low Risk (1)

10.7. Results should be interpreted as follows:

- A score between 50 and 100 is classified as High Risk (Red); a score within this range implies that the identified risk must be addressed either because it is an imminent occurrence or because the potential outcome is unacceptably high, or both. Active measures must be taken immediately to mitigate identified risks falling within this category. In the event that it is not possible to determine an acceptable expected value on the probability rating but at the same time the potential impact from an identified threat is inevitable, the assessors should program a risk reduction strategy based on progressive improvements in situational countermeasures. The strategy should also include timeframes for immediate improvements and medium to longer term investments in protective security. Such risks should also be reviewed at least bi-annually and it may be advisable to include an interim annual review until reduction is demonstrated.
- A score between 25 and 49 is classified as Medium Risk (Yellow); a score within this range implies that the identified risk is tolerable for a determined time period, but should be kept under constant review and the recommended measures adopted at the earliest available opportunity. A reduction strategy similar to the one highlighted above should also be devised, focusing upon improving security countermeasures over a briefer time period. Significant risk reduction should be generated by first review, normally within two years of initial assessment.
- A score between 1 and 24 is classified as Low Risk (White); a score within this range implies that the identified risk is acceptable for the foreseeable future but should be documented and kept under constant review. Such risks should be reviewed on a bi-annual basis.

The Role of Probability

The probability that a specific identified threat event should occur in a particular installation plays a fundamental role in the threat assessment and highly influences the final risk analysis.

Yet the probability factor remains the most elusive to predict accurately in the context of a safety, security and logistics risk assessment. While the expected or anticipated impact from a particular threat event is quantifiable and therefore predictable, the multitude of factors involved in estimating probability renders it a highly hazardous exercise indeed.

This dilemma is equally applicable at the level of a port or an Installation. The logical solution to this difficulty is to replace complex, probability-based calculations by qualifying probability in more readily acceptable terms. For this reason, the Security Risk Assessment Guidelines issued by the American Society for Industrial Security (ASIS) [See para. 10.4 above] is being suggested as a common benchmark for port and Installation Safety, Security and Logistics Risk.

Interestingly a recent article published in the International Journal of Risk Management has tackled this issue and re-enforced our views on risk mitigation. Jablonowski argues that in conducting risk assessments in which expected impacts are disproportionately high – or catastrophic – the probability rating is largely irrelevant and the risk should be mitigated.

Clearly this argument has cogent implications for physically mitigating risk at all levels and is should be useful in informing future port security policy and strategy.

11. Assessment limitations and constraints

11.1. Assessors shall find that for many reasons their Safety and Security Risk Assessments may suffer from limitations imposed by various factors, such as:

- Lack of dependable threat data, evidence and/or criteria pertaining specifically to the local circumstances at the time of documenting the assessment;
- Lack of general vulnerability assessments relating to the various logistical installations, sites and zones;
- Lack of existing security guidelines available from centralised sources.

11.2. It is imperative that, from a regulatory point of view, these limitations are clearly understood and accounted in reviewing and approving future Safety, Security and Logistics Risk Assessments relating to the various types of logistical installations. ***As an example, Transport Malta could consider publishing periodic guidance to transportation installations in order to ensure that such limitations do not weaken disproportionately the quality and validity of individual assessments and plans; weak evaluations will almost certainly produce weak safety and security programs, resulting in unsecured facilities and vulnerable Ports and logistical installations.***

12 Validity and Assurance

12.1. The standard, overall quality, reliability and applicability of individual safety and security risk assessments should be assured through the combination of the following measures:

- The assessment methodology – the study should adhere to established requirements, and take into account interim changes and amendments issued by international bodies and periodic guidance issued by Transport Malta as appropriate;
- Use of references – all references should be sourced from approved or accredited organisations, bodies or open sources. References should be included in the assessment text and in the Bibliography or Reference List produced at the end of each component of the Study;
- Measurement criteria – all risk ratings, factors, descriptors and matrices should be accredited from established sources, adapted for local use and duly referenced in a full Bibliography or Reference section.

12.2. In this manner safety and security risk assessments should represent current best practice in terms of safety and security standards within an relatively recently regulated and emerging area of supply chain and logistics management.



Part 3 Conclusions

13 Definitions of SWOT and criteria

13.1. For the purpose of the SWOT analysis, the four key elements were defined specifically taking into account the Maltese supply chain, and first indicative criteria listed as shown in Table 2.

Threats	
Definition	SWOT Criteria
<p>A circumstance, condition or event that has a potential to cause harm, loss or damage to an asset.</p> <p>Alternatively, it could be defined as an adversary with the intention and capability of attacking assets for gain.</p>	<p>Security threats to the transportation infrastructure [should be Scenario based as required by ISO 28001] Known threats are not readily communicated – an effective mechanism is required. Unknown threats cannot be communicated. Community safety threats – security compromises safety and vice-versa. Disparity in performance between large players and small players, leading to: Fragmentation; Small players coming in under the radar; Small players often represent the same risks as big players, or similar, with additional risk factors: Degree of compliance. Degree of competence.</p>
Opportunities	
Definition	SWOT Criteria
<p>An opportunity represents the prospect of gain or improvement from a particular set of circumstances.</p>	<p>An opportunity to map the chemical logistics process An opportunity to identify gaps in the supply chain and logistics process An opportunity to build on established security regimes and harmonise with safety requirements Opportunity to identify accident scenarios Opportunity to establish and subsequently transfer ownership Opportunity to improve co-ordination "from the ground upwards."</p>
Weaknesses	
Definition	SWOT Criteria
<p>Identified vulnerabilities, limitations or unfavourable conditions within the infrastructure of supply and logistics of chemicals which, either alone or in combination, create risk to at least two, or even several, stakeholders.</p>	<p>Systemic weaknesses in areas that generally apply to organisational structures; e.g: Structures, roles, responsibilities Policies Plans Procedures Response arrangements Specific weaknesses which generally tend to apply to the physical dimensions of the infrastructure, organisational arrangements, resources, limitations and constraints; Competence-based weaknesses resulting in apathy, lack of awareness and lack of coordination. Economies of scale – Malta suffers from lack of capacity redundancy.</p>
Strengths	
Definition	SWOT Criteria
<p>An identified characteristic within the national transportation supply chain infrastructure with positive attributes that could potentially create opportunities for multiple stakeholders.</p>	<p>Relatively few players imply that the Logistical Supply Chain is manageable by sector. Two main ports of entry should favor the following: Quality of Data; Control Compliance activities. Overall, issues are containable and therefore manageable</p>

Table 2 – SWOT Definitions and First Indicative Criteria

14 Concluding Remarks

14.1. General

14.1.1. The project has presented an opportunity to address existing issues from a community perspective, taking into account the potential requirements of multiple stakeholders.

14.1.2. The project presents an opportunity to approach risk in the Maltese logistics transportation chain from a harmonised safety and security perspective.

14.1.3. During the course of the project studies, interesting possibilities might emerge such as, for instance, the concept of twinning port authorities in similar manner to the twinning concept between cities, towns and villages in the EU.

14.1.4. The project has presented an opportunity to build on established practice and good state of the technology – regarding the structure and conceptual objectives of ISO 28001 could potentially provide a highly useful tool for multiple stakeholders.

14.1.5. Specifically in terms of the Maltese context, the project presents an opportunity to influence decision makers to build up capacity in terms of the National coordination capabilities.

14.2. Strengths

Definition of Strength – An identified characteristic within the national transportation supply chain infrastructure with positive attributes could potentially create opportunities for multiple stakeholders.

14.2.1. The relatively small size of the market sector indicates that good appraisal of the issues is possible. Additionally, the fact that relatively speaking there are few importers of bulk chemicals, implies that the Maltese Logistical Supply Chain should be manageable by sector.

14.2.2. The fact that Malta operates only two main ports of entry and one harbor to link Malta and Gozo should favor the following aspects:

14.3. Weaknesses

Definition of a Weakness – Identified vulnerabilities, limitations or unfavourable conditions within the infrastructure of supply and logistics of chemicals which, either alone or in combination, create risk to at least two, or even several, stakeholders.

14.3.1. Specific weaknesses generally tend to apply to the physical dimensions of the infrastructure, organisational arrangements, resources, limitations and constraints. Operators will not readily see the value of security and – to a lesser extent – the community safety as they operate in the belief that such issues are the concern of central government authorities.

14.3.2. Systemic weaknesses in areas that generally apply to organisational structures, such as but not necessarily limited to:

- Structures, roles, responsibilities that are readily identifiable;
- Centralised Policies that are well communicated and understood;
- Safety, security and Emergency Plans;

- Coordinating Procedures;
- Response arrangements.

14.3.3. Possible silo mentality between Authorities can create indirect risks such as excessive costs of compliance, perceptions of unfairness, excessive bureaucracy and so on, which increase the overall likelihood of [voluntary] non-compliance.

Competence-based weaknesses resulting in lack of awareness and lack of coordination and apathy. The cost of capacity building in terms of training, organizational improvements, procedures and logistical arrangements and so on is likely to be perceived as excessive in relation to anticipated benefits.

Malta suffers from lack of capacity redundancy, which means that businesses as well as critical infrastructures are more vulnerable to the domino-effect in case of major accidents and business interruption events and scenarios.

14.4. Opportunities

14.4.1. Definition of Opportunity – An opportunity represents the prospect of gain or improvement from a particular set of circumstances.

14.4.2. The LOSAMEDCHEM project should enable LCA to learn about the scope and context of the issues and engage as an active stakeholder with the regulatory authorities in terms of consultation towards capacity building.

14.4.3. The project provides an opportunity to build on known and established good practice, namely the assessment–plan–designated management–audit model as per ISPS Code and ISO 28001.

14.4.4. LCA could take an opportunity to encourage the MRA to formally conclude its study in order to provide local stakeholders with a benchmark report on the subject matter. This is also an opportunity to map the chemical logistics process

14.4.5. LCA could place itself in a position to engage with other key stakeholders in capacity building.

14.4.6. LCA could actively consider setting up a Risk Monitoring Group.

14.4.7. LCA could suggest that Logistics Centres are formally designated for the purposes of safety and security in the same manner as Designated Port Facilities.

14.4.8. The SWOT Analysis should provide the Authorities with an opportunity to identify gaps in the supply chain and logistics process.

14.4.9. On the basis of the recommendations of the SWOT Analysis, stakeholders could have an opportunity to build on established security regimes and harmonize with safety requirements.

14.4.10. Depending on risk appetite and political mandate, the LCA should build upon the opportunity to identify accident scenarios and engage with key stakeholders accordingly.

14.4.11. The LCA could use the SWOT Analysis as an opportunity to establish and subsequently transfer ownership of the issues relating to chemical logistics in the Maltese Islands.

14.4.12. The LCA could use the findings of the SWOT Analysis as an opportunity to engage with Authorities and stakeholders to improve co-ordination "from the ground upwards."

14.5. Threats

Definition of Threat – circumstance, condition or event that has a potential to cause harm, loss or damage to an asset.

Alternatively, it could be defined as an adversary with the intention and capability of attacking assets for gain.

14.5.1. LCA needs to be aware that the evaluation of threat scenarios to the transportation infrastructure is not within its remit.

14.5.2. Generally speaking, known threats are not readily communicated between stakeholders. LCA is not likely to be part of the communication loop. Unknown threats cannot be communicated.

14.5.3. In relation to threats to community safety, the LCA should acknowledge and become aware that security breaches often compromises safety and vice-versa.

14.5.4. Disparity in performance between large players and small players, leading to:

- Fragmentation;
- Small players coming in under the radar;

14.5.5. The threat of pollution in the Maltese coastal littoral is of critical National significance and the LCA should actively consider pursuing a policy of proactive involvement wherever possible.

14.5.6. Relatively smaller industrial players often represent the same risks as the larger organizations although frequently they have additional risk factors such as:

- Degree of compliance – larger organizations are more likely to be actively scrutinized by the regulatory authorities;
- Degree of competence – larger organizations are generally more likely to invest in operative competence, for a variety of reasons.

14.5.7. The chemical transportation sector is very heavily regulated. The danger with (excessive) legislation may lead to confusion, conflict and lack of compliance. Harmonization is essential in this sector and LCA may play a role as an interested party.

14.5.8. Following on from 14.5.7, the sector may be facing up to a lack of a level playing field. If operators are allowed to operate under the radar, so to speak, then not only is effective enforcement not possible but there is also the twin issues of competitive distortion and, perhaps worse from the LCA perspective, resultant safety and security risks.

14.5.9. The issue of transportation of explosives is highly contentious in the Maltese Islands and the LCA should consider its position. LOSAMEDCHEM project may be the appropriate conceptual vehicle.

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Study Notes

- i. For a fuller discussion on the background to ISPS Code and ensuing developments please visit the IMO website.
- ii. Our italics; note the requirement to assess potential risks to security.
- iii. This Regulation respects the fundamental rights and observes the principles recognised in particular by the Charter of Fundamental Rights of the European Union.
- iv. While not a threat related security issue in itself, the question of funding is of fundamental importance to port facilities within the respective Ports. Down the years, a variety of factors have resulted in a gross deficit in the quality and degree of protection afforded to some of the State-owned or partly-State-owned port facilities, logistical installations and supporting infrastructures.

This is a fact, and was starkly highlighted in some PFSAs in the run-up to the ISPS Code implementation. However, the problem is not simply limited to the lack of effective physical security countermeasures within the various port facilities in Valletta and Marsaxlokk. Of equal concern, if not more so, was the attitude displayed by executives at senior echelons of operating companies who were of the view that (the) security (of their facilities) was a Government issue and as such should be the responsibility of the AFM and/or the Malta Police.

Clearly this reasoning is wrong and operators have had to come to terms with it in this, the post-EU accession period.

However one has to bear in mind that the implementation of security countermeasures very often entails high costs which operators are frequently reluctant to justify. Again, this is a big argument which cannot be fully expounded within the scope of this work. Suffice to assert that competitiveness is a key issue common to all port facility operators. It is strongly recommended that the TRANSPORT MALTA takes immediate stock regarding what stage the study is presently at and also to maintain an active watching brief on proceedings and developments.
- v. The subsidiary principle is intended to ensure that decisions are taken as closely as possible to the citizen and that constant checks are made as to whether action at Community level is justified in the light of the possibilities available at national, regional or local level. Specifically, it is the principle whereby the Union does not take action (except in the areas which fall within its exclusive competence) unless it is more effective than action taken at national, regional or local level. It is closely bound up with the principles of proportionality and necessity, which require that any action by the Union should not go beyond what is necessary to achieve the objectives of the Treaty.
- vi. Within this document, use of the term port facility indicates a generic reference to any entity that operates from within Valletta Grand Harbour, Marsaxlokk or anywhere else in the Maltese Island. The abbreviation PF refers to some specific facility.
- vii. However one has to bear in mind that all assessments and plans were written prior to the 01st July 2004. While PFSAs and PFSPs are no doubt compliant with the ISPS Code requirements, it is likely that not all have been reviewed for compliance with EC/725/2005 and L.N. 484/2004. There exists a likelihood, therefore, that assessments and plans contain gaps in them which, apart from compromising the individual port facilities' compliance, may expose the facility operators to the greater risks of operating within the strictures of outdated regulation.
- viii. NERSA – A collective term for the Malta Police, Armed Forces, Civil Protection. Other services also have key role to play in this respect and should be consulted as and when appropriate.
- ix. Risk evaluations based on such parameters are technically known as Expected Value (Criteria) risk assessments.
- x. Note use of the term additional as opposed to alternative approach.
- xi. For a full discussion of the concept of an event trajectory see (Reason, 2000; 12).
- xii. Risk evaluations based on such parameters are technically known as Expected Value (Criteria) risk assessments.
- xiii. Note use of the term additional as opposed to alternative approach.
- xiv. For a full discussion of the concept of an event trajectory see (Reason, 2000; 12).



SWOT analysis of chemical sector in the Castellón area

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1. Introduction

The chemical industrial sector and its associated logistics have a certain degree of relevance in the Valencian Community. Consequently the need to carry out an analysis to identify the weaknesses, threats and strengths thereof has been considered relevant.

As a previous step to carrying out the analysis, it is appropriate to provide a description of the conditioning factors in the study region, including economic factors that reflect the reality of the industrial sector therein.

Owing to the need for transport to carry out business activity, and to be able to identify the bottlenecks in this sector, another study of the existing infrastructures in the territory has been carried out, with special emphasis placed on the area of Castellón.

The next step is to analyze the chemical sector and the hazardous merchandise sector today, taking into account the most relevant figures associated with it (GDP, No. of workers, etc.) in order to establish an idea as to the relevance of the industry in this region.

After describing the aforementioned items and with a view to completing the desired analysis, contacts have been made with a number of participant companies in the chain of the analyzed sector, from production to distribution of end products, with the aim of obtaining the point of view of the agents involved, and consequently to be able to identify the needs and claims demanded from within the sector.

The result is an analysis of numerous aspects of the sector that permits a global vision of the current situation and the possibility of developing policies and actions to optimize operations.

2. Description of the region / area

2.1. Description of the Sector

The Valencian Community located to the east of the Iberian Peninsula next to the Mediterranean Sea consists of the provinces of Alicante, Castellón and Valencia. It has an elongated shape, with abrupt and irregular relief which has historically made communications and exploitation of land difficult, with only the coastal areas facilitating connection with Europe, either by sea across the Mediterranean or by land through Catalonia. It covers a surface area of 23,255 km², distributed as follows: 6,632 km² in the province of Castellón; 10,763 km² in the province of Valencia and 5,816 km² in the province of Alicante. The following figure illustrates the profile of this region, showing the three member provinces.



Figure 1. Map of the Valencian Community.

Source: Infrastructures and Transport Council of the Valencian Community.

In 2010 the population census in this region was bordering on 5.1 million inhabitants, accounting for 10.9% of the national population. As for provinces, in Castellón nearly 0.6 million people live (11.8%), Valencia is home to a population of around 2.6 million people (50.6%) and finally, Alicante is home to over 1.9 million people (37.6%).

The data in the following table indicate the active population figures for the region in the fourth quarter of 2010, differentiating between the different business sectors in each of the provinces.

Table 1. Active population census of the Valencian Community by business sector. Fourth quarter 2010. Expressed in thousands of people

	Castellón	Valenci	Alicante
Agriculture	11.7	28.9	14.5
Industry	48.1	161.5	111.5
Construction	21.9	96.3	57.4
Services	148.9	729.9	507.3
TOTAL	230.60	1,016.60	690.70

Source: Valencian Statistics Institute (IVE).

The main production sectors in the Valencian Community from the point of view of foreign trade are food and agriculture, car industry, construction materials, textile sector, footwear, furniture and toys.

The important ceramics industry is worthy of special attention in the area near La Plana (Castellón), whose data in terms of exports in 2009 reached 1,669 million euros to 179 countries, which accounts for 10% of the total exports in the Valencian Community and over 77% of total exports in that sector in Spain. This has positioned the Valencian Community as the most prolific export region in this business sector.

In addition to the foregoing information, the figures shown in the following table show the evolution of the GDP to market prices in the whole community and in the three provinces.

Table 2. Evolution of GDP to current prices in the Valencian Community by provinces. Period 2005-2009. Expressed in Million Euros.

Castellón	th12,129.48	13,354.85	13,855.77	-	-
Valencia	45,491.69	49,357.13	53,364.78	-	-
Alicante	30,830.91	33,328.34	35,352.62	-	-
TOTAL	88,452.08	96,040.32	102,573.17	105,554.21	101,608.35

Source: Valencian Statistics Institute (IVE). Estimated data

The foregoing data represents an average of 9.7% of the total GDP in the country, known as the “10% region”. Similarly, the figures showing the GDP per capita are given for the same period of time.

Table 3. Evolution of the GDP per capita in the Valencian Community and provinces. Period 2005-2009. Expressed in Euros

		2006		2008	2009
Castellón	22,697	24,343	24,524	-	-
Valencia	19,283	20,569	21,790	-	-
Alicante	18,318	19,133	19,562	-	-
TOTAL	19,327	20,477	21,275	21,336	20,259

Source: Valencian Statistics Institute (IVE). Estimated data

Throughout the time period analysed, the GDP per capita in the region has decreased compared to the figure recorded for the rest of the country, dropping from 92.3% in 2005 to 88.5% in 2009.

To end this brief analysis of the region in question, information concerning R&D figures in the region is provided.

Table 4. Personnel involved in R&D in FTE* employment in the Valencian Community.

Valencia Region	% of national
15,256.3	8.7
15,722.3	8.3
17,810.8	8.9
19,488.7	9.0
19,691.8	8.9

Source: Valencian Statistics Institute (IVE). *Full time equivalent.

The information in the preceding table shows the growing importance that R&D processes have acquired in the community, directly related to technological development in the region.

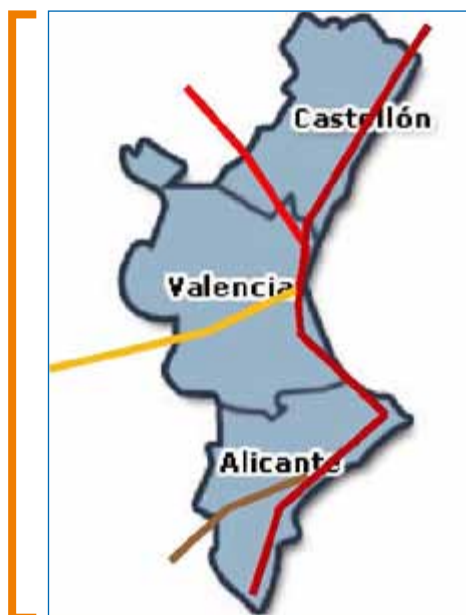
Finally, the following table includes a number of innovative companies for 2006-2008 period in the region.

Table 5. Innovative companies in the Valencian Community in the 2006-2008 period.

	Valencia	% of natio	
	Region		
2006-2008 Period	4,400	11.3	
Of product	2,178	12.3	
Of process	3,701	11.3	
Of product and proc	ess 1,480	13.1	

Source: Valencian Statistics Institute (IVE).

The above figures support the idea of how the concept of R&D has been acquiring great importance in the business sector in the Valencian Community in recent years.



2.2. Description of the transport infrastructure in the region

This section of the report aims to provide a brief description of the different infrastructure networks in the region, differentiating between four possible modes of transport currently existing: road, rail, maritime and pipeline.

Consequently this study refers to the centre on the existing network in the province of Castellón, where the highest number of companies in the chemical or hazardous merchandise industry is found, such as: the BP Oil hydrocarbon plant, the Infinita Renovables biodiesel plant, CHL and UBE Industries.

2.2.1. Highway network

The Valencian Community features several highway axes that link it to the neighboring regions, and the main areas in the country.

Figure 2. Map of the main highway corridors in the Valencian Community.

Source: Own preparation based on data supplied by the Spanish General Directorate for Traffic.

A-3: Levante Highway

AP-7/A-7: Mediterráneo Highway / Toll Road A-23: Mudéjar Highway A-31: Alicante Highway

The Levante Highway (A-3) links the region with the centre of the peninsula, making it one of the main corridors in the eastern region of the country.

The community is linked to the northwest of the country by means of the A-23 (Mudéjar Highway), directly to Zaragoza via Teruel. The main north-south axis that crosses the region is the Mediterranean Highway (AP-7 / A-7) that includes toll sections with freeway sections, and carries high levels of traffic. Finally the A-31 (Alicante Highway) joins the south with the centre of the country.

If the description is centred on the area of Castellón, the most important highway network is as follows:

The map shows the major highways crossing the province, among which those already mentioned, are included:

A-7 According to figures provided by the Spanish Ministry of Public Works, a large part of this highway is already in service, although the part between Castellón and Barcelona is the one that has suffered most delays. In fact, between Castellón and Vandellos there is a span of 150 km with no highway. The part between Algeciras and Castellón is mostly finished, however the sections Almuñecar – Albuñol, Alcoy – Albaida, Castellón – L'Hospitalet de l'infant and Altafulla – Barcelona remain unfinished. The section Sagunto – Almenara was opened on March 14th 2007.

AP-7 The Ministry of Public Works calls this highway the Mediterranean Motorway or AP-7, being the axis along which the whole Mediterranean coastline is linked from the border with France down to Algeciras. This motorway is part of the European Highway Network known as the E-15 and mainly comprises toll sections and some freeway sections as per Royal Decree 1421/02 passed on December 27th. The first section of the motorway was officially opened in 1969 between Barcelona and Granollers.

The motorway in the Valencian Community is managed by three concession holders, each managing different toll sections along the motorway throughout the community (from a total of five along the whole section):

- Aumar on the Tarragona - Alicante section.
- CIRALSA on the Alicante By-pass motorway section.
- AUSUR on the section between Crevillente and Cartagena.

N-340 The N-340 is one of the main arteries along the Mediterranean corridor, serving, among others, the three provinces comprising the Valencian Community from north to south. According to data provided by the Ministry of Public Works, in the province of Castellón the N-340 enters between the A-7 and the AP-7 crossing Almenara, La Llosa and Chilches. Once it reaches Nules, it joins the A-7 by-passing this town to split into the N-340 and the CV-10 (continuation of the A-7 but competence of the regional government). It crosses Alquerias del Niño Perdido and by-passes Villarreal, where there are major traffic jams daily. It then reaches the city of Castellón, flanking around it from south to north. It joins other highways such as the CS-22 direction Castellón Port, the CV-17 towards the Plana Highway CV-10, the CV-16 direction Alcora and the CV-151 direction Borriol. At the end of the Castellón by-pass, the highway crosses the towns of Benicasim, Oropesa del Mar, la Ribera de Cabanes, Torreblanca, Alcalá de

Xivert, Santa Magdalena de Pulpis, the turn-off for Peñíscola, Benicarló and Vinaroz running parallel to the AP-7 the whole way, before entering Catalonia.



Figure 3. Main highways in the province of Castellón

Source: Own elaboration.



Figure 4. Route of the A-7 highway

Source: Wikipedia. 2011



Figure 5. Route of the N-340 highway

Source: Wikipedia. 2011.

CV-10

The CV-10 Plana Highway is in theory part of the A-7 Mediterranean Highway, but since it was developed and is maintained by the Valencian Regional Government it bears the nomenclature referring to the autonomous highways of the Valencian Community.

The Valencian Community Highway Map published by the Infrastructures and Transport Council of the Valencian Regional Government indicates that the CV-10 begins at kilometer 275 of the A-7 Mediterranean Highway at Villavieja, direction Bechi and Puebla Tornesa.

Today, it is the highway with most traffic, along with the N-340 since it is used to cross the province starting from Valencia along the A-7 to Nules, where it diverts along the CV-10 in order to avoid the N-340, which is a more dangerous road with some crossroads.

When the CV-10 approaches Villanueva de Alcolea, the dual carriageway disappears and becomes a single carriageway road to its end at La Jana.



Figure 6. CV-10 Autonomous highway layout

Source: Wikipedia. 2011

N-232

The Ministry of Public Works describes the 232 A-Road as a Spanish overland highway that crosses the peninsula transversally from Vinaroz in the province of Castellón to Cabañas de Virtus in the province of Burgos.

This road links the regions of Bajo and Alto Maestrazgo and Els Ports. It joins Vinaroz with the town of Morella passing through the towns of Xert, La Jana, Traiguera and San Jorge.



Figure 7. Layout of the N-232 A-Road

Source: Wikipedia. 2011

CV-20

The current CV-20 is the result of joining the C-223 and CS-200 which linked Villarreal with Onda, and Onda with Puebla de Arenoso respectively, which were joined after modifying the nomenclatures of the Valencian highways.

Between 1998 and 2002 another carriageway was added to the Villarreal – Onda section, mainly because of the high number of trucks travelling daily on this highway, since where nearly all the ceramics factories in the province of Castellón are found.

According to the Valencian Community Highway Map published by the Infrastructures and Transport Council of the Valencian Regional Government, the CV-20 now starts in Villarreal itself. As of the cross-roads with Montanejos, the CV-20 highway passes near the Arenoso reservoir to reach Puebla de Arenoso where only 3 or 4 kilometres separate it from the province of Teruel and the next town, Olba, where it then takes on its new name under the Aragon highway nomenclature, namely the TE-V-2001.

A-23: The layout of the A-23, according to data supplied by the Ministry of Public Works, runs along the N-234 corridors between Sagunto and Retascón and the N-330 between Retascón and Jaca. Although the whole dual carriageway route is new and is independent from the national highways except for two short sections, (one covering a length of 10 km at the northbound when leaving Zaragoza and another one which is 30 km long to avoid the extremely complicated mountain pass of Monrepós in the foothills of the Pyrenees), it is the most expensive section of the whole highway.

Other highways of interest that appear on the Valencian Community Highway Map published by the Infrastructures and Transport Council of the Valencian Regional Government are as follows:

CV-16: Link road between Castellón de la Plana and l'Alcora. This renewed dual carriageway extends to the junction with the CV-160 and CV-190 where access is gained to the town of Sant Joan de Moró and l'Alcora. The section between Castellón de la Plana and l'Alcora is completed via the CV-190 provincial highway (which links Sant Joan de Moró with l'Alcora), constructed along a rural track converted in a highspeed road.

CV-17: This road joins the Plana Highway with the large traffic roundabout feeding traffic towards the N-340, the AP-7 or the centre of the provincial capital city via the Ronda Sur (South By-pass) and its extension. It has become an urban dual carriageway.

CV-18: This road links Castellón with Almassora, Borriana and Nules, and could become an alternative for internal traffic in the ceramics area replacing the N-340. This surface has been improved and it is now practically all dual-carriageway, and since it does not cross any town centers it has high traffic densities varying between 7,000 vehicles/day between Nules and Borriana and 20,000 at the final section where access is gained to Castellón.

CV-21: This road runs through the towns of Onda and l'Alcora with just one carriageway.



Figure 8. Layout of the CV-20 highway

Source: Wikipedia. 2011



Figure 9. Layout of the A-23 highway

Source: Wikipedia. 2011

2.2.2. Railway network

Today a large number of all the railway network lines in the Valencian Community are of a conventional gauge. Only some connections belonging to Ferrocarrils de la Generalitat Valenciana (Valencian Regional Government Railways) and TRAM Alicante are metric gauge, and more recently the high-speed railway that links the area with Madrid through Cuenca is UIC gauge.

The existing railway network is arranged around the Alcázar de San Juan-Albacete-La Encina-Valencia-Castellón-Tarragona line. It is a conventional gauge twin direction, electrified track, with the exception of the last stretch between Vandellòs and Tarragona, in Catalonia, which is a single track. This railway line represents the main connection between Madrid and Catalonia, from Alcázar de San Juan, where it links up with the Madrid – Seville line on conventional gauge track. It is also this track where the highest top speeds can be reached of around 220 km/h. Only on the section between Xàtiva and Valencia is the top speed reduced along the track, dropping off to 160 km/h. Today, as mentioned earlier, as of December 2010 this is the high speed railway joining the cities of Valencia and Madrid passing through Cuenca.

From the aforementioned Mediterranean corridor different branches stem out that provide access to the major towns of the Valencian Community and communicate with the rest of the neighbouring provinces. In Sagunto the line leading to Zaragoza via Teruel branches off.

From the town of Silla, located to the south of the city of Valencia, a branch stems off leading to Gandia. This branch, with double electrified track leads to Cullera from where it continues with just one electrified track to Gandia. The whole branch permits top speeds of 140 km/h.

At Xàtiva, in the south of the province of Valencia, a branch begins, with just one non-electrified track ending at Alcoi in the north of the province of Alicante. The maximum speed along this stretch is 90 km/h.

The last of the existing lines begins at the La Encina railway node (in Alicante) heading southbound, comprising a single, electrified track, providing access to the city of Alicante, and permitting top speeds of 160 km/h. From here begins the Alicante – Murcia – Aguilas line, with just one, non-electrified track.

Now with more detail concerning the area of Castellón, the main railway lines belong to the 02 and 03 ADIF lines. As mentioned earlier, these lines can be grouped together in two major corridors, with some comprising the corridors themselves, and others being branches, diversions or junctions comprising the whole network.



Figure 10. Current situation of the railway network

Source. Provided by the Adif (Railway Infrastructure Administration) Network 2011.



Figure 11. Railway lines in the Valencian Community

Source. Cirtra 2009.

Table 6. Railway lines in the Valencian Community

AXIS	LINE	STARTING NODE	FINAL NODE	LENGTH (METERS)	TYPE OF LINE	E	LOCK	SIS SEG
03	LINEA 600	VALENCIA NORD	VINAROS	151,350	A1	YES	BAD/BAD	AS FA
03	LINEA604	LES PALMES	CASTE LLO-PORT	6,800	C	NO	BLAU/BAU	
02	LINEA 610	BARRACAS	SAGUNT A KM 28.3	78,563	C	NO	RM/BT	AS FA

Source: Own elaboration

By associating these lines with the aforementioned corridors, the following is shown:

- Mediterranean Corridor: Comprising lines 300, 304,330, 332, 334, 336, 600
- Sagunto-Teruel-Zaragoza Corridor: Comprising line 610.

One of the special characteristics there are, in spite of some deficiencies in these railway lines, is that all Port Authorities of general interest (APC, APV and APA), have connection to the general railway line at their ports (Castellón, Sagunto, Valencia, Gandia and Alicante). The port of Castellón links up to line 600 through line 604.

Today, all the local railway lines operated by Renfe share the infrastructure with the other passenger and merchandise transport services. In the province of Castellón the C-5 and C-6 local lines link up with the Alto Palancia Region and hence improve communications in the province.

Both lines have connections with Sagunto where change can be carried out. Line C-5 ends in Caudiel, whereas line C-6 ends in Castellón, meaning that the towns in the north of the province in the Bajo Maestrazgo area are not linked to the capital of the province.



Figure 12. Local railway lines

Source: Renfe Operator.

Table 7. Local railway lines

LINE	ADIF LINES	SERVICES
C5	600 610 612	Valencia Nord, València-F.S.L., València-Cabanyal, Roca-Cuper, Albuixech, Massalfassar, El Puig, Puçol, Sagunt, Gilet, Estivella-Albalat dels Tarongers, Algimia, Soneja, Segorbe-Ciudad, Segorbe-Arrabal, Navajas, Jérica-Viver and Caudiel.
C6	600	Valencia Nord, València-F.S.L., València-Cabanyal, Roca-Cuper, Albuixech, Massalfassar, El Puig, Puçol, Sagunt, Les Valls, Almenara, La Llosa, Xilxes, Moncofa, Nules-La Vilavella, Burriana-Alquerías N.P., Vila-real, Almassora and Castelló.

Source: Own elaboration

The main logistics nodes in the area are: Burriana-Alquerías, Moncofar and Villarreal

2.2.3. Maritime infrastructures

In the Valencian Community, there are three Port Authorities of general interest: Castellón, Valencia (which manages the ports of Sagunto, Valencia and Gandia) and Alicante. From these ports, it is the Port of Valencia where there is most traffic, owing to its inter-ocean rating which positions it as the most important enclave in the Mediterranean in terms of container traffic, and one of the most important ports on the European continent.

The following map shows the location of the aforementioned port facilities



Figure 13. Location of the general interest Port Authorities in the Valencian

Community

The following figure shows the layout of the Castellón Port facilities.

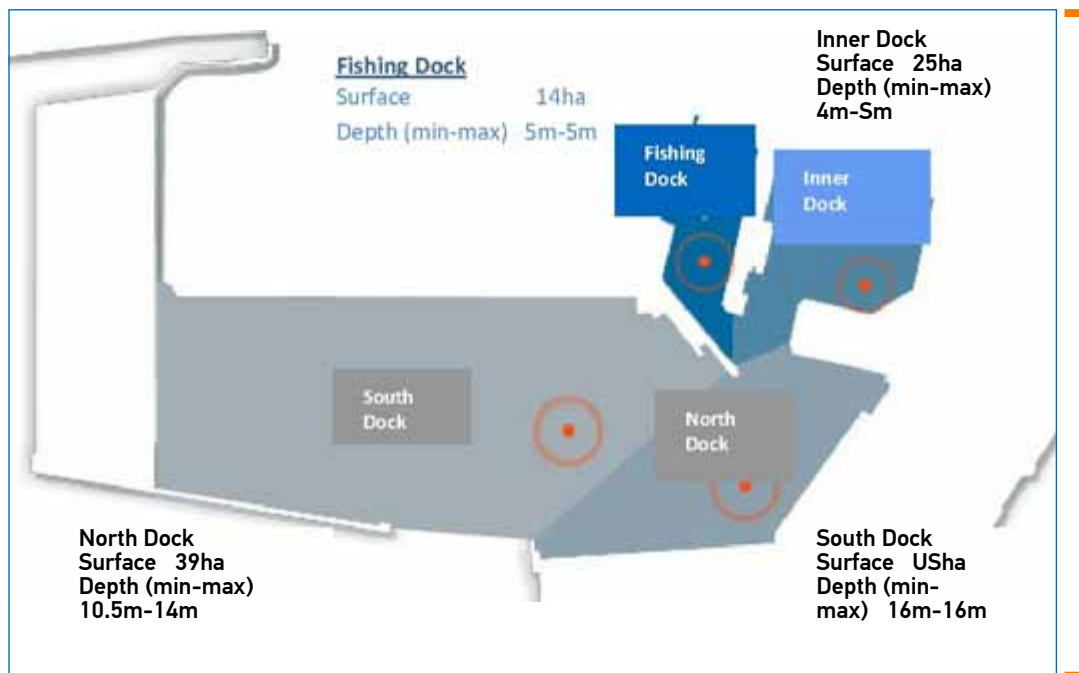


Figure 14. Layout of the Port of Castellón.

Source: Castellón Port Authorities.

In the Port of Castellón the traffic of bulk liquids is particularly noteworthy, especially hydrocarbons, as it will be discussed later. The South Dock of this port houses facilities of the major companies involved in the chemical sector in the region.

To date five terminals and plants have been fitted out for different activities, whose concession holders are:

- PortSur. Public terminal for unloading, stockpiling and dispatching bulk solids covering a plot of 77,000 m², with a wharf line of 500 metres.
- La Torreta (holder; operated by Cementos Elite). A plot for milling clinker and producing and exploiting Portland cement (30,000 m²).
- Cemex. Plot for milling clinker and producing and exploiting Portland cement (63,000 m²).
- Infinita Renovables. Biodiesel production plant from vegetable oil (with a plot of 65,000 m²). It has its own mooring in front of the plot which is connected to the plant and the BP-Oil refinery by pipelines.
- Compañía Logística de Hidrocarburos (CLH). Installation of arms and ducts for discharging gasoline and diesel connected to the storage plant in the port facilities.

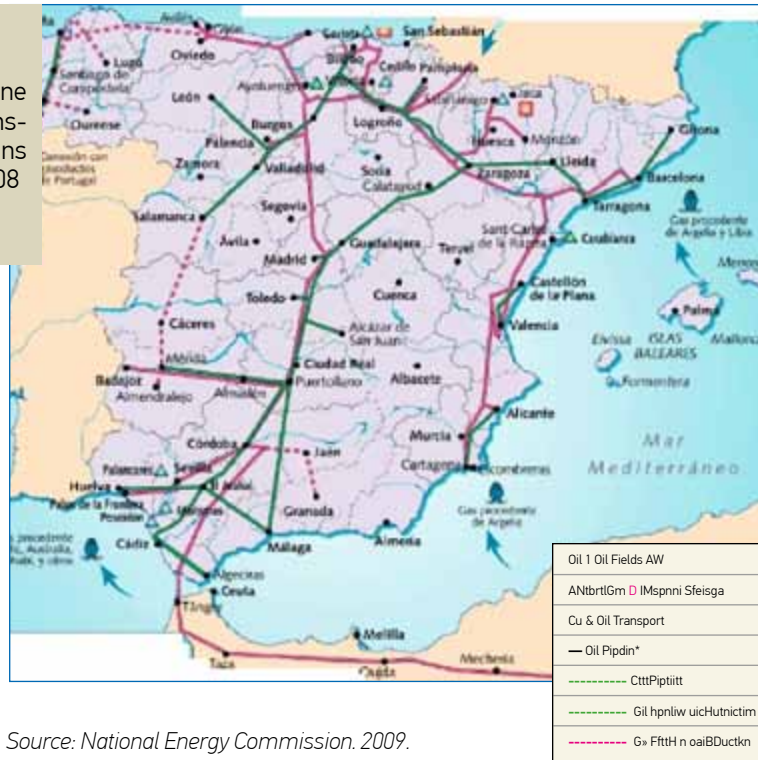
On the other hand, there are seven companies in process of installation in the South Dock: Hormasa, manufacturers of concrete (on a plot covering 14,400 m²), Transportes Temex, which will be the biodiesel and/or vegetable oil and bulk products storage site (20,000 m²); UBE Chemical Europe, which will open its logistics centre for raw materials and finished products connected to its facilities in the Serrallo industrial estate (40,000 m²); Agriberia Nutricion Vegetal, which will open a plant for the manufacture of vegetable nutrients and fertilizers (30,430 m²); Leatransa, with a plant for storage and logistics of bulk solids and liquids (34,070 m²); Urbamar, which will install a plant to receive and store liquid waste produced by shipping vessels (2,500 m²); and BP Oil, which will have a product unloading point at the enclosure dike connected to their refinery in Serrallo industrial estate.

2.2.4. Pipeline network for liquids and gas

The region of Valencia is crossed by several pipeline networks for the transport of hydrocarbons and energy products, in order to meet the supply requirements of the population.

The following graph shows the main networks for the transport of these products.

Figure 15. Pipeline network for the transport of hydrocarbons in Spain. 2008



The preceding map shows the oil and gas pipelines currently existing in the Valencian Community, highlighting those in the area of Castellón, influenced by the refinery established in that area.

Source: National Energy Commission. 2009.

3. Evolution of the chemical sector in the valencian community

3.1. Figures for the chemical industry in the Valencian Community

At the end of 2010 the census reported a total of 459 companies in the Valencian Community involved in the chemical sector, which accounts for 13.9% of total in the country for this industrial sector. The rating of these companies per number of employees is as follows:

Table 8. Rating of the companies in the chemical industry in the Valencian Community in October 2010 per number of employees.

		50-99	100-199	200-499	> 500	TOTAL
Nº of companies	407	29	14	8	1	459

Source: Spanish Chemical Industry Business Federation (FEIQUE). 2010.

The main points of implementation of the chemical industry in this region are in the provinces of Valencia and Castellón. In the latter there is a refinery and a bio-diesel plant, as well as a large number of businesses in the ceramics industry, strongly established in this region.

The following itemization can be made for the main business activities carried out by the aforementioned companies:

	Nº companies
Basic chemistry	89
Agrochemistry	30
Paints, vernishes and inks	100
Detergents, perfumes and cosmetics	121
Other chemical Products	98
Artificial fibers	3
Pharmaceutical raw materials	7
Pharmaceutical	11
TOTAL	459

Table 9. Classification of the companies in the chemical industry in the Valencian Community in October 2010, rated by activity.

Source: Spanish Chemical Industry Business Federation (FEIQUE). 2010.

The following chart shows the evolution of the number of employees in the sector in region in 2009, as well as the percentage over the national total.

Table 10. Employees in the chemical industry in the Valencian Community and nationally. Year 2009.

	Valencia Region	National	% of national sector
Mining and oil industries, energy and water	15,636	176,772	8.8
Chemical industry	12,059	124,273	9.7

Source: Valencian Statistics Institute (IVE).

The added value of the chemical sector over the total of the industrial sector in the Valencian Community accounted for 7.8% in 2009, with a value of 3,975 million euros, providing employment for over 13,000 people. Regarding the latter, the net amount of the turnover in the sector in 2009 is shown in the following table:

Table 11. Net turnover of the chemical industry in the Valencian Community. Year 2009. M€

	Valencia Region	National	% of national sector
Mining and oil industries, energy and water	9,144.18	107,506.51	8.5
Chemical industry	3,264.45	44,694.53	7.3

Source: Valencian Statistics Institute (IVE).

By analyzing foreign trade recorded by this sector in our region, it can be seen that, in case of exports, more favorable figures were achieved in the last three years (2008-2010), where an accumulated increase of 13.4% was recorded, in spite of the decrease in 2009, when there was a general reduction mainly due to the severe economic crisis, as can be seen in the following table:

Table 12. Export figures for the chemical industry in the Valencian Community in the 2008-2010 period. Data expressed in tonnes and M€.

	Tons	M€	Tons	M€	Tons	M€
Road	740,635.64	1,183.62	691,899.82	1,092.55	746,117.6	1,323.83
Rail	1,852.53	4.33	546.85	1.03	563.11	0.98
Maritime	1,010,670.89	875.83	1,241,943.73	799.52	1,243,639.42	913.02
Other	3,228.28	24.89	1,332.09	21.6	1,472.62	32.2
Total	1,756,387.34	2,088.67	1,935,722.49	1,914.70	1,991,792.75	2,270.03

Source: Datacomex 2011.

Similarly, by studying the export flows, the results obtained for the same period are as follows:

Table 13. Import figures in the chemical industry in the Valencian Community in the 2008-2010 period. Data expressed in tonnes and M€.

			2009			
	Tons	M€	Tons	M€	Tons	M€
Road	936,597.8	1,867.66	724,355.31	1,639.22	742,589.34	1,803.13
Rail	3,552.53	9.1	1,034.6	1.79	1,175.21	2.58
maritime	1,103,076.98	889.38	1,043,802.73	640.97	1,333,450.75	951.4
other	2,774.77	25.98	2,275.32	27.1	1,165.81	34.76
Total	2,046,002.08	2,792.12	1,771,467.96	2,309.08	2,078,381.11	2,791.87

Source: Datacomex 2011.

As it can be seen, in 2008 there was a rebalancing process in foreign trade, with the import and export figures recorded being similar, although imports were slightly higher.

By outlining the most widely produced chemical products in the region throughout 2008, from the results in the following table it can be seen, where the specific weight over the total is provided for these production figures:

Table 14. Main products according to production in the Valencian Community in 2008.

Description	Quantity	Units
Industrial gases		
Argon (1)	1,766	thousand m3
Nitrogen (1)	84,841	thousand m3
Oxygen (1)	114,977	thousand m3
Carbon dioxide	32,380	Tons
Dyes and pigments		
Colorants, preparations and luminophores (1)	1,951	tons
Fertilizers and nitrogen compounds		
Nitric acid; sulphonitric acids, ammonia	274,325	tons
Other nitrogenous fertilizers and mixtures	15,537	tons
Fertilizers with three elements: nitrogen, phosphorus and potassium	67,068	tons
Fertilizers with two elements: phosphorus and potassium (1)	451	tons
Mineral or chemical fertilizers with at least two elements (nitrogen, phosphorus, potassium) n.c.a.p.**	54,674	tons
Fertilizers, whatever its composition, packaging ≤ 10 kg gross weight (1)	8,814	tons
Other fertilizers and mixtures (packaging > 10 kg gross weight) (1)	45,860	tons
Animal or vegetable fertilizers n.c.a.p. (1)	31,637	tons
Plastics in primary form		
Polymers of ethylene, in primary forms	17,767	tons
Polymers of styrene, in primary forms	7,634	tons
Polyacetals, other polyethers and epoxy resins, in primary forms, polycarbonates, alcohol resins, polyols esters and other polyesters, in primary forms	70,079	tons
Polyacetals, polyethers and polyesters, polycarbonates, alkyd and epoxy resins in primary forms (1)	76,358	tons
Polypropylene in primary forms (1)	1,533	tons
Ureic resins, thiourea resins, in primary forms *(1)	122,974	tons
Other ammonium and phenolic resins and polyurethanes, in primary forms	22,790	tons
Pesticides and other agrochemical products		
Carbamate insecticides (such as aldicarb, carbofuran, methomyl, etc.)*, ***p.f.r.s.	1,482	tons act.sub.
Organophosphate insecticides*, ***p.f.r.s.	3,268	tons act.sub.
Pyrethroid insecticides*, ***p.f.r.s.	6,211	tons act.sub.
Other insecticides*	2,958	tons act.sub.
Herbicides, ***p.f.r.s.	6,041	tons act.sub.
Regulators (***p.f.r.s) or its preparations or whatever presentation of plant growth articles	361	tons act.sub.
Disinfectants or ammonia-based preparations*, ***p.f.r.s.	43	tons act.sub.
Rest of disinfectants and other preparations*, ***p.f.r.s.	797	tons act.sub.
Fungicides, rodenticides and similar products, ***p.f.r.s.	2,976	tons act.sub.
Paints, varnishes and similar coatings, printing ink and mastics		
Paints and varnishes based on acrylic or vinyl polymers in an aqueous medium	125,756	tons

Paints and varnishes based on polyesters, acrylic or vinyl polymers, in a non-aqueous medium; solutions	35,946	tons
Pigments, opacifiers and prepared colors, glazes and enamels varnishes, coatings, liquid polishes and similar; glass frit	1,339,254	tons
Other paints and varnishes; prepared driers	34,453	tons
Colors for painting, teaching and signs, colors for modifying tints, amusement colors and similar products	706	tons
Other printing inks*	1,142	tons
Soaps and detergents, cleaning and polishing articles		
Soap and organic surface-active products and preparations for use as soap; paper, wadding, felt and nonwovens, impregnated, coated or covered with soap or detergent	30,343	Tons
Detergents and washing preparations	181,072	Tons
Artificial waxes and prepared waxes (no about polyethylene glycol)*	20,919	Tons
Polishes and creams for footwear, furniture, floors, coachwork, glass or metal	5,600	Tons
Perfumes and beauty products and health		
Toilet waters and colognes*	5,866	m ³
Soap, organic surfactants products and toiletries (including bath gel)	10,560	Tons
Explosives and pyrotechnics		
Fireworks	1,106	Tons
Glues manufacture		
Glues and other prepared adhesives*, **n.c.a.p	20,076	Tons
Essential oils		
Essential oils; mixtures of odoriferous substances	1,234	Tons
Other chemical products **n.c.a.p.		
Dressings and other finished products, accelerators of dyeing, or fixations of dyestuffs used in the textile industry (including domestic softeners)*	5,850	Tons
Inorganic solvents and thinners for varnishes and similar	246	Tons
Biofuel substitutes for diesel oil plants; ethanol by fermentation of sugar or starchy plants, used in transport, **n.c.a.p.	6,934,070	Tons

In order to end this brief analysis of the sector, is needed a study of the evolution of hazardous merchandise and chemical products transport registered in one of the aforementioned transport nodes, namely the Port of Castellón. The reason for choosing this node is its close proximity to the BP Oil hydrocarbon plant, the bio-diesel plant (Infinita Renovables), and the important ceramics industry.

Thus, the aforementioned study firstly shows the total flow during the 2005-2009 period, to follow on with the analysis for each typology of this type of merchandise that have recorded major traffic levels in the years taken into account.

3.2. Total traffic of chemical products and hazardous merchandise at the Port of Castellón. 2005-2009

The following table includes the data for the total movement of hazardous merchandise and the chemical sector, expressed in tons, differentiating between loaded and unloaded goods on and from ships through the Port of Castellón, between 2005 and 2009. Likewise, the attached table and graphs show the evolution in the movement of these goods, from which the traffic trends can be seen over the last few years.

Table 15. Total traffic of chemical products and hazardous merchandise at APC.
Expressed in tons. 2005-2009

	2005	2006	2007	2008	2009
Disembarking (t)	7,152,925.00	6,799,399.00	6,124,154.00	6,232,061.00	5,896,629.00
Embarking (t)	3,817,169.00	3,247,124.00	3,096,599.00	3,108,925.00	3,389,091.00
TOTAL (t)	10,970,094.00	10,046,523.00	9,220,753.00	9,340,986.00	9,285,720.00

Source: Own elaboration from APC data

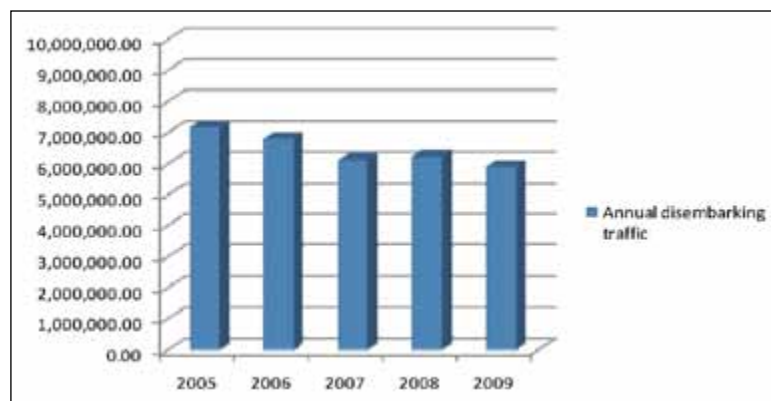


Figure 16. Evolution of traffic of hazardous merchandise disembarking at APC. Expressed in tonnes. 2005-2009

Source: Own elaboration from APC data.

In the graph for disembarked traffic, it can be observed a decreasing trend throughout the whole period, with an accumulated negative growth of 17.5% between 2005 and 2009. This behavior is partly due to the current economic and social situation, LOSAMEDCHEM - SWOT Analysis of chemical sector in the Castellón area immersed in a major crisis since the end of 2007, which hassled to a fall in traffic in general, as well as a decrease in incoming hydrocarbons at the BP Oil plant.

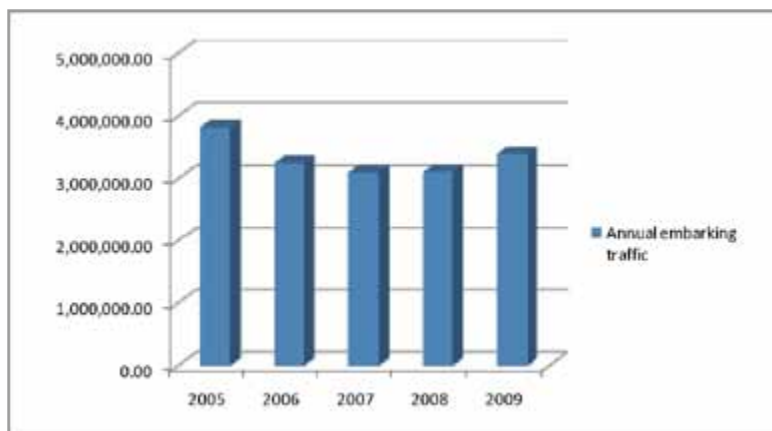


Figure 17. Evolution of traffic of hazardous merchandise disembarking at APC. Expressed in tonnes. 2005-2009

Source: Own elaboration from APC data.

If the embarked figures are analysed, in 2005 a period of decrease began, lasting through to 2007, and recovering at the end of the following year, with this trend continuing in 2009, mainly due to the output of diesel and kerosene.

By itemising the study by the top ten types of merchandise recording the highest traffic figures recorded in the period, the results obtained are as follows:

3.2.1. Petroleum crude oil (TARIC 2709A)

This merchandise is the one that has shown the highest volume of traffic at the Castellón Port Authorities, with numbers approaching 21.5 million tons overall in the period between 2005 and 2009, which are all due to disembarking operations.

The table and graphs on the following page show the volume of traffic for this kind of merchandise in the study period.

Table 16. Total traffic of petroleum crude oil (TARIC 2709A) at APC. Expressed in tonnes. 2005-2009

	2005	2006	2007	2008	
Disembarking (t)	4,646,342.00	4,348,149.00	3,764,051.00	4,406,782.00	4,219,746.00
Embarking (t)	0.00	0.00	0.00	0.00	0.00
TOTAL (t)	4,646,342.00	4,348,149.00	3,764,051.00	4,406,782.00	4,219,746.00

Source: Own elaboration from APC data.

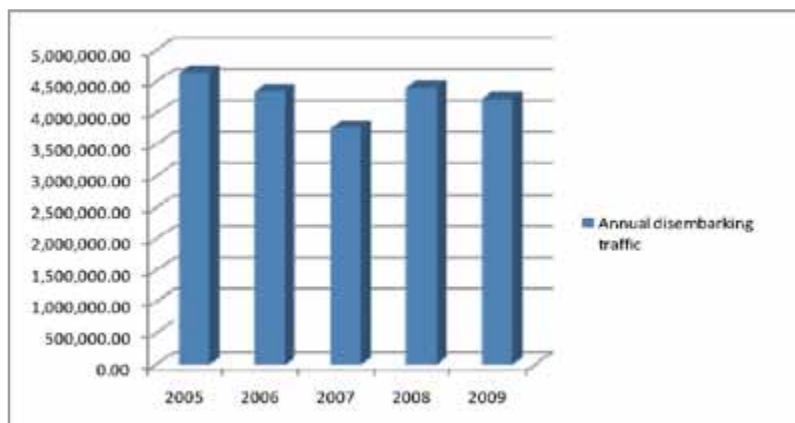


Figure 18. Evolution of petroleum crude oil traffic (2709A) disembarking at APC.

Expressed in tonnes. 2005-2009

Source: Own elaboration from APC data.

The first of the preceding graphs shows that there was a decrease in imports of this product (19%) between 2005 and 2007, followed by a considerable recovery in 2008 (17% over the previous year), with imports dropping off once again in 2009.

As mentioned earlier, no movements have been recorded about the tonnage disembarking for this merchandise.

3.2.2. Kerosene, gasoline and petroleum (TARIC 2710B)

The traffic of these products is highly significant in the activities carried out at the Port of Castellón, with total figures in excess of 10.9 million tons for the 2005-2009 period. The trend recorded during said period is decreasing, with accumulated negative increases of around 21%.

The following table and wfigures show the traffic figures, differentiating between embarking and disembarking operations.

Table 17. Total traffic of kerosene, gasoline and petroleum (TARIC 2710B) at APC.
Expressed in tonnes. 2005-2009

	2005	2006	2007	2008	2009
Disembarking (t)	317,922.00	291,944.00	435,356.00	101,524.00	57,882.00
Embarking(t)	2,270,716.00	2,028,128.00	1,779,522.00	1,662,216.00	1,992,622.00
TOTAL (t)	2,588,638.00	2,320,072.40	2,214,878.00	1,763,740.00	2,050,504.00

Source: Own elaboration from APC data.

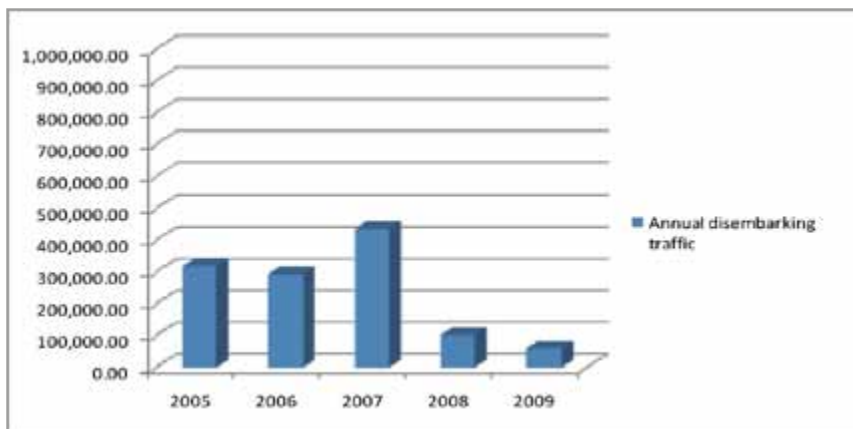


Figure 19. Evolution of traffic of kerosene, gasoline and petroleum (2710B) disembarking at APC. Expressed in tonnes. 2005-2009

Source: Own elaboration from APC data.

The above figure showing the tonnage disembarked permits observing the sharp fall in the last two years (2008 and 2009), mainly due to the fall in consumption for that period.

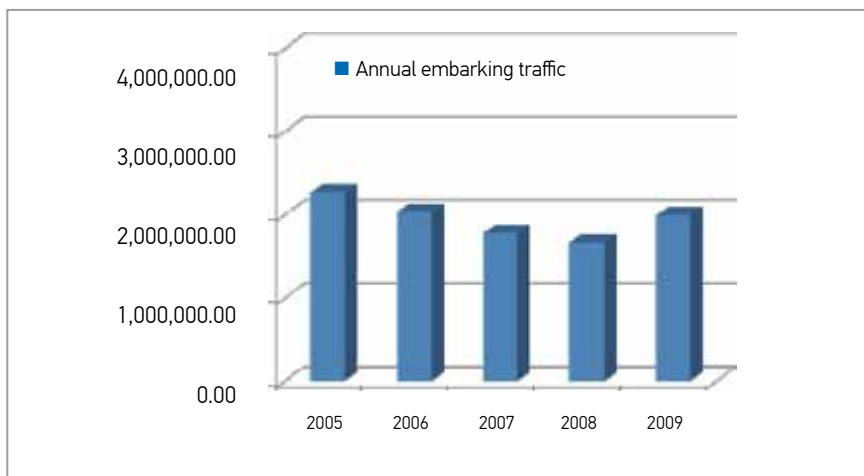


Figure 20. Evolution of traffic of kerosene, gasoline and petroleum (2710B) embarking at APC. Expressed in tonnes. 2005-2009

Source: Own elaboration from APC data.

With regards to outbound traffic (embarking), there was a continued negative increase over the four first years in the study period, followed by a growth in 2009, thus permitting figures similar to those recorded in 2006 to be achieved.

3.2.3. Diesel (TARIC 2710F)

This product has recorded total accumulated traffic of over 6.6 million tons in the period analyzed (2005-2009). The decreasing trend initiated in 2005 continued through 2008, with an accumulated decrease of 41.46%, which continued after a slight recovery in 2009 (36% compared to the previous year).

The figures shown as follows illustrate the evolution of traffic for this commodity, differentiating between inbound and outbound traffic flows.

Table 18. Total diesel traffic (TARIC 2710F) at APC. Expressed in tons. 2005-2009

	2005	2006	2007	2008	2009
Disembarking (t)	1,217,641.00	1,089,125.00	926,729.00	709,873.00	725,538.00
Embarking (t)	546,986.00	234,040.00	189,409.00	323,187.00	679,367.00
TOTAL (t)	1,764,627.00	1,323,165.00	1,116,138.00	1,033,060.00	1,404,905.00

Source: Own elaboration from APC data.

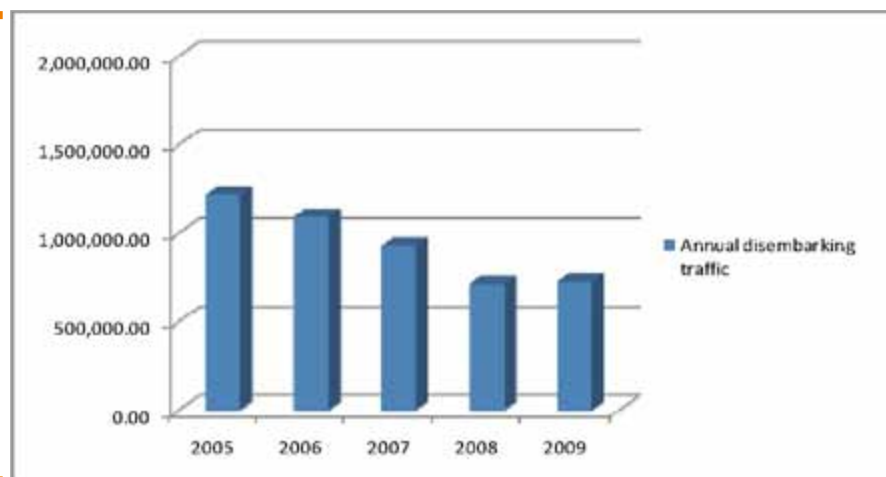


Figure 21. Evolution of diesel traffic (2710F) disembarking at APC. Expressed in tons. 2005-2009

Source: Own elaboration from APC data.

The graph illustrating the disembarking tonnage allows us to see the continued drop off in inbound traffic for this product between 2005 and 2008, accumulating a negative increase of 41.70%, with a slight recovery being recorded in 2009 (2.21% compared to the previous year).

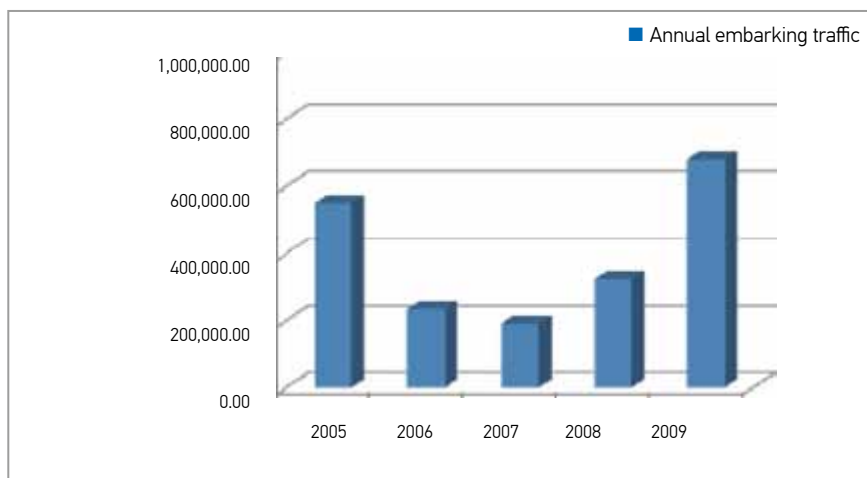


Figure 22. Evolution of diesel traffic (2710F) embarking at APC. Expressed in tonnes. 2005-2009

Source: Own elaboration from APC data.

The graph referring to outbound traffic (embarking) shows a strong fall in traffic between 2005 and 2007 (-65.37% in both years), recovering afterwards to reach a value way higher than at the start of the period in 2009, which accounts for accumulated growth of 24.20%

3.2.4. Fuel (TARIC 2710A)

The traffic figures for this commodity between 2005 and 2009 amounted to a total of 3.93 million tons, recording unstable behavior in terms of increases in the study period, and showing a notable fall in the last year.

The following table shows the most representative data for fuel movements in the last few years, differentiating between inbound and outbound traffic.

Table 19. Total fuel traffic (TARIC 2710A) at APC. Expressed in tonnes. 2005-2009

	2005	2006	2007	2008	2009
Disembarking (t)	235,111.00	317,844.00	245,801.00	120,963.00	136,842.00
Embarking (t)	620,280.00	584,079.00	714,303.00	721,725.00	236,333.00
TOTAL (t)	855,391.00	901,923.00	960,104.00	842,688.00	373,175.00

Source: Own elaboration from APC data.

In the following graphs the evolution of fuel traffic can be seen in the time interval in question, considering both direction flows (inbound and outbound).

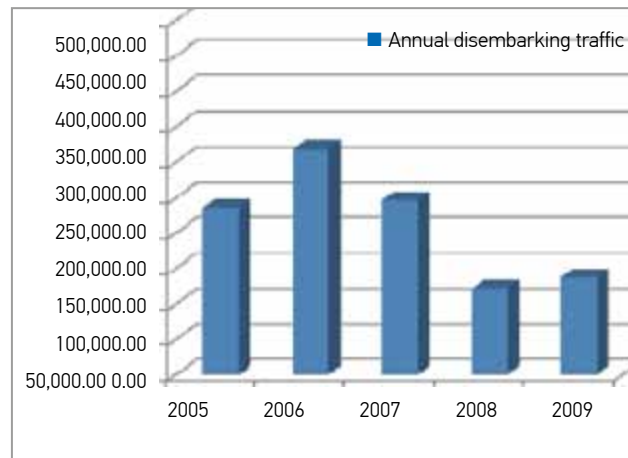
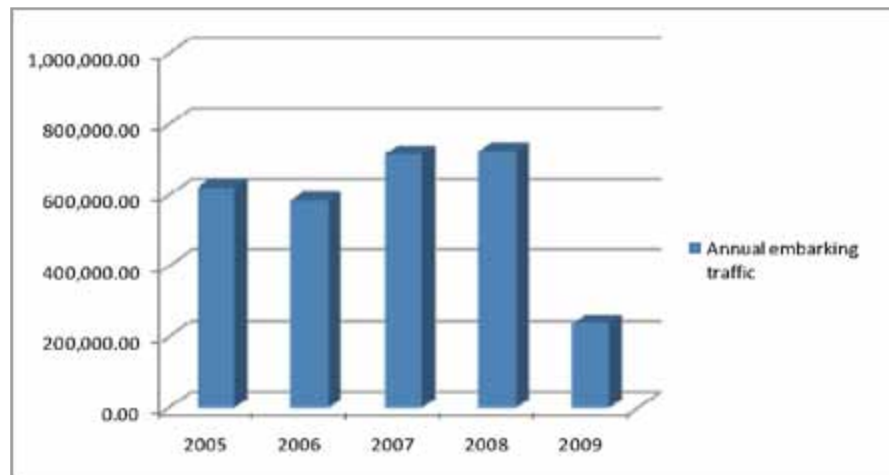


Figure 23. Evolution of fuel traffic (2710A) disembarking at APC. Expressed in tons. 2005-2009

Source: Own elaboration from APC data.

As for inbound fuel at the port, the study period began with a sharp growth of 35.19% (2006 compared to 2005), only to suffer a major slump, with accumulated negative growth over three years of -48.55%. Finally, in 2009, there was a recovery of 13.13% over the previous year.

Figure 24. Evolution of fuel traffic (2710A) embarking at APC. Expressed in tonnes. 2005-2009



Source: Own elaboration from APC data.

By analysing the traffic originating at the Port of Castellón a slight decrease between 2005 and 2006 can be observed, followed by major growth in traffic the following two years with an accumulated increase of 16.35%. In the last year of the study period a sharp fall was recorded in the embarked volume which had a knock-on effect for the five-year period recording decreases of nearly 62%.

3.2.5. Sulphates, alum and peroxosulphates (2833)

The total quantity of these products moved during the study period between 2005 and 2009 amounted to 0.92 million tons, including inbound and outbound flows. In the former case these movements practically disappeared in 2008, and in the latter case levels remained stable to end the period with a slump of over 12% in 2009.

The following table and graphs show the evolution recorded.

Table 20. Total traffic for sulphates, alum and peroxosulphates (TARIC 2833) at APC.
Expressed in tons. 2005-2009

	2005	2006	2007	2008	2009
Disembarking (t)	4,450.00	4,654.00	7,555.00	0.00	4.00
Embarking (t)	179,339.00	197,893.00	180,430.00	188,760.00	157,479.00
TOTAL (t)	183,789.00	202,547.00	187,985.00	188,760.00	157,483.00

Source: Own elaboration from APC data.

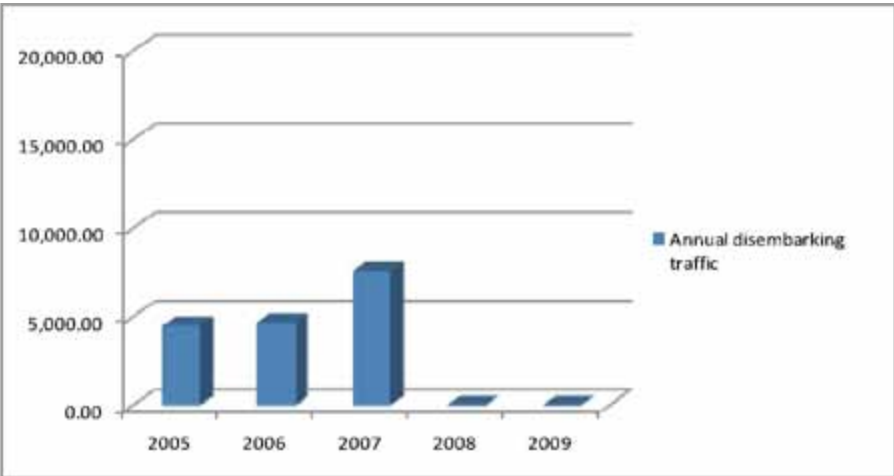


Figure 25. Evolution of traffic of sulphates, alum and peroxosulphates (27833) disembarking at APC. Expressed in tons. 2005-2009

Source: Own elaboration from APC data.

The graph shows the major growth rate in percentage with inbound volumes for these products in 2006 and 2007 (62.33%), and then the drastic slump leading to the practical disappearance of traffic for these items.

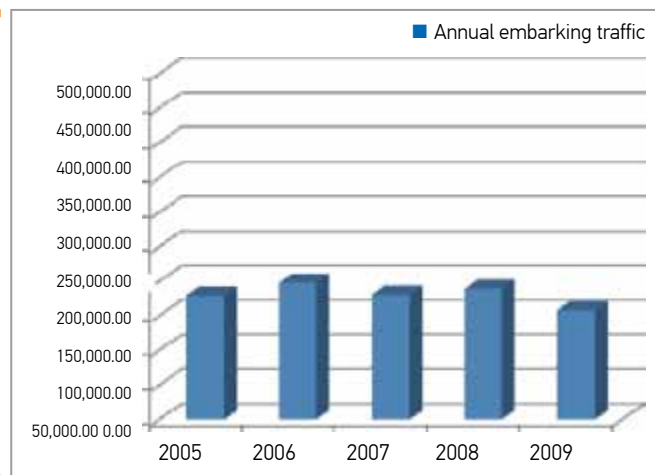


Figure 26. Evolution in the traffic of sulphates, alum and peroxo-sulphates (2833) disembarking at APC. Expressed in tonnes. 2005-2009

Source: Own elaboration from APC data.

The behaviour of sulphate, alum and peroxosulphate traffic is variable, alternating between positive and negative increases each year since 2005, leading to an accumulated increase over the five years of -12.19%.

3.2.6. Ammonium sulphate (TARIC 3102B)

Throughout the study period referred to in this report (2005-2009) the total traffic at port facilities for this product amounts to around 0.9 million tons, showing a slight increase in terms of inbound traffic and a variable trend in the case of outbound traffic.

The following table and graphs clearly show the evolution in the movement of this product over recent years.

Table 21. Total traffic of ammonium sulphate (TARIC 3102B) at APC. Expressed in tons. 2005-2009

	2005	2006	2007	2008	2009
Disembarking (t)	0.00	8,541.00	9,995.00	8,738.00	30,583.00
Embarking (t)	181,183.00	148,441.00	180,034.00	136,252.00	166,841.00
TOTAL (t)	181,183.00	156,982.00	190,029.00	144,990.00	197,424.00

Source: Own elaboration from APC data.

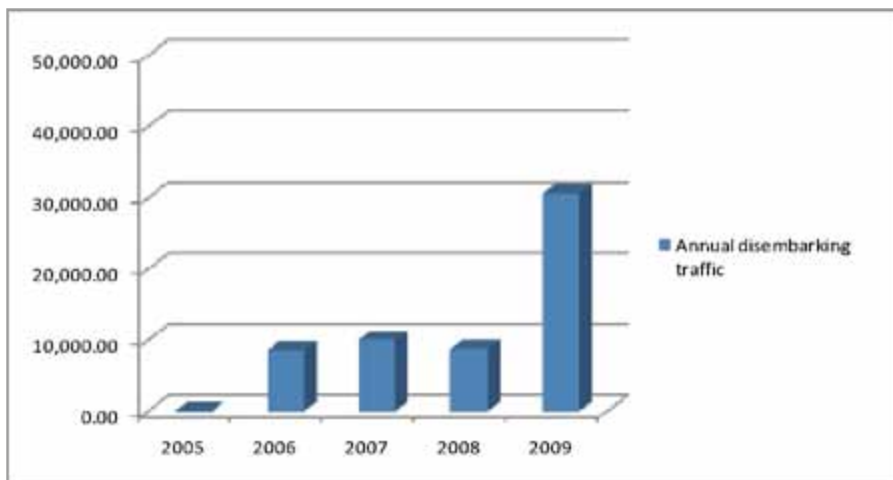
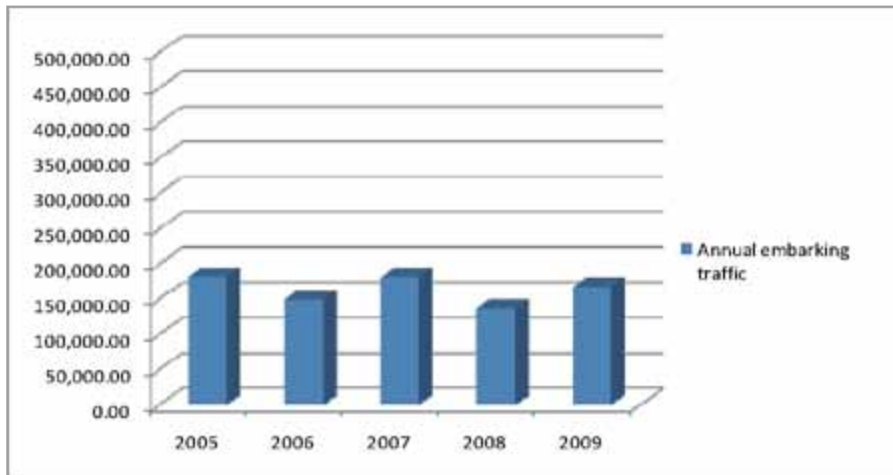


Figure 27. Evolution of traffic of ammonium sulphate (3102B) disembarking at APC. Expressed in tons. 2005-2009

Source: Own elaboration from APC data.

The above figure shows the upward trend recorded for inbound traffic of ammonium sulphate at the Port of Castellón during the period 2005-2009, from practically zero to a later excess of 30,000 tonnes.

Figure 28. Evolution in the traffic of ammonium sulphate (3102B) embarking at APC Expressed in tonnes. 2005-2009



Source: Own elaboration from APC data.

The inbound traffic of this product reports stable figures with slight increases and falls to accumulate a negative growth rate of -7.92%. LOSAMEDCHEM - SWOT Analysis of chemical sector in the Castellón area.

3.2.7. Anhydrous ammonia or in solution (TARIC 2814)

The Port of Castellón only recorded inbound traffic for this commodity between 2005 and 2009. The values for the study period are very similar, with a notable increase being recorded between 2006 and 2007, only to fall off the following year. With these figures the total movements are in excess of 0.6 million tons.

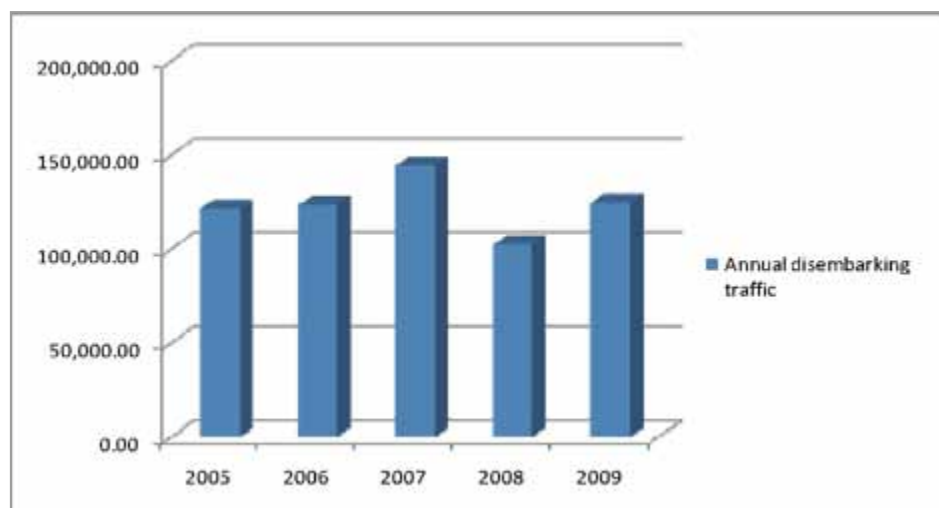
As on previous occasions, a table and two graphs are provided clearly showing the evolution in the traffic of anhydrous ammonia or in solution during the study period.

Table 22. Total traffic for anhydrous ammonia or in solution (TARIC 2814) at APC.
Expressed in tons. 2005-2009

		2006	2007	2008	2009
Disembarking (t)	121,025.00	123,076.00	143,828.00	102,112.00	124,195.00
Embarking (t)	0.00	0.00	0.00	0.00	0.00
TOTAL (t)	121,025.00	123,076.00	143,828.00	102,112.00	124,195.00

Source: Own elaboration from APC data.

Figure 29. Evolution in the traffic of anhydrous ammonia or in solution (2814) disembarking at APC. Expressed in tons. 2005-2009



Source: Own elaboration from APC data.

As stated previously, this product has only been unloaded, registering stable trends except in 2007 and 2008, when there was a considerable increase (16.86%) and then a major slump (29%), respectively, compared to the previous year.

Once again, it must be stated that there was no outbound traffic for this commodity in the study period.

3.2.8. Mineral or chemical fertilizers with two or three fertilising components: nitrogen, phosphorous and potassium (TARIC 3105)

The Port of Castellón moved a total in excess of 0.53 million tons of these commodities in the five years spanning from 2005 to 2009. The recorded figures for each of the years are similar with the exception of 2009, when there was a notable slump of -19.04% compared to the previous year.

As is true for the previous cases, the figures, and the evolution of this traffic are shown in the following table, accompanied by graphs showing the types of traffic flows (inbound / outbound).

Table 23. Total traffic of mineral or chemical fertilizers with two or three fertilizing components: nitrogen, phosphorous and potassium (TARIC 3105) at APC. Expressed in tons. 2005-2009

	2005	2006	2007	2008	2009
Disembarking (t)	116,340.00	102,224.00	107,513.00	97,885.00	87,510.00
Embarking (t)	81.00	453.00	718.00	14,528.00	3,496.00
TOTAL (t)	116,421.00	102,677.00	108,231.00	112,413.00	91,006.00

Source: Own elaboration from APC data.

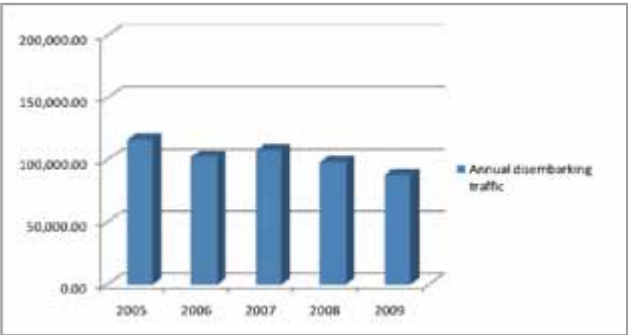


Figure 30. Evolution in the traffic of mineral or chemical fertilizers with two or three fertilizing components: nitrogen, phosphorous and potassium (3105) at APC. Expressed in tons. 2005-2009

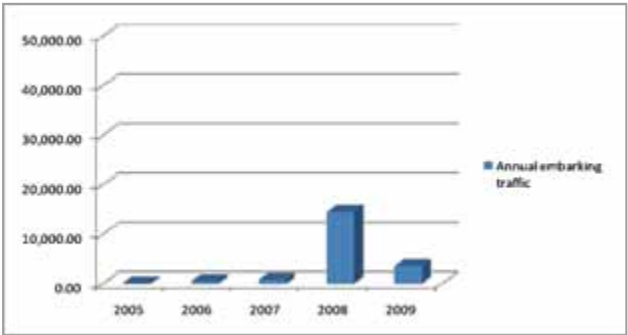


Figure 31. Evolution in the traffic of mineral or chemical fertilizers with two or three fertilizing components: nitrogen, phosphorous and potassium (3105) at APC. Expressed in tons. 2005-2009

Source: Own elaboration from APC data.

As the figure 30 shows, the trend for inbound merchandise of this type reports a slight decrease, with the exception of 2007, accumulating a negative increase throughout the study period of nearly -25%.

If outbound movements are analyzed, the opposite of inbound movements occurs, the trend is upwards, with maximum figures being recorded in 2008, followed by a sharp slump in 2009, in spite of which there is an overall increase over the five years of 4,216%.

3.2.9. Ethers, alcohol ethers and phenol ethers (TARIC 2909)

The traffic of these chemical products recorded between 2005 and 2009 amounted to over 0.4 million tons, with practically all operations involving inbound traffic at the port (99.86%), with an increase in traffic at the start and end of the period.

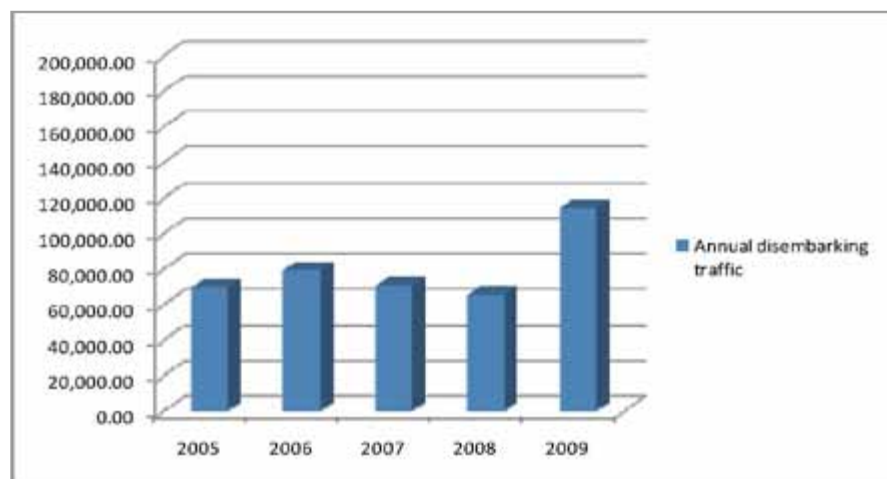
The evolution of this commodity is shown in the following table in a more detailed fashion, and in the figures on the following page.

**Table 24. Total traffic of ethers, alcohol ethers and phenol ethers (TARIC 2909) at APC.
Expressed in tons. 2005-2009**

	2005	2006	2007	2008	2009
Disembarking (t)	69,783.00	79,238.00	70,910.00	65,242.00	114,271.00
Embarking (t)	0.00	11.00	300.00	133.00	122.00
TOTAL (t)	69,783.00	79,249.00	71,210.00	65,375.00	114,393.00

Source: Own elaboration from APC data.

Figure 32. Evolution of the traffic of ethers, alcohol ethers and phenol ethers (2909) disembarking at APC. Expressed in tons. 2005-2009



Source: Own elaboration from APC data.

The graph above shows the growth rate in the inbound traffic of these products between 2005 and 2006 (13.55%), the decrease in 2007 and 2008 and finally the notable increase recorded in 2009, with a percentage of 75.15% over the previous year and an accumulated increase of 63.75% since 2005.

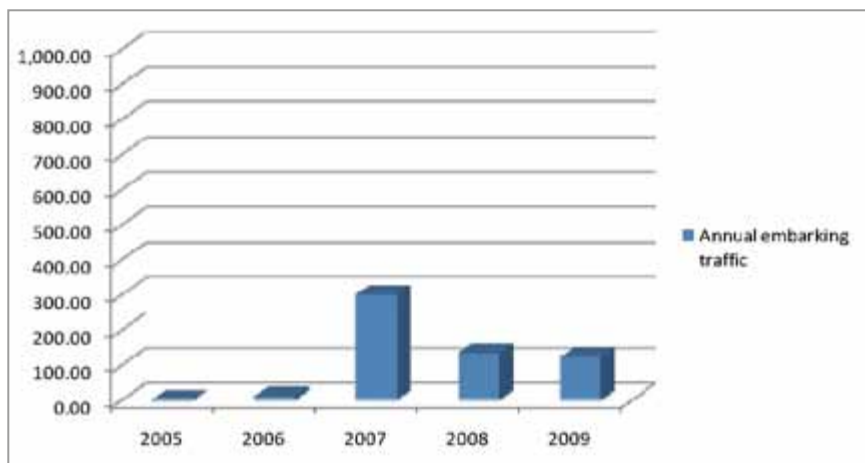


Figure 33. Evolution of the traffic of ethers, alcohol ethers and phenol ethers (TARIC 2909) disembararking at APC. Expressed in tons. 2005-20

Source: Own elaboration from APC data.

In 2005 and 2006 the embarking traffic of these chemical products was practically nonexistent, with a maximum of 11 tonnes. In 2007 the volume increased threefold, and LOSAMEDCHEM - SWOT Analysis of chemical sector in the Castellón area underwent a strong decrease the following year (-55.67%), and 2009 showing similar traffic values to those of the previous year.

3.2.10. Binding mixtures for moulds and nuclei (TARIC 3824)

Finally, the group of commodities included these products reached a total traffic volume in the study period in excess of 0.25 million tons, nearly all of which was in 2008 and 2009, there previously being residual traffic values.

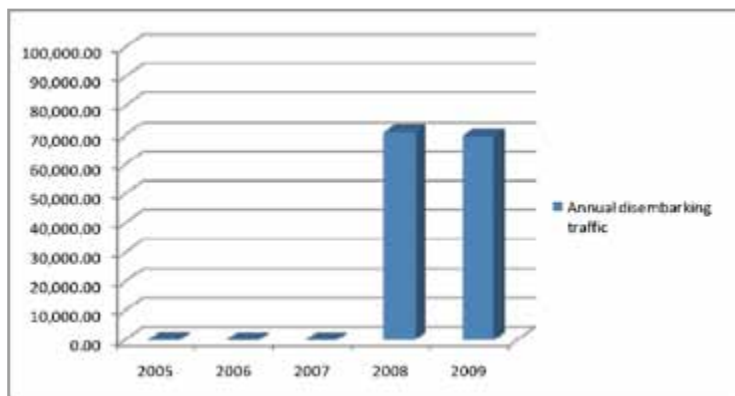
Once again, the data for the traffic of this commodity and its evolution is shown in more detail in the following table and the graphs accompanying it.

Table 25. Total traffic for binding mixtures for moulds and nuclei (TARIC 3824) at APC. Expressed in tons. 2005-2009

	2005	2006	2007	2008	2009
Disembararking (t)	147.00	0.00	0.00	70,943.00	69,620.00
Embarking (t)	138.00	315.00	1,000.00	30.00	112,846.00
TOTAL (t)	285.00	315.00	1,000.00	70,973.00	182,466.00

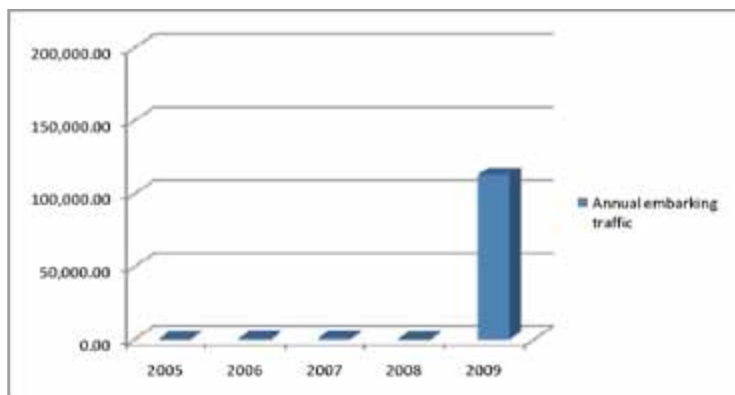
Source: Own elaboration from APC data.

Figure 34. Evolution of traffic for binding mixtures for moulds and nuclei (3824) disembarking at APC. Expressed in tons. 2005-2009



The figure shows how disembarking traffic in the first three years is negligible, and in 2008, 70,000 tons inbound was recorded, which was maintained in 2009. LOSAMEDCHEM - SWOT Analysis of chemical sector in the Castellón area.

Figure 35. Evolution of traffic for binding mixtures for moulds and nuclei (3824) embarking at APC. Expressed in tons. 2005-2009



Source: Own elaboration from APC data.

As was true for inbound traffic, the movements leaving the port (embarking) were negligible until 2008, and later went on to record a total of 112,000 tons in 2009. LOSAMEDCHEM - SWOT Analysis of chemical sector in the Castellón area.

4. SWOT analysis of the chemical sector and associated logistics in the Castellón area

After describing the chemical industrial sector in the foregoing chapters, we then moved on to analyse the sector, considering associated logistics and the factors that characterise the transport of this kind of merchandise in order to identify any weaknesses and bottlenecks, as well as any possible strengths and opportunities in the immediate future. The result of the above is a SWOT analysis in which the external threats and opportunities conditioning the sector will be studied, along with any internal strengths and weaknesses present today.

In order to develop the aforementioned analysis, it was previously necessary to carry out a number of interviews with companies participating in the chain in this sector, from the production process through to distribution of end products, so that the point of view of all the possible players intervening in the chain could be taken into account. This criterion has been first and foremost when selecting the companies to hold contacts with.

Consequently, the organisations interviewed are shown in the following list, stating their main business activity, and in some cases, the number of workers associated with them:

- Castellón Port Authority -> provider of logistics services
- BP Oil España, S.A. -> hydrocarbon refinery
- Nitroparis, S.L.-> potassium nitrate production. 7 employees
- FOYJOR, S.L. -> provider of road transport services. 5 employees
- TECASA -> provider of logistics services. 22 employees
- Roca Castellón Consignatarios, S.L. -> provider of logistics services for maritime transport.
- Infinita Renovables -> Bio-diesel production. 55 employees
- QUIMGRA, S.A -> Import, storage and distribution of potassium nitrate. 12 employees
- Pirotecnia Peñarroja, S.L. -> handling and preparation of pyrotechnic articles. 8 employees.

After identifying the agents to be interviewed, the main results obtained from the subsequent analysis are described.

4.1. External threats to the sector

The external factors associated with the economic and social conditioners which are apparent today account for a real threat in different ways for the development of the sector. The main threats identified in this study are detailed as follows:

- Economic trends

Internationalization of markets is seen in most cases as a business opportunity, but this also entails an increase in competition. This increase in competition does not pose a real threat given the high degree of standardization of processes / procedures in some of these companies, as well as the application of continuous improvement in the quality of their products or processes, assured by means of a certified management system (usually ISO 9001). There is also fixed clientele.

- Socio-cultural trends

Contrary to what one could think, the growing percentage of labor by immigrants is not considered to be threat for the rest of the workforce, or good working of the company. On the contrary, the fact of having a higher level of qualification for the job by workers is seen as a problem, since this leads to lack of commitment to the company by employees. This phenomenon has grown in the last few months because of the crisis, with the subsequent need to occupy jobs which require lower qualification than that held.

- Energy and the Environment

The availability of energy sources and the costs are identified as one of the largest existing threats. The constant increase in energy prices leads to lower profit margins, or in some cases lack of competitiveness. In some cases the tightening up of legislation and regulations regarding CO2 emissions and contaminated effluents is also considered to be a risk. This is not so for those companies who have been awarded certificates pertaining to this matter.

- Policies and Innovation

One of the negative aspects identified in general by most of the interviewed companies is the absence of help and subsidies by the different public administration departments. The awarding of this kind of support would represent considerable backing for these companies, in some way setting off the high costs associated with the business activities they carry out.

- Infrastructures and transport

Concerning the different modes of transport, the scarce use of railways is a threat owing to lack of competitiveness because of the lack of a good railway infrastructure and optimum management. In the case of roads, the high fuel prices and toll fees and considered serious threats to the sector. The nearby location of several port enclaves such as the ports of Castellón, Sagunto and Valencia are considered to be important opportunities. Nevertheless the rating of the inter-oceanic port of Valencia and its growth in capturing clients represents a threat to other smaller ports, such as the port of Castellón.

- Safety / Prevention

It is worth mentioning that the highest threat in the sector was unanimously agreed to be those companies who do not meet the minimum requirements of safety and prevention. The consequences are that, in spite of it being impossible to do so they carry out their business activities with considerably lower overheads, and can therefore cut the prices of their production / service, thus capturing part of

the market, while running serious risks.

- Market access

Smaller companies see the development of economies of scale as a considerable threat, which mean that replacement products are introduced to the market by competitors.

4.2. External opportunities over the sector

Similar to the previous case, this section identifies the main opportunities provided by the current social and economic conditions.

- Economic trends

As mentioned earlier, internationalisation of markets is seen as a business opportunity in most cases. Regional development also offers opportunities for the future, but in the current crisis situation this process has been severely hampered.

Socio-cultural trends

The increase in specific training required by personal in companies in this sector is an opportunity, since they usually guarantee a better quality in the service offered.

- Energy and the Environment

Companies with more restrictive quality assurance certificates consider the toughening up of regulations in this aspect to be an opportunity over their competitors.

- Policies and Innovation

International standardisation of traffic regulations represents an opportunity to open up into new markets for companies in the transport sector. On the other hand, the development of a transport infrastructure network is fundamental to improve competitiveness of the sector, and therefore any progress made in this sense is a great opportunity.

- Infrastructures and transport

The existence of large port infrastructures in the area is considered to be a great opportunity for the sector. Likewise, promoting intermodal transport is also seen as something positive by the players in the sector, as is true for the use of new information technology.

- Safety / Prevention

Certification by a large majority of companies in standards pertaining to safety and quality is considered to be an opportunity. All the surveyed companies are holders of ISO type certificates and in some cases even hold SEVESO certificates, through enforced compliance by law. Moreover, international cooperation is a clear opportunity for the entire sector.

- The industrial sector and competition

The degree of standardisation of products represents a great opportunity for all the companies surveyed. Likewise, the possibility of integrating their own activity in the supply chain downstream is also considered to be an opportunity, since it permits complete tracking of products and constant contact





with clients.

The degree of concentration / dispersion of clients can be both positive and negative, since intense geographical concentration facilitates distribution of products, but in the event of a market crash, there could be catastrophic consequences.

Finally, achieving brand identity involves clearly standing out from the competition and winning customer loyalty. Therefore, this is a great opportunity.

4.3. Internal strengths of the sector

Identifying strengths means carrying out an analysis from within the sector itself, in an objective manner that permits highlighting the strong points to develop in the immediate future.

- Contracting policy

This aspect is only applicable to production, handling and stockpiling companies, where the short deadlines required to obtain the raw materials to be used are particularly important, as well as the policy of developed supply and supply strategies adopted, permitting dealing with any unexpected situations. Once again emphasis is placed on quality certification obtained through compliance with the standards.

- Storage

In all the cases with the companies carrying out this business activity, they all emphasized the strong policies maintained concerning stocks, inventories and subcontracting. The use of different software and IT tools for the control of these items is generalized.

- Production logistics

Some of the production processes entail a certain degree of complexity and rigidity, thus making them weak. On the other hand, in some cases these processes are much easier and much more flexible. It is precisely the degree of difficulty which determines whether they are considered strengths.

- Distribution and transport

A large number of the companies surveyed consider that the time of delivery of the product or performing of the services (in the case of hauliers) is a strength with delivery being carried out by road in most cases. In the case of transport companies, the use of useful load optimisation systems is in general use for filling vehicles.

- Planning and control

Practically all the companies consulted, state implementing methods and tools that permit offer and demand to be planned. Moreover, in most cases, the companies have fixed, loyal clientele.

Another of the considerations to be taken into account is the generalised possession of Quality Assurance certificates, and implementation of error control systems, that allow these companies to employ continuous improvement systems. The companies involved in production and distribution are those that show more interest in this subject than transport companies.

- Processing order

A complete tracking process of product deliver has been identified in all cases, although the system itself

does vary, which ranges from confirmation of delivery by phone call to sophisticated control systems.

- Business level safety and protection

Owing to the nature of the materials employed in this sector, the safety levels implemented by companies are high, with minimum certificates of the ISO type, and different management systems as well as safety protocols in cooperation with the different authorities. The companies affected by the SEVESO directive are emphasised here (refineries, bio-fuel production and production and/or handling of potassium nitrate), which entail strict safety standards.

None of the companies participating in the program is a Responsible Care company, because of the complexity of achieving this rating owing to the demands of certification by all the members of the chain. Additionally, the lack of awareness of this program is generalised among the surveyed companies, except for occasional exceptions.

- Information and Communication Technology in companies

Only the companies involved in maritime transport have Electronic Data Interchange (EDI) systems, with said system being a clear strength. Likewise, the use of telemetry via satellite is not generalised.

4.4. Internal weaknesses in the sector

As was the case for strengths, identifying the weakness of the sector requires an introspective analysis of the sector by the companies taking part in it.

- Contracting policy

In some cases the policies for supplying and payment conditions required represents a weakness, as is true for deferred payment terms (from 3 or 6 months to 1 month), or the need to keep a minimum safety stock, with the subsequent costs of maintaining it.

- Production logistics

The rigid, complex production processes are a weakness for the company that has to implement them, mainly because of the high costs and energy consumption related to said processes, as well as the high fees paid for the production of waste.

- Distribution and transport

The main threat identified in this aspect is the cost of these items, which is generally very high, and consequently increases the end price, which leads to loss of competitiveness. Moreover, the scarce availability of intermodal transport in the development of this activity also represents another threat, because of the lack of other options and almost complete dependence on road transport, which has a much higher cost.

- Planning and control

In the case of some of the companies surveyed, the impossibility of planning demand is considered to be a weakness, which is also true in the case of inexact and inflexible planning of product delivery.

5. Conclusions

The chemical industry has a certain degree of importance in the region of Valencia, and especially in the area of Castellón, and therefore its development and optimum management in order to face up to the challenges of the future and improve competitiveness are vital. The results obtained from the analysis in this report permit certain conclusions to be drawn up, while identifying the weak points where specific action is required within a process of continuous improvement.

Internationalisation of the markets accounts for a great opportunity for the sector, permitting growth of business in this industry. But increases in the level of competitiveness should not be forgotten, owing to the competition working in this sector.

Today, one of the main threats to this sector is the high cost of energy sources. Production and distribution companies alike, and other players in the logistics chain have been suffering from the constant increase in the price of energy and fuel in recent years, which has led to reduce profits or competitiveness. Consequently, stronger support from the different public administration departments through financial subsidies to mitigate this loss of competitiveness is missed by this sector.

On the other and, the opening up of markets also enforces optimisation of the logistics chain, offering multiple possibilities, which entail development of intermodal transport. At present, shipping and road transport account for all the transport flows in this sector, and consequently there are three major port enclaves in the area, as well as a more than acceptable highway network. Nevertheless, the presence of railways in goods transport is negligible. The deficient railway infrastructure in the area and the inexistence of any intermodal logistics centre are handicaps that must be addressed in coming years.

When highlighting the strong points of the sector, the high degree of standardisation must be pointed out, and the strong commitment to quality in production and service providing. Obtaining certificates in these matters, and ensuring safety aspects is generalised and represents added value for the sector while being one of its main strengths, thus leading to customer loyalty. This fact justifies the existence of numerous quality control systems and error detection systems in the companies surveyed.

The use of Information and Communication Technology and other similar technologies is more widely implemented in the maritime transport channels than in other modes of transport, although it is becoming more widely used in line with the increasing quality of the service provided.

Finally, in the case of production companies, the higher or lesser degree of complexity of production processes, and the degree of flexibility therein, establish the possibility of adopting new technologies, otherwise defining the need to keep to specific procedures without the possibility of alternatives.

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SWOT analysis of the chemical sector in Catalonia

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1. Introduction: geographical and economical notes

Catalonian region can be described as a triangle defined by the Mediterranean coast (East), the Pyrenees (North) and the plains associated with the Segre / Ebre river basins (West).

From South to North, the main rivers of Catalonia are: Ebre, Llobregat, and Ter. All the three flow into the Mediterranean (see image below).

Figure n. 1. Basic geography

Source: Barcelona Chamber of Commerce (BCM)

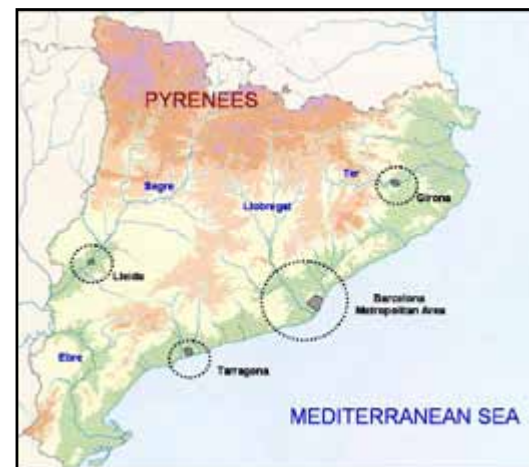
This geography has determined the structure of the Catalonian transport network: the coastal transport corridor (also known as the Mediterranean corridor) connecting Southern Spain and France and 2 perpendicular corridors (named Ebro and Central corridors) that connect the hinterlands with the Mediterranean corridor.

There is also a transverse corridor which cuts across Catalonia, intersecting at key points with the radial corridors which originate mostly in Barcelona.

The Mediterranean transport corridor represents one of the main trans-European transport links, with a growing demand -and equally growing traffic congestion.

As for the urban settlements, the major concentration of urban land –both residential and industrial- is to be found near the coast line. Most of the agricultural land is located inland.

From South to North, the main urban settlements are: Tarragona, Lleida –situated in the middle of the western plain-, Barcelona and Girona. Barcelona is the capital of the autonomous region of Catalonia, and also its biggest urban settlement, representing a metropolitan area comparable to the main European cities. Its local market represents two thirds of Catalonia's population (more than million people) and industrial activity, and more than a quarter of Spain's GDP.



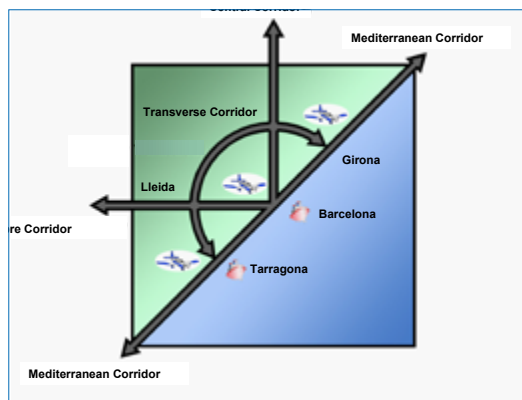


Figure n. 2. Main transport connections in Catalonia

Source: BCM

Thanks to its location on the Mediterranean and proximity to France, Catalonia has become a centre of industry, trading and shipping. Catalonia's Mediterranean climate, with hot, dry summers and mild winters with little precipitation, has also been a positive factor for the industrial activity.

Catalan industry covers a whole range of activities. The most relevant in the Barcelona area are: chemical, textile, papermaking, food processing, graphic arts, metalworking and motor vehicles. The traditional textile industry is currently in crisis and is being taken over by other industrial activities. Tarragona has developed an important activity in petroleum refinery.

The industrial centres of Tarragona and Barcelona are closely related to their commercial ports and are both prominent in the Mediterranean basin. Tarragona specialises in chemicals and petroleum, and Barcelona in containers and vehicles.

Barcelona's port is in the middle of a logistics hub providing a combination of infrastructure and logistics services, situated on the Llobregat river delta. Its main infrastructure includes the international airport of Barcelona-El Prat; the port; and several industrial and logistics areas (ZAL I, ZAL II and the industrial free-port of Zona Franca. See Figure n. 2)



Figure n. 3. The Llobregat delta logistics hub

Source: BCM

The city of Barcelona is immediately adjacent to the Llobregat delta logistics hub: very few European logistic platforms are so closely situated to a metropolitan area. This has been a key factor in the growth of its port and industry.

Since the Olympic games of 1992, which were accompanied by major infrastructure investment and urban transformation, Barcelona has become a city open to the world. This has been particularly positive for the growth of foreign investment and for the development of other economic sectors such as tourism and education.

Concerning tourism, the city has taken good advantage of its exceptional architecture and cultural heritage. There are many air traffic connections between Barcelona and most European cities, and Barcelona's port has become the most important cruise-liner port in Europe. As for education, Barcelona hosts seven universities, eight scientific and technological parks and three of the best European business schools (IESE, ESADE and EAE).

The city is currently experiencing a new transformation process, stimulated both by public and private sectors, bringing new technologies into the industrial and services economy. The best example is the 22@ project, located in Poblenou, a post-industrial area of town which is being redeveloped as a high-tech development zone.

Main economical data	
Inhabitants (millions) - 2010	7,5
Area (sq km)	32.092
Gross domestic Product (billion €) - 2009	207
Gross domestic Product/capita (€) - 2006	27.310

Source: Institut d'Estadística de Catalunya (IDESCAT)

2. The chemical industry in Catalonia

This chapter deals with some basic information about the chemical industry in Catalonia. We will consider its main sectors:

- Chemicals (raw chemicals, agrochemicals, chemicals for industry, chemicals for final consumption, synthetic and artificial fibres)
- Pharmacy
- Plastics

2.1. Chemicals

The chemical sector represents almost 10% of Spain's GDP. Spain is the 5th largest European chemical producer and the 8th in the world, after the USA, China, Japan, Germany, France, Italy and the United Kingdom.

It is the second major Spanish exporter in monetary terms and the first one concerning R+D+I and environment investment.

This sector presently hosts 3,997 enterprises, of which one quarter are located in Catalonia, and it generates 87,000 direct jobs. If we take into account all indirect jobs, this figure rises to 500,000, half of which are located in Catalonia.

More than 93% of the chemical companies in Spain have fewer than 100 workers. Therefore Spain is, together with Italy, the European country with the highest number of small and medium enterprises.

The table below shows some basic information concerning Catalonia's chemical sector:

The chemical industry in Catalonia	
GVA ¹ chemical industry / GVA total industry (2008)	15.6%
Jobs chemical industry / jobs total industry (2009)	6.7%
Turnover Catalan chemical industry / turnover Spanish chemical industry (2007)	44.7%
Jobs Catalan chemical industry / jobs Spanish chemical industry (2009)	37.5%

Source: Generalitat de Catalunya: "2009 Informe Anual sobre la Indústria a Catalunya"

Catalonia represents more than one third of the jobs and almost a half of the exports of the Spanish chemical sector. The most important Catalan chemical sector is raw chemicals, which represent 53% of local chemical production, followed by final consumption chemicals (25%) and chemicals for industry and agrochemicals (22%).

The importance of raw chemicals is due to the petrochemical industry in Tarragona, the biggest in all Southern Europe, situated on a 1,400 hectare complex. It represents one quarter of the Spanish production, hosting 36 enterprises, including many of the most relevant multinational companies of this sector; 6,000 direct jobs; and more than 30,000 indirect jobs. Almost 30% of the sales of the enterprises of this petrochemical complex are directed to other companies in this same complex. Therefore, a solid business and knowledge network has been established.

The main external market for the Catalan chemical industry is the EU. Germany and France are the countries from which Catalonia imports chemical products; and nearby countries such as France, Italy and Portugal are the main destinations for Catalan exports.

Due to the global economic crisis, many chemical companies have reduced their production and commercial operations. More specifically, the petrochemical cluster in Tarragona has reduced its production by 30%. There are concerns relating to its recovery but these enterprises are already developing new strategies for investments and production diversification. Moreover, the current construction of new petrochemical industries in Middle East (Saudi Arabia, Iran, Iraq) will also be decisive in the future.

2.2. Pharmacy and biotechnology

The pharmaceutical sector is the tenth largest industrial sector in Spain, in turnover terms. It is the sector with most investment in R+D.

It is actually one of the traditional sectors in Catalan industry. Catalonia hosts 255 pharmaceutical laboratories, representing 50% of the Spanish pharmaceutical industry.

The pharmaceutical industry in Catalonia	
GVA ² pharmaceutical industry / GVA total industry (2007)	5.5%
Jobs pharmaceutical industry / jobs total industry (2009)	4.4%
Turnover Catalan pharmaceutical industry / turnover Spanish pharmaceutical industry (2007)	49.5%
Jobs Catalan pharmaceutical industry / jobs Spanish pharmaceutical industry (2009)	47.8%

Source: Generalitat de Catalunya: "2009 Informe Anual sobre la Indústria a Catalunya"

Pharmacy and biotechnology industries generates jobs for highly qualified personnel - 2,306 of its workers are located in R+D jobs, half of the R+D employees in the whole Spanish State.

This sector hosts an important number of family-owned enterprises: Almirall, Esteve, Ferrer, Uriach, Salvat, Lacer, Isdin. There are also international groups: Novartis, Sanofi-Aventis, Bayer-Schering, Boehringer Ingelheim, Menarini, Merck.

Pharmaceutical laboratories represent the 77% of the total pharmaceutical and biotechnological industry in Catalonia. Some of them are amongst the most important in the Spanish State.

Biotechnology is also a very important sector in Catalonia, especially in the medical area. Barcelona is one of the main cities in the world for biomedical research. There is an essential link between pharmaceutical industry turnover and biotechnological project financing.

The global economic crisis has affected the pharmacy and biotechnology sector though much less than other sectors. In 2009 the sector experienced its lowest growth ever, but it still grew. In fact, the pharmacy sector was the only industrial sector that grew in Spain during 2009.

The EU-27 represents the 66% of the imports and the 62% of the exports of the Catalan pharmacy sector. Exports to Asia are growing: in 2009, they equalled the exports to the USA.

2.3. Plastics

Catalonia is the most important Spanish region regarding the plastic industry. Its main industries are a few multinational corporations with factories in the petrochemical cluster of Tarragona and also in other Catalan locations in the Barcelona Metropolitan Area: Dow Chemical, Basf, TDP, EDESA, Basell, Atofina, Hispavac, Repsol YPF Química, etc.

The plastics industry in Catalonia	
GVA ³ plastics industry / GVA total industry (2008)	4.2%
Jobs plastics industry / jobs total industry (2008)	4.4%
Turnover Catalan plastics industry / turnover Spanish plastics industry (2007)	30%
Jobs Catalan plastics industry / jobs Spanish plastics industry (2009)	27.6%

Source: Generalitat de Catalunya: “2009 Informe Anual sobre la Indústria a Catalunya”

More than half of the Spanish plastic exports have their origin in Catalonia.

The main market of Catalonia’s plastics industry is the EU (mostly France, Germany and also Italy). However, it must be said that China already represents 7.9% of the imports.

The global economic crisis has deeply affected plastic industry production and commercial exchanges. A reason for this could be found in two of its main clients: the construction and automobile sectors. However, this industry had already started to reduce its job generation around 2007, due to the de-localization of some of its production towards Asia.

² GVA = Gross Value Added



3. The Catalan logistics system

The Catalan logistics system handled 500,2 million tonnes of cargo in 2008, less than 2007, when 540,2 million tonnes were recorded.

The table below shows the distribution of this cargo traffic and its evolution from 2007 to 2008, due to the current global economic crisis.

Type of traffic	2007 (million tonnes)*	% total (2007)	% total (2008)
By land			
Catalonia - Catalonia	270,3	57	54
Catalonia - Iberian Peninsula	79,9	15	16
Catalonia - Europe	25,8	5	5
Long distance pass-through traffic	76,4	7	8
By sea	85,7	16	17
Maritime through Port of Barcelona	50,5	-	-
Maritime through Port of Tarragona	33,3	-	-
Maritime through other Catalan ports	1,9	-	-
By air			
Barcelona Airport	0,1	-	-
Total traffic	540,4		

* Includes inbound and outbound traffic

Source: CIMALSA, Centres Logístics de Catalunya: "Observatori de la Logística 2009"

Intermodal traffic represents a minimal part in comparison to mono-modal traffic. However, it has shown some growth during the last years, especially during the current global crisis, due to the contraction in the road transport sector.

Type of traffic	2005	2006	2007	2008
Mono-modal	82,6 %	82,5 %	82,1 %	80,5 %
Multi-modal	17,4 %	17,5 %	17,9 %	19,5 %

Source: CIMALSA, Centres Logístics de Catalunya: "Observatori de la Logística 2009"

Rail transport represents the 2% of the global cargo traffic in Catalonia. The sustained decrease since 2006 in international traffic market share has been counter-balanced by internal railway traffic. As a result, the global rail market share is fairly stabilised at around 2%.

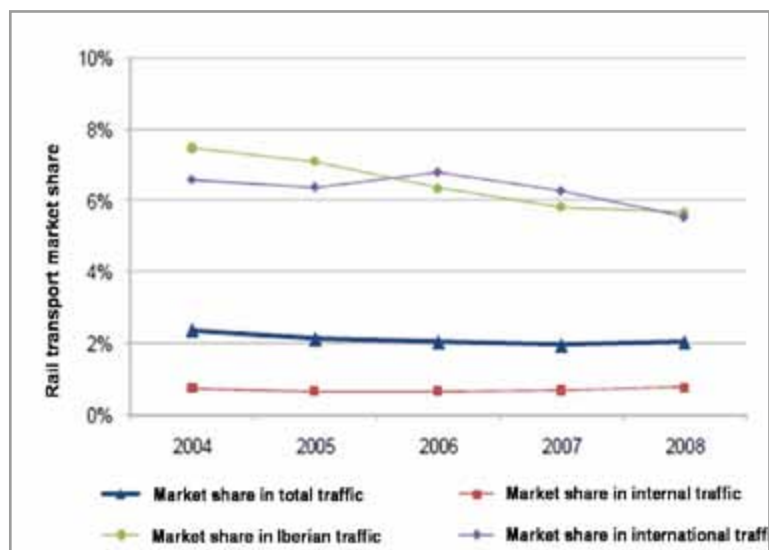


Figure n. 4. Evolution of rail traffic market share

Source: CIMALSA, Centres Logístics de Catalunya: "Observatori de la Logística 2009"

Regarding maritime transport, the global crisis has had an impact on Catalan port traffic. However, traffic is already recovering and growth has returned during the last year. Importantly, even during the worst year, 2008, Catalan maritime traffic with France and Italy recorded a 7% growth.

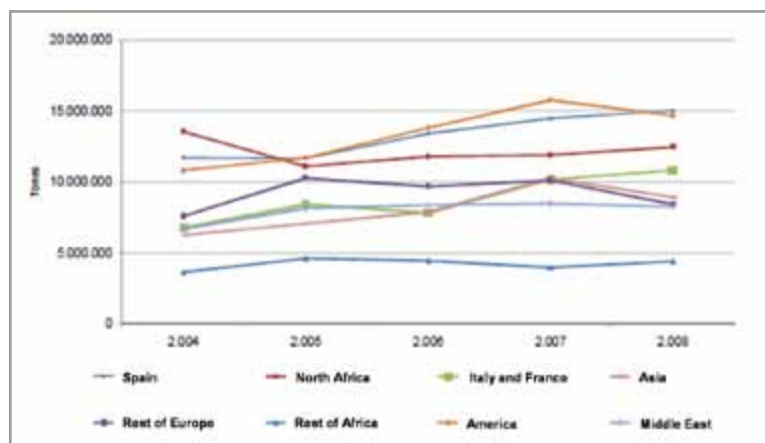


Figure n. 5. Evolution of maritime traffic

Source: CIMALSA, Centres Logístics de Catalunya: "Observatori de la Logística 2009"

In 2008 road transport had most of the port access market share at 60%. Pipeline market share was 37% and rail 3%.

3.1. Road

The tables below show some basic data for the Catalan road network:

Road type	Total kilometres (2008)
Toll motorways	1,027.7
Non-toll motorways	702.0
Dual carriageways	122.5
Rest of road network	10,125.3
Total	11,977.5

Source: Institut d'Estadística de Catalunya (IDESCAT)

Transit 2008	
ADT – all vehicles (vehicles/day)	8,140.0
% heavy traffic (% total ADT)	6.9
ADT – heavy traffic	561.7
Vehicles per road kilometre (millions)	17,979.0

Source: Institut d'Estadística de Catalunya (IDESCAT)

This general information requires a few comments on each of the main road corridors:

The Mediterranean Corridor connects the entire Iberian Mediterranean coast from Cadiz to France and the rest of Europe.

It is one of the oldest in the Iberian Peninsula and also one of the most important with the best developed infrastructure. The AP-7 toll motorway has the highest capacity, though the parallel N-340 and N-II national roads receive a fair amount of traffic, especially trucks, as they are free. Both national roads are presently being converted to dual carriageway motorway, and thus will complement the toll motorway for better traffic distribution.

The Mediterranean Corridor has some of the highest traffic at any national border, in this case with France. This applies both to cargo and people at peak season. Due to this, both the EU and Spanish authorities view the transfer of road freight to rail and maritime as an urgent initiative.

The Ebro corridor connects the Catalan industry and ports with the centre and North of the Iberian Peninsula, and also carries important cargo and passenger traffic. It has both a motorway (AP-2) and a freeway (A-2).

The Central corridor is inferior in comparison with the Mediterranean and Ebro Corridors. Despite being considered a trans-European road (E-09) with potential as a direct connection from the Port of Barcelona to Toulouse, it has limited capacity being a mixture of motorway and single carriageway. There are no Government plans on either side of the border to increase capacity on the E-09.

The transverse corridor is the least developed of all. It is simply a connection between the other corridors. Construction to increase capacity is presently underway.

In brief, the two main corridors (Mediterranean and Ebro) have a good infrastructure but are not enough to cope with present traffic levels, especially in the Mediterranean Corridor. There are alternatives such maritime and rail transport, both of them much more real than any other alternative road (Central corridor).

3.2. Rail

The tables below show some basic data of the Catalan railway network:

Rail type	Total kilometres (2009)
Total rail lines	1,600
Exclusively for cargo	58
Double track	799
Electrified	1,490
High speed	128

Source: Institut d'Estadística de Catalunya (IDESCAT)

Rail traffic 2009 (all figures in thousands)	
Short distance	161,635
Regional	11,577
Long distance	8,064
Total passenger traffic	181,276
Cargo	6,242

Source: Institut d'Estadística de Catalunya (IDESCAT)

Regarding rail cargo, until December 2010 the Mediterranean Corridor consisted of a double track Iberian gauge line all the way from the South Catalonia to France. However, this line passed through the Barcelona metropolitan area where priority is given to passenger traffic.

Iberian gauge has also been a problem for the cargo traffic up to France and the rest of the EU.

However, things have started to change. Thanks to the construction of a new UIC line parallel to the old Iberian gauge line, there is now a rail connection from the Port of Barcelona to the French border in UIC gauge, without the interference of passenger traffic in the metropolitan area. The Barcelyon service is the first rail service that uses this new connection.

The **Ebro Corridor** hosts two railway lines with just one track each on Iberian gauge. Both lines should be duplicated but there is still no Government plan for this. There is also a UIC line for passengers, which connects Northern-central Spain with Lleida, Tarragona and Barcelona.

The **Central Corridor** has poor single-track infrastructure that does not permit cargo traffic to reach France - Iberian gauge, with steep inclines for cargo trains. There are no Government plans for improving this.

Finally, the **Transverse Corridor** has no railway lines whatsoever. There is a very ambitious Government plan for the construction of a line, but should be considered a very long term.

Figure n. 6. The new rail network

Source: BCM



Rail traffic in Catalonia therefore still has a long way to cross in order to improve its market share. However, the recent start of a UIC connection for rail cargo from the port of Barcelona to France offers a very different prospect.

A direct connection from Tarragona's port with the new Mediterranean UIC axis is still a major project awaiting investment from the Spanish government.

3.3. Maritime

Port of Barcelona

Concerning total traffic, Barcelona's port recorded 43.0 million tonnes in 2009. It is the 12th European port if we consider its container cargo, of 1.8 million TEU in 2009.

It must be said that before the global crisis, in 2007, the port's container traffic had reached 2.7 million TEU. Until then, this port had registered a sustained traffic growth.

Now, after the worst moments of the global crisis (2008-2009), traffic growth has returned: 2.37 % for total traffic and 8.27 % for TEU in 2010.

Barcelona's port is presently under a major enlargement process, which will increase its capacity to 10 million TEU. So a greater traffic growth will come in due time.

There is a very active industrial and logistic activity close to this port. The most relevant industrial activities in the area are metallurgical, chemical, pharmaceutical, automobile, textile and food and beverage.

Logistics services are also remarkably close. 305 hectares are located in a 10 km range, including the port's ZAL; the cargo centre in the Airport of Barcelona; and the Zona Franca free port.

With the prospect of the future enlargement during 2012-2013, the Port of Barcelona is busy looking for new logistics areas. Together with the Abertis group – a private enterprise specialised in transport and logistics concessions – it has created a consortium for the promotion of new logistic platforms not only in Catalonia, but also in the rest of Spain and especially, the South of France.








-  Hydrocarbon terminals
-  Automobile terminals
-  Short Sea Shipping terminals
-  Bulk terminals
-  Container terminals

Figure n. 7. The Port of Barcelona: aerial view

Source: BCM

The Port of Barcelona has a direct road connection with the rest of Spain and Europe through the dense Llobregat Delta network. However, there is a high level of metropolitan traffic that circulates through the same roads as the trucks coming in and out of the port. As a result cargo traffic around the port is slow and transporters must take into account the extra time required to get into the port.

Concerning the rail connections, they can be found in all terminals except for those situated on the East dock. The connection with central and Northern Spain has always existed, at least from the infrastructure point of view, but the connection with Europe has always had serious deficiencies. The new UIC line from the Port of Barcelona to France implies a significant change for the port traffic within Europe.

Regarding the new enlargement terminals, they will naturally have their rail connections and also two new rail terminals, all of them with Iberian and UIC gauge.



Figure n. 8. The Port of Barcelona: road and rail connections

Source: BCM

- Main roads (Freeways, motorways)
- Secondary roads
- Railway lines

Port of Tarragona

This port, with a total traffic of 31.5 million tonnes in 2009, is amongst the 15 largest European ports in liquid bulk traffic (20 million tonnes in 2009) and in dry bulk (10,5 million tonnes in 2009).

Before the global crisis, in 2007, the port had reached 36.5 million tonnes. Now, after the worst years of the global crisis (2008-2009), traffic growth has returned: 3.9 % for total traffic and 35.8 % for liquid bulk.

An important petrochemical industry has developed very close to Tarragona's port. The main enterprises in the sector are there: Bayer Hispania, BASF Española, Dow Chemical Ibérica, Hoechts, Shell España, Repsol and ASESa.

Therefore an important part of the port's traffic is hydrocarbon (16.8 million tonnes in 2009).

Tarragona's port is increasing its container cargo; it has already passed from 0.4 million tonnes in 2007 to 2.4 million tonnes in 2009. The enlargement works presently under way will undoubtedly allow future additional growth: the Port Authority hopes that container traffic will double in 5 years' time.

Tarragona also hosts 100 hectares of logistic parks and has planned for the construction of an extra 270 hectares. The closest logistics area to the port is the ZAL-Tarragona. But there is logistics development in the whole province.



Figure n. 9. The Port of Tarragona: aerial view

- 1, 2 – container, automobile and RO-RO terminals
- 2 – ASESa dock (cement bulk)
- 3 – Repsol dock (petrochemical)
- 4, 5 – inflammable, hydrocarbon and bulk terminals

Source: BCM

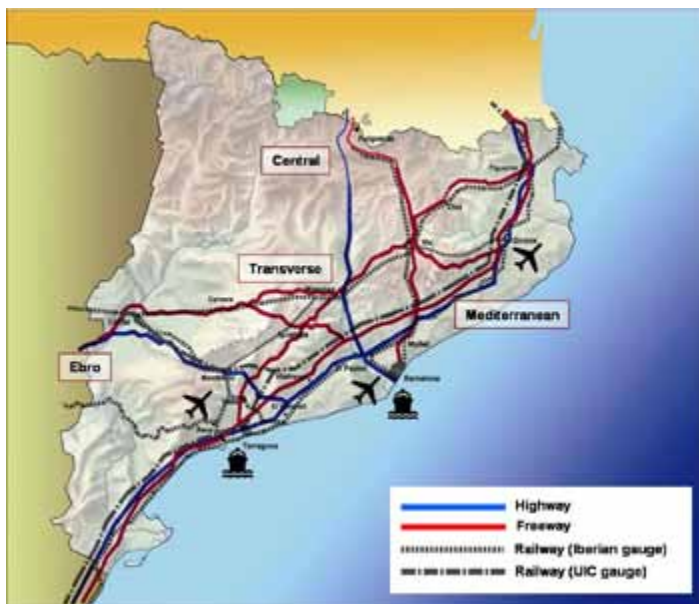
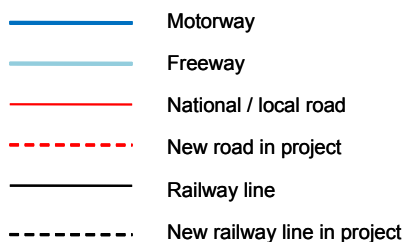


Tarragona's port has a complete road access system to the rest of the Iberian Peninsula and Europe. Concerning the rail access, this arrives at the solid and liquid bulk, and petrochemical terminals, though with just one track. This rail access system connects the port with Southern and Central Spain, and also with Barcelona, though just to the Iberian line.

In spite of the fact that there is a plan for the enlargement of the port's railway infrastructure, this does not include a UIC connection with the Mediterranean Corridor, which would be extremely positive especially for the chemical industries.

Figure n. 10. The Port of Tarragona: road and rail connections

Source: BCM



4. Government plans and political trends in transport infrastructure and mobility

The following figure shows the future general scheme of the main road and rail infrastructure that will connect the main commercial ports of Barcelona and Tarragona with their hinterlands. It corresponds to the existing infrastructure government plans.

Figure n. 11. The future Catalan transport network

Source: BCM

With the exception of the final stretch of the Central Corridor, a complete corridor scheme is planned for the Catalan transports network: toll motorway, non-toll motorway and at least one railway line for each corridor.

Therefore in general terms, an increase in capacity and a completion of the rail network are to be established.

Concerning the rail, the new high-speed lines with UIC gauge have been the most relevant projects up to now. The Ebro corridor has already a UIC gauge. It connects Barcelona, Tarragona and Lleida with Central Spain (Madrid). The Mediterranean high speed line between Barcelona and France is presently under construction, and is awaiting its

connection towards the South of Spain, still in a pre-project phase.

Concerning the cargo transport, the very first infrastructure plan specific to cargo was launched a few months ago. The Spanish Government has publicly admitted the “obsession” for passenger high speed railway infrastructure, which has been detrimental to the development of a railway cargo in Spain.

The Spanish Government is trying to update its transport and infrastructure policies in accordance with EU transport policy: encouraging multimodal transport, both railway and maritime.

A first result of this new policy has been the establishment of a complete UIC railway connection from Barcelona’s port to the French cargo railway network. It started to run in December 2010. This is very good news for cargo transport.

Nevertheless, this UIC connection has a short-term value, as it is composed of a sequence of stretches, some exclusively constructed for rail cargo and others using the future passenger high-speed line. Therefore, it will not be able to sustain higher rail traffic in future, sharing capacity with long and middle distance passenger services.

What the Port of Barcelona really needs is the substitution of the high-speed line stretches of the current Iberian gauge line with mixed Iberian/UIC. Thus a continuous cargo railway line would be established. This infrastructure project is officially planned but it is not under current government consideration – other projects have been given priority, due to public financial restrictions.

Tarragona is in a worse situation. Though the high-speed connection from Barcelona to Valencia is already planned and will eventually be constructed, there is no plan for an exclusive railway cargo connection from Tarragona’s port to the current Mediterranean Corridor.

In brief, important changes are coming for rail cargo in Spain, but they are arriving late and they are not being designed in a sufficiently ambitious way, with a long-term view.

Examining the port’s road and rail connections more closely, things are also concerning, especially for the Port of Barcelona. The port is already under significant traffic pressure, mostly metropolitan, and it urgently needs its own motorway exclusively for cargo. However, the Spanish government has started the construction of a much less ambitious new road access that still will be affected by the metropolitan traffic and will provide short term relief for the port’s cargo traffic.

Regarding urban development planning, governments, and especially municipalities, are favouring residential and tourism developments, and are restricting industrial and logistics developments. For example, the residential areas of Barcelona, in their expansion, have already arrived at the limits shared with its logistics and industrial areas.

This pressure detrimental to these economic sectors, as highly valuable land, which would otherwise be developed for port industry and logistics, is being used by public authorities for services companies. The objective is the “transformation” of the industrial face of the city. The effects of this type of policy to Catalan industry do not seem to matter.

5. Results of interviews with chemical companies and logistic operators

The following chapter summarizes the results of individual interviews with the most significant chemical companies and logistics operators of Catalonia, mostly from Barcelona and Tarragona: Ercros, S.A., Campi y Jové Export, S.L., KATOEN NATIE IBERICA, S.L., Dow Chemical Ibérica, S.L., BASF Española, S.L., COMERCIAL QUÍMICA MASSÓ, S.A., Kao Corporation, S.A., Autoridad Portuaria de Barcelona.

5.1. Economic trends, access to market

Road transport for chemical products suffers from an import-export imbalance: in many cases trucks that take product to Germany return to Spain empty, effectively doubling transport costs for the client, and thereby raising export costs.

The current economic crisis has affected the chemical sector. This has provoked strategy changes within the enterprises. Some raw chemicals enterprises in Europe have closed, with their clients having to import raw materials from countries like India or China. Other chemical enterprises have changed their strategies, looking for more specific markets and reducing commodity production.

Global crisis has also hit the transport companies very hard. Some of them have disappeared and many have reduced their size. So on certain occasions (especially for exporting to central Europe) it is difficult to find trucks.

Non-EU external market product is perceived as a threat. Some chemical companies (raw chemicals, plastics) fear a massive import of Chinese products to our local markets in coming years. China has already got the development and technology necessary for chemical production and export. Other countries in Middle East or Eastern Europe will eventually represent the same threat. The trick with these countries is to start introducing themselves in one phase of the production chain and later on to participate in the whole process technique.

For some chemicals enterprises, North Africa represents a long-term threat as a producer, but others consider that it will only play as a consumer market.

The Middle East has already started work in petroleum derivatives. As a result, Spanish petrochemical divisions have already begun to re-orientate activity from production to distribution and concentrate the production in Central Europe.

In general terms, international competitiveness has made it very difficult to compete with commodity products. Plastic companies state that they are re-orienting their production to a greater specialisation, though not abandoning the high-volume market.

Non-EU ports and custom systems are perceived as a threat because they can reduce the efficiency of electronic certification from EU ports. This can be essential for the maritime commerce with North African countries. Bilateral agreements (or even at a greater scale from the UpM) should be established in order to avoid this problem.

Finally, the export potential from our chemical companies to the new consumers in countries like China could be taken by other non-EU countries like Middle East or North Africa.

5.2. Environment and energy

Some of the chemical enterprises interviewed have stated that respect for the environment has become a real enterprise goal and that this is fully integrated into their costs. Most of them have implemented this as a consequence of the existing legislation, but others have assumed extra commitments (for example concerning CO₂ emissions) independent of legislation matters.

However, environmental legislation concerning emissions (pollution, noise) is perceived as a growing restriction to chemical production. Chemical companies feel that legislation is under a continuous restrictive process. The public perception of chemical companies does not help either. Chemical companies have changed a lot and pollute much less than before, but negative public opinion remains.

Spanish legislation in environment matters has gone too far in comparison with other European countries. This means much excellence in Spanish enterprises but it also means a lot in terms of cost and efficiency.

By-product management is considered an external threat by some chemical companies due to a long non-control tradition. This applies not only to chemical companies. Former governments and legislative systems have a big responsibility for this. Anyhow, many chemical by-products are currently well managed or sold to other enterprises that use them as production materials. Costs associated with general by-product management are generally well integrated into total cost.

Energy is a key factor for basic chemical production. The energy cost has a huge influence on total production cost. Twenty years ago, energy was cheaper and factories could take advantage of different hourly tariffs (running by night). They try to keep doing so at present, but tariff margins are tighter and the advantages smaller.

Some companies claim that electricity costs in Spain are higher than those in Central Europe.

However, Spain is very well situated for its gas supply. The main source comes from Northern Africa but the country is working on an alternative supply from Eastern Europe.

Petroleum is a key factor in chemical production costs, especially as a raw material. The fluctuations in market price do have adverse effects: a lower production level during a rise in petroleum cost can be an advantage for any company which has enough finished product in stock to supply cheaper than the competition.

Consequently, market petroleum price demands specific analysis and structure within some enterprises.

New Spanish legislation concerning reductions on speed levels in order to reduce petroleum consumption is perceived as a threat because it adds inefficiency to transport processes.



5.3. Politics and innovation

Despite the importance of the chemical sector in Spain, the government has never backed this industry with budgetary help. The situation in Northern European ports is totally different.

Local government urban politics create a good deal of problems for chemical companies, especially those which are located close to the sea or to urban areas, for not exceeding the allowed levels of emissions. Municipalities' interest in urban expansion and tourism revenues are the real reason. This implies a high cost to relocate production centres, and for reconditioning of the terrain for urban development which has to be paid by the chemical company.

Additionally, administrative procedures make it very difficult to develop industrial areas fast enough to compete with the more dynamic European areas. All these have a very negative influence on Spain's capacity to develop industry.

Enterprise policy also counts. Establishing a chemical factory away from port or railway connections is a mistake that has been made more than a few times by enterprises, especially multinational companies. This has affected their logistic operations and their costs.

Enterprises have not yet adapted the logistic operations required by security legislation. In this regard, the document exchange between enterprises and transport companies implies extra stock time and therefore the need for adequate space in the factory area which do not exist. This means more investment in enterprise logistics, but chemical companies worry mostly about production.

Legislative matters are especially complicated in Spain due to a multi-administrative system (State, Autonomous Communities, Municipalities, etc.), which is complicated to apply to logistics operations.

5.4. Transport infrastructure and services

Ports

Catalan ports have got good infrastructure and maritime connections. There is however a certain perception of rigidity, concerning tariff levels, administrative proceedings and the usual difficulties in the relation with the ship's agents.

Another complaint about Catalan ports is the increasing "lack of interest in dangerous goods". Some chemical companies believe that society is much more interested in container and automobile cargo and in cruiser liners. Port terminal regulations concerning maximum stock time for dangerous goods and the lack of spaces for an adequate boat-truck operation are other concerns.

Logistics operators say that cost disadvantages in Barcelona and Tarragona are giving an extra advantage to ports like Antwerp and the Northern chemical and commercial companies, with a long exporting tradition.

Catalan ports do not suffer from labour problems, except for those related to road transport companies. They can provoke strikes and price changes which are very negative for chemical companies and logistic operators.

The Port of Tarragona, currently undergoing major extension works, has a commercial strategy to attract container merchandise and is getting good results with the local chemicals cluster.

Current competition between the ports of Barcelona and Tarragona will lead, in future, to bad results for both of them. Collaboration to assign traffic according to the most optimal cost should be the correct strategy.

The existing Short Sea Shipping services are very positively valued but some chemical enterprises consider that the State Governments should encourage it to a greater extent.

Road

Road transport is perceived as a very clear opportunity for chemical companies, mostly thanks to its flexibility.

Transport costs associated to gas-oil are perceived as a threat but the way this threat is internalised by transport agents and chemical companies varies from case to case. Some chemical companies do not assume the gas-oil price changes, and others (especially the big ones) have arranged a procedure together with transport companies to increase or to reduce transport tariffs according to gas-oil price fluctuations.

The lack of harmonisation in matters like truck load puts Spain in a disadvantaged position compared with other European countries.

Railway

Rail transport is perceived as a good long-distance opportunity for chemical companies with a large amount of non-perishable and non-urgent product to transport. Rail transport also allows loads to be maximized (20 tonnes in a truck, 27 tonnes in a train), and to make their transport safer.

Railway cargo in Spain is not developed enough to compete with Northern European ports and their powerful railway connections to chemical factories. Spain lacks an integrated railway cargo line from South to North (Mediterranean Corridor) well connected to the ports (Barcelona already has this connection, but Tarragona does not). Additionally, there is a deficit in adequately designed railway terminals, with enough capacity and space for an adequate operation, especially for dangerous goods.

The lack of an efficient railway connection from Tarragona to the Mediterranean corridor is a clear disadvantage for those chemical companies which have plants and stock in this area and wish to export to Europe. Tarragona is also the natural port for Madrid and North-western Spain. It should have its own railway cargo terminal and UIC connection.

However, governments transport policy is perceived right now as an opportunity for rail transport. The Spanish government has recently drafted a railway cargo plan with new infrastructure, though more detail is needed (especially concerning new terminals and stabling tracks suited for dangerous goods).

The new UIC line from Barcelona's port to France and the so-called "Barcelyon service" are very positively valued but most of the enterprises interviewed have not yet tried it. Some still consider it an expensive option.

There is still a lot to be done about rail in Europe, especially in the Spain-France connection, not only due to infrastructure, but also to the SNCF strikes in France. Currently, the main problem concerning railway transport between Spain and France is the lack of reliability.

The lack of harmonisation in matters like train lengths puts Spain in a disadvantaged position compared with other European countries.

5.5. Safety and security

Environmental legislation concerning security (transport and handling; REACH especially) represents an opportunity to avoid the invasion of certain non EU products (China). It has also been useful to improve certain transport proceedings, though it has not been easy to get there due to the fragmented Spanish road transport sector.

However, this legislation also presents a good deal of extra pressure and cost on chemical companies. More than a threat, it is a new constraint for all producers. It is a must for any chemical company that wants to be in the game.

The big question: Is the bureaucracy associated with this legislation really worth it? EU authorities and member state governments should still make a much greater effort to simplify and harmonise the whole system and look for greater efficiency. The whole legislation should be re-thought according to the whole production chain, with operation criteria (up to now, the administrative and financing side of this legislation has been disconnected from the chain production operation).

There should also be a reduction (or even elimination) of local legislation in favour of a pan-European legislative system.

Some chemical companies ask this question: are non- EU imported goods submitted to the same quality and security requirements? Is there unfair competition? It must be said that distribution companies say that imports are equally subject to strict UE requirements.

Quality requirements and social responsibility established by multinational companies, for example packaging for food and beverage industries, are seen as an advantage for local chemical companies, as they also represent a restriction for the non-EU competition.

Anti-dumping legislation from the EU has been essential for the survival of many chemical companies.

6. Final results of SWOT analysis

6.1. Internal strengths

The industry sector

The Catalan chemical sector is prominent in the Spanish industrial sector: it represents almost half of the turnover of the Spanish chemical sector and a third of its employees; and a quarter of the Catalan industry's GDP.

It belongs to a solid industrial tradition, with excellent infrastructure, know-how and training, according to EU standards.

To set an example, the petrochemical industry in Tarragona is the biggest in Southern Europe, with a dense enterprise network whose members are strongly supportive of each other through the Tarragona Chemical Enterprises Association (AEQT). This associative spirit benefits the cluster and allows members to address their demands more effectively to Port Authorities and Governments.

Catalonia also hosts an excellent pharmaceutical sector, which represents 50% of the Spanish pharmaceutical industry. It has been the only industrial sector that has kept growing despite the economic crisis. The Catalan pharmaceutical sector excels in R+D investment. There is also an essential link between pharmaceutical industry turnover and biotechnological project financing.

Catalonia is also the most important Spanish region regarding plastics industry. More than half of the Spanish plastics exports have their origin in this region. Catalan plastics industry is both strongly traditional and innovative. A good R+D strategy has allowed some of its enterprises to adapt to the current global crisis that otherwise would have caused them serious harm.

Environment and energy

Catalan chemical enterprises have embraced respect for the environment as a real enterprise aim, fully integrated into their cost structure. Most of them have done this as a consequence of the existing legislation, but some have assumed extra commitments (for example concerning CO₂ emissions) as a core enterprise value, independent of legislation.

Transport infrastructures

The Catalan chemical industry has been a key factor for the Catalan ports development.

Chemicals, plastics and pharmaceutical products are some of the most relevant industrial sectors in the Llobregat Delta Logistics Platform and also in the rest of the industrial areas of the Barcelona province. All the maritime commerce linked to these activities goes through the Port of Barcelona.

The petrochemical complex of Tarragona has been crucial for the Port of Tarragona, which is amongst the 15 largest European ports in liquid bulk traffic, most of it hydrocarbon.





Safety and security

Spanish legislation is particularly strict concerning safety and security matters. This has become a reason for excellence of the Catalan chemical sector.

6.2. Internal weaknesses

Economic trends, access to market

Road transport for chemical products suffers from an import-export imbalance: in many cases trucks that take product to Germany return to Spain empty, effectively doubling transport costs for the client, and thereby raising export costs.

Politics and innovation

Concerning enterprise policy: chemical companies have not yet adapted to the logistic operations required by security legislation. In this regard, extra stock time and therefore the need for adequate space in the factory area should be planned and executed. This means more investment in enterprise logistics, whereas chemical companies still worry mostly about production.

Safety and security

Spanish legislation in security matters is very strict in comparison with other European countries. While this is extremely positive, it also has implications in terms of costs and competitiveness.

6.3. External opportunities

Economic trends, access to market

China is a new opportunity for Spanish Chemical exports. North Africa will equally be so in due course.

Energy

Regarding energy, Catalonia, and Spain in general, have built a good gas supply network, with the main source coming from Northern Africa. Work is in progress on an alternative from Eastern Europe.

Politics and innovation

The Spanish Government is trying to update its transport and infrastructure policies in accordance with EU transport policy, encouraging multimodal transport, both railway and maritime. Concerning cargo transport, an infrastructure plan specific to cargo was launched a few months ago.

A first result of this new policy has been the establishment of a complete UIC railway connection from the Port of Barcelona to the French cargo railway network. It started to run in December 2010.

Anti-dumping legislation from the EU has been essential for the survival of many chemical companies.

Transport infrastructures and services

Catalonia is crossed from South to North by the Mediterranean Corridor, which connects the entire Iberian Mediterranean coast from Cadiz to France and to the rest of Europe.

It is one of the oldest transport corridors in the Iberian Peninsula and also one of the most important, with the best developed infrastructure. It connects the most important logistics, industrial and demographic centres of the Iberian Peninsula, as well as some of the most active European commercial ports. It provides a key link between North Africa and Europe.

The ports of Barcelona and Tarragona present a great development potential as a whole Catalan port front, with common hinterland areas and specialisation in different types of cargo. Collaboration to assign traffic according to the most optimal cost would be a very suitable strategy in future.

Rail transport is perceived as a good long-distance opportunity for chemical companies with a large amount of non-perishable and non-urgent product to transport. Rail transport also allows loads to be maximized (20 tonnes per truck against 27 tonnes per train wagon), and improves transport safety.

Therefore, the new UIC line from Barcelona's port to France and the so-called "Barcelyon service" represent a remarkable improvement for the Spanish railway system.

The existing Short Sea Shipping services are very positively valued, though some chemical enterprises consider that the State Governments should encourage it to a greater extent.

Safety and security

Environmental legislation concerning security (transport and handling; REACH especially) represents an opportunity to avoid the invasion of certain non EU products. It has also been useful to improve certain transport processes.

6.4. External threats

Economic trends, access to market

The current economic crisis has affected the chemical sector. This has provoked strategy changes within the enterprises. Some raw chemicals enterprises in Europe have closed, with their clients having to import raw materials from countries like India or China. Other chemical enterprises have changed their strategies, looking for more specific markets and reducing commodity production.

The global crisis has also hit the transport companies very hard. Some of them have disappeared and many have reduced their size. So on certain occasions (especially for exporting to central Europe) it is difficult to find trucks.

Non-EU external market product is perceived as a threat. China already has the development and technology necessary for chemical production and export for raw chemicals and plastics. Other countries in the Middle East or Eastern Europe will eventually represent the same threat. For some chemicals enterprises, North Africa represents a long-term threat as a producer, but others consider that it will only operate as a consumer market.

The Middle East has already started work in petroleum derivatives. As a result, Spanish petrochemical divisions have already begun to re-orientate activity from production to distribution and concentrate the production in Central Europe.

In general terms, international competitiveness has made it very difficult to compete with commodity products. Plastic companies state that they are re-orienting their production to a greater specialisation, though not abandoning the high-volume market.

Finally, non-EU ports and custom systems are perceived as a threat because they can reduce the efficiency of electronic certification from EU ports. This can be essential for the maritime commerce with North African countries. Bilateral agreements (or even at a greater scale from the UpM) should be established in order to avoid this problem.

Environment and energy

Environmental legislation concerning pollution and noise is perceived as a growing restriction to chemical production. The public perception of chemical companies does not help either. Chemical companies have changed a lot and pollute much less than before, but negative public opinion remains.

Spanish legislation concerning reductions on road speed limits is perceived as a threat because it adds inefficiency to transport processes.

Petroleum is a key factor in chemical production costs, especially as a raw material. The fluctuations in market price do have adverse effects: a lower production level during a rise in petroleum cost can be an advantage for any company which has enough finished product in stock to supply cheaper than the competition.

Energy is a key factor for basic chemical production, where energy costs have a huge influence on total production costs. Spain is not sufficiently self-supplied with electricity unlike countries such as France, and therefore energy costs are superior to those in Central Europe.

Politics and innovation

Despite the importance of the chemical sector in Spain's economy, the State government has never backed this industry the way it should have done. There is no real government commitment to industry and logistics in the form of budgetary help, unlike Central and Northern Europe.

There are also problems concerning local government urban policy. Those chemical companies which are located close to sea or to urban areas, despite not exceeding the allowed levels of emissions, are pressured to leave. This implies a high cost to relocate production centres, and for reconditioning of the terrain for urban development, which has to be paid by the chemical company.

Additionally, administrative procedures make it difficult to develop industrial areas fast enough to com-

pete with more dynamic European areas. All these have a very negative influence on Spain's capacity to develop industry and logistics.

Finally, legislative matters are especially complicated in Spain due to a multi-administrative system (State, Autonomous Communities, Municipalities, etc.), which is complicated to apply to logistics operations.

Transport infrastructures

Northern European ports are still a preferred alternative for international maritime commerce. The port infrastructure and maritime traffic concentration, connected with a truly efficient railway system, offer a better alternative for intermodal transport.

Spanish railway cargo infrastructure is not developed enough to compete with Northern European ports and their powerful railway connections to chemical factories. Spain still lacks a fully integrated railway cargo line from South to North (Mediterranean Corridor) well connected to the ports. Barcelona already has this connection, but Tarragona does not. Additionally, there is a deficit in adequately designed railway terminals, with insufficient capacity and space for proper operations, especially for dangerous goods.

The lack of efficiency of rail transport is perceived as a threat. There is still a good deal to do concerning rail in Europe, especially in the Spain-France connection, not only regarding infrastructure and liberalisation of services, but also the SNCF strikes in France. Currently, the main problem concerning railway transport between Spain and France is the lack of reliability.

Road transport costs associated with gas-oil are perceived as a threat, although the way this threat is internalised by transport agents and chemical companies varies from case to case.

There is a certain perception of rigidity concerning Barcelona's port: tariff levels, administrative proceedings and a less than pro-active attitude towards dangerous goods. Port terminal regulations concerning maximum stock time for dangerous goods and the lack of space for adequate boat-truck operations are some of the chemical companies concerns.

Port labour problems cause strikes and price changes which are negative for chemical companies and logistic operators.

The lack of harmonisation in transport matters like truck load or train lengths puts Spain in a disadvantaged position compared with other European countries.

Safety and security

The administrative and financing side of the current security and safety legislation in Europe is disconnected from the production process. In other words, while a bureaucratic process is associated with this legislation it does not bring any clear operational improvements. The whole system should be simplified and harmonised to produce greater efficiency.

7. Actions Required Arising from SWOT Results

Regarding industrial strategy:

- Encouraging the formation of an industrial cluster, especially as a common front to negotiate with local, regional and estate governments.
- Encouraging the formation of port commercial association (Catalan port front).

Regarding Government industrial policies:

- Budgetary help from the Central Government to the Chemical Industry.
- More flexibility in urban policy: allow the industry to stay close to urban or coastal areas, or alternatively compensate for the costs associated with any relocation.

Regarding transport infrastructure and services:

- More flexibility in port terminals, especially concerning logistics operations for dangerous goods: longer stock time, better operational and storage space.
- Greater encouragement (and budgetary help) for Short Sea Shipping services.
- Ambitious infrastructure planning (and urgent execution) for railway cargo: exclusive railway line in UIC gauge all along the Mediterranean Corridor, with direct connections to the Ports of Barcelona and Tarragona; well-designed railway terminals, with enough capacity and space for an adequate operation, especially for dangerous goods.
- Political commitment for rail cargo between Spain and France, especially concerning labour matters. Reliability must be assured.
- Harmonisation of road and rail operational parameters, such as truck load or train lengths.

Regarding environment, security and safety legislation:

- More flexibility in environmental legislation, avoiding regulations which affect the efficiency and costs of Chemical enterprises.
- Simplification and rationalisation of the European safety and security legislation. It must bring an improvement to logistics operation and not be a bureaucratic obstacle.
- Establishment of pan-European safety and security legislation, eliminating state and regional variations.



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Chapter 2: Best Practices

The best practices, which were identified in the framework of Work – Package 3, could be arranged in two different groups, but are all related to logistics improvements.

1. The first group is related to strategic type of projects that represent an advanced solution to many previously existing deficits. It is important to mention that the main characteristics are that the number of different companies that receive advantages in their business.

1.A. Maritime traffic control and cargo information managements systems (Genoa, Barcelona).

VTS (Genoa) and PORTIC (Barcelona) are integrated information systems that manage all the information related to the cargo maritime traffic and offer transparent data to all people involved in freight handling.

These systems are not specifically related to chemical products but they offer major benefits when dangerous goods are to be treated.

Moreover, both applications have been proved to provide invaluable benefits and are still being developed.

1.B. Clustering of chemical industries (Tarragona)

- The process of clustering demands the availability of two preliminary conditions:
- Geographical proximity of individual activities
- Value creation
- Cluster when implemented, is characterized by the existence of spill-over and linkages among the single companies: this situation provides real economic benefits:
- Higher level of productivity: close access to the specialized suppliers and a faster learning of the best practices from close industries.
- More innovation: teams can turn ideas into products and services more efficiently.
- Easier access to external services and assets.

The Tarragona cluster is a really good example of how clustering proves to be the best response to the necessity to share capital investments on assets and infrastructures needed for manufacturing and transporting chemical products.

However, it is important to stress the highly positive role of Taraggona's port, which was the leading force providing the necessary inputs and guiding lines for the realization of this leading chemical area in the Mediterranean basin.

2. The second group focuses on the best practices that offer a good scenario concerning the way by which technology can provide substantial improvement in the logistic/ manufacturing processes of single companies.

2.A. Shifting transport from road to rail (Novara)

Previous situation: company trucks left Novara and reached final destination (Freiburg in Breisgau) using road network across the Alps, with all contains being affected by this travel: trip duration, two drivers, ban of night and Sunday travelling, accident risks (especially fearsome for dangerous goods), custom formalities with long queues.

Now: time sharply reduced, only one driver is necessary, normally the trip is during night, where the driver sleeps in a train wagon. There is also an elimination of custom formalities; a number of accidents are avoided. Moreover, the environmental pollution is reduced and due to above mention reasons there is a better punctuality.

The reduction of costs reaches to 1/3 of the previous level.

2.B. “ Less is more “ (Thessaloniki)

This best practice refers to the advantage of a new ordering model, for incoming raw materials, set by a large manufacturer/ distributor of chemical products.

Only concentrated goods are ordered; additional water is added in company facilities: the reduction of water content in raw materials' input flow a result both in diminished transported quantities and costs and also reduces the environmental pollution.

Bulk instead of packed raw materials: this means less transported volumes and therefore less transport costs, but also almost no plastic packages to destroy/recycle, with good savings and promotion of the company environments “foot print”.

2.C. Computerized control at filling station for road and rail tanks (Koper)

The company, which is the largest distributor of petroleum products in Slovenia, decided to invest in a new computerized system to manage the filling operations.

Results were outstanding: simultaneous filling of two products in two tanks is now possible, maximum allowable weight is controlled and no errors happen, so unloading is eliminated, productivity is increased and filling operations are simpler and safer for the worker.

2.D. “ Technology helps” (Thessaloniki)

A remote management system c/o the company premises allows:

Distant access and control of the company owner of all ongoing processes/procedures

Improvement of order processing activity and reduction of operation time

Increased security in the communication channels

N>B>: The company declares the current situation in the rail network and prevents it from reaching other important benefits, in terms of costs and environmental protection.

2.E. Use of pig (pipeline inspection gauges) in the connection pipelines (Castellon/ Valencia)

This best practice describes the modus operandi and the advantages deriving from the use of pig cleaning system in a pipeline network, emphasizing its low installation cost and quick investment recovery, and highlights the good results in terms of cleaning results and reduced possible contamination of pumped liquids.

2.F. Computerised remote control of the product stock c/o customer premises (Maribor)

With this system the supplier assumes complete responsibility for the buyer's inventory replenishment, which however is driven by the buyer's forecast and inventory control level.

The supplier decides about the delivery dates and quantities: the buyer does not need to send any order.

This case represents a win-win condition for both buyer and supplier.



Province of Novara Best Practice



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Rolling highway

Referents

Project leader	Project partners
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Timescale

Start	End
2001	In progress

The best practice case

Some companies in the area of Novara area take advantage in using the rolling highway service between Novara and Freiburg in Breisgau, which has become a strategic track in the Mediterranean – Northern Europe routes (Germany in particular). Among the companies that have contacted the two following cases are: MACDERMID ITALIANA s.r.l. and COLUMBIAN CARBON EUROPA s.r.l. The former forwards its finished products directly to Germany and underlines the advantages of having only one driver, with a decrease in cost and time. The latter sends its tank trucks to Germany with similar competitive advantages, remarking also the high quality of the service. RAAlpin carries vehicles containing all the dangerous goods that are allowed by the European Agreement on International transport of dangerous goods by road and rail (ADR/RID). The exceptions are the following ADR classes: 1.1A, 2, 3, 4.1, 4.3, 5.2, 7, 8. The rolling highway is a combined transport service for both dangerous and non-dangerous goods (with the above mentioned limitations) where trucks are loaded onto a train in specific stations and the truck's drivers travel in an accompanying wagon. This service between Freiburg in Breisgau and Novara has been introduced in 2001. A time advantage for companies is represented by the fact that there is no need for logistic conversions and investments because the rolling highway can carry nearly every truck that can travel on European roads. Limitations are cited in a following chapter. The rolling highway adds on to the offer of transport of mass goods with full wagons, sliding wagons or containers.

The possibility that the Rolling Highway is not going to be banned from night and Sunday travelling is appreciated by the companies. In fact the time spent on rail is considered resting time for drivers, who can start driving again as soon as they reach their rail destination.

Initial situation

The rolling highway is a part of a policy that encourages rail over road transport within the Swiss territory.

It is important to underline that this policy is aimed at a more efficient and more sustainable means of transporting goods through Switzerland.

In order to support and implement the development of this alternative means of goods transport re-vamping of old infrastructure and new ones were necessary, such as tunnels and bridges.

In fact, not all vehicles are suitable for transportation on the rolling highway. Dimensions of the trucks can not exceed the following limits: height 3.8 – 4 m, width 2.5 m and a weight of 44 tons.

Objectives

The objectives of the rolling highway coincide with its advantages:

- No hindrances at the border due to road controls or queues.
- Elimination of customs formalities.
- Observing and optimizing the resting times.
- Perfect planning of the use of trucks and drivers.
- Overcoming the Sunday and night ban of trucks on Swiss roads.
- Positive effects on the management, in terms of an increase in productivity and profits for the carriers and decrease in costs.
- Improving effects on the environment and cutting climate altering emissions.

Financial frameworks

The fare of the rolling highway service between Novara and Freiburg in Breisgau varies between 450€ and 560€ (average: 505€ - VAT not included), while the equivalent cost by road with ordinary means and infrastructures would be about 1700€ (VAT not included).

Results and evaluation

Although this typology of transport system has recently been introduced, nowadays, more than 500,000 trucks with their drivers have chosen this service. The service capacity has also increased over the years. In 2003 105,000 trucks were carried, but the opening of the new Lötschberg tunnel in 2007 has allowed the present transport capacity of 350,000 trucks.

The rolling highway is an important result of the integration of unaccompanied combined traffic (containers and semitrailers) and a meaningful element of the Swiss transport policy. About 600,000 trucks a year now travel on rail and not by road.

Therefore RAlpin actively contributes to relieve traffic congestion and to protect the delicate balance of the Alpine environment.



Lessons learnt

The distance between Freiburg in Breisgau and Novara can be covered in 8-9 hours. It is very important to mention that the organization service of the traffic is largely nightly, matching better the requirements of user companies. Furthermore the drivers can sleep while they travel on proper cars at the same train.

The saving in time is due to the fact that the drivers do not need any further compulsory operating break, precisely because they have the possibility to rest on the train. Another aspect of the Rolling Highway which leads to time saving is represented by the reduced customs controls.

Additional information

RAlpin SA has been appointed by the Federal Transport Bureau (UFT) to run the rolling highway for the period 2012-2018. The contract allows to develop innovative projects and to carry out strategic investments. Among the new initiatives for improving the service, from 2012 the drivers will travel in air-conditioned wagons. The company is also planning to improve and simplify the driving system of the Rola trains through a co-operation between BLS Cargo and FFS Cargo. Nowadays, due to the characteristics of the facilities at Freiburg in Breisgau terminal (Germany) the rolling highway trains have to be turned in Basel: this intervention needs time and cause serious delays in the working cycles. According to the most recent plans, an improvement of the Freiburg in Breisgau terminal will eliminate this drawback and the trains won't delay anymore. The CEO René Dancet has proudly claimed that RAlpin is now able to offer better solutions and better services.

RAlpin and UFT have planned together to increase further the line capacity by creating a new connection between Freiburg in Breisgau and Domodossola (Italy). This progress will be carried out only if the infrastructures in Domodossola are modernized and that is the reason why RAlpin and UFT have intensified their meetings with their Italian counterparts.

RAlpin SA – Short history

The RAlpin AG has its headquarter in Olten and runs the rolling highway 414 kilometres (Rola) between Freiburg in Breisgau (Germany) and Novara (Italy).

The RAlpin shareholders are BLS AG, Hupac SA, FFS Cargo AG and Trenitalia SpA. Trenitalia owns 1% of the RAlpin AG capital.

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Genoa Port Authority Best Practice

AUTHOR
Port Authority of Genoa



Definition of the BP

In recent years, the Genoa Port Authority and Operators' Associations developed a virtual infrastructure that would allow the tracking of goods handled in the Port and the dialogue between operators and between the latter and the government.

In this context, the ICT solutions represent a fundamental tool to ensure proper quality of services offered by Genoa's port.

The telematics solution (the E-port system) can be considered as a project which covers the entire port and, in the near future, an inland port extension. Combining the re-organization process and the technological developments, it ensures the rationalization of the data interchanged and it accelerates the traffic flow.

An essential element in the "success" of E-port is its capacity to integrate the system with the other technological assets already operating in Genoa's port. The Maritime Authority - Coast Guard and Port Authority, in particular, pays great attention to the integration of E-port with specific elements of the Vessel Traffic Service. By this it tries to ensure the availability of the "sea side" information for the whole port community and to have an effective integration with the "land side" documentation process.

In the port there is already full traceability of goods' route (container and conventional goods) and a more accurate monitoring especially for the dangerous goods.

The solution is the integration between functional areas for controlling dangerous goods on board ship and goods on land. In other words, it consists the sharing of data and information of the authorization cycle of Dangerous Goods both on the sea side and on the land in the port. This is to facilitate the inclusion of large amounts of data and information entered in the system by stakeholders.

Taking into account the growth in exports of the Italian chemical industry, this item represents a strong point of the logistics cluster port of Genoa and an opportunity to develop in the near future.

The integration between the different systems placed in the responsibility of Maritime Authority and Port Authority, permits the achieving of a significant reduction in the completion time of the procedures by operators and optimizes the relationship between PMIS (Port Management Information System) and port system; particular regarding the timing of traffic into the port areas.

Initial situation, relevant problems and existing conditions

Initial situation

In the last years there has been a continuous evolution of the legal and operative aspects concerning the transport of dangerous goods; this evolution has produced extremely positive effects in safety and security field.

The growing importance expressed by the public opinion concerning the environmental issues and the risks related to the production and transport of chemical goods, obliges the chemical firms to having a greater environmental care. Moreover, they have a supply chain constantly controlled, monitored and checked. If on the one hand these elements can determine an extra-cost and a friction point in the logistics chain, on the other hand they can represent an interesting business opportunity since the clients increasingly request qualified and value added services to logistics operators.

The logistic service providers can manage to offer a tracing and tracking of the goods along the whole supply chain, considering that the chemical firms require a productive process and a procurement/distribution cycle protected both on the safety and security side on the environmental side.

This aspect is further emphasized by the fact that most of the chemicals are characterized by the legislation as dangerous cargo. As a consequence, the chemicals generate a specialized logistics flow (material and immaterial) submitted to an ad hoc discipline.

The transport of dangerous goods is a process developing through different phases involving several subjects with defined roles and responsibilities. The cycle for chemical dangerous containers in the port of Genoa is organized as follow:

Export:

- The Freight Forwarder requests from the Port Authority the authorization to the entrance and the temporary storage of the container in the designated areas via an electronic message to a service center (external to the PMIS)
- The Ship Agent requests to the Maritime Authority (Coast Guard) the authorization to the loading of the container via electronic message using PMIS
- The Ship Agent sends to the Maritime Authority the Departure HAZMAT via e-mail with attachment in .doc format according to the IMDG Code.

Import:

- The Ship Agent requests to the Maritime Authority (Coast Guard) the authorization to the unloading of the container via electronic message using PMIS
- The Port Chemist receives though fax or e-mail the information for making the risk evaluation of the disembarkation operation according to the IMDG Form
- The Port Chemist send this evaluation to the Maritime Authority (Coast Guard) through e-mail

- The Ship Agent requests from the Port Authority the authorization to the temporary storage of the container via an electronic message to a service center (external to the PMIS)
- The Freight Forwarder requests the Port Authority the authorization to the exit of the container by the designated areas through an electronic message to a service center (external to the PMIS)
- The Ship Agent sends to the Maritime Authority the Arrival HAZMAT through an e-mail with attachment in .doc format according to the IMDG Code.

Transshipment

The transshipment operation requires two separate procedures one for the Import and one for the Export as described above.

Direct Loading/ Unloading

The Port Authority can oblige to the direct loading/ unloading (without stoppage in the port areas) once the Maritime Authority has authorized the loading/ unloading.

For the direct loading/ unloading it is also necessary that:

- The ship is already at the berth and operational
- The container is on board of the vehicle designated to the loading/unloading operation
- Presence in the port terminal of a substitutive vehicle with the proper characteristics in case of emergency

In particular circumstances, the evaluation of the Port Chemist can be required as by the Ordinanza 123/2004 by the Maritime Authority.

The described BP addressed the following relevant problems and existing conditions:

Duplication of data input: now the port operators input the data only one time considering that there are protocols for the data sharing among the different applications on the System. This solution reduces significantly the waste of time.

Lack of communication and interoperability among the informatics systems of the involved Public Authorities: now there is a perfect interoperability inside the System.

Paper documents exchange: with the new system the papers' circulation has been reduced or eliminated. The documents exchange takes place via telematics.

Lack of traceability of the flows of information and cargo: now all the public and private entities involved in the supply chain have a detailed, comprehensive and on real time basis vision of material and immaterial flows related to dangerous port traffics.

Lack of safety and security: since there is the possibility of tracking constantly the cargo flows and having a full visibility of the cargo information, the safety and security of the chemicals traffics are considerable





increased.

HAZMAT messages: now the HAZMAT messages have a standardized format and have to be codified with a precise and established wording; furthermore, the messages are sent through EDI.

Objectives

The described BP contributes to achieve the following objectives:

Port Safety and Security Perspective

The transport of Dangerous Goods is ruled by complex regulations that involve the requirements' compliance with the various stakeholders.

The non-compliance involves the application of sanctions by authority/regulatory bodies.

In this context it becomes important to identify the strengths and weaknesses of the Genoa logistics hub in order to identify good practices and improve the supply chain in terms of effectiveness, efficiency, security and safety.

The new System which is included in this perspective enhances the safety and security if the cargo handles and flows in the port.

Improvement of integration among port operations information systems

The aim is to promote the integration of existing port operations information systems of port authorities, institutions and operators.

Dangerous Goods management system (Port Authority)

E-Port system (Port Authority)

The Vessel Traffic Service (Coast Guard)

Port Management Information System (Coast Guard)

Hazard Assessment Computer Package (Chemicals/Terminals)

Relationships and connections with other projects

The effectiveness of the effort in the port of Genoa is depending on the cooperation level among the different projects that are developing by the port Community (i.e. the Maritime Authority is developing activities to ensure coherence of the “sea side” information; the platform for the national logistics network management – UIRNET is developed by the Ministry of Transport).

In particular for the chemical goods process, it seems of great interest the evolution of the Customs

Code with the implementation of the new amendments on security of the Codice Doganale Comunitario - Reg (CE)1875/2006 in place by January 1, 2011.

These amendments will have interesting and positive impact on traffic segment taken into account by LOSAMEDCHEM.

Financial/Legal Framework

Legal Framework

All the legal framework of the described BP makes reference to the UN Recommendations on the transport of dangerous goods (the so called "Orange Book") prepared by the Sub-Committee of Experts on the Transport of Dangerous Goods of the United Nations Economic and Social Council (ECOSOC). These recommendations deal with the classification of goods, the packages conditions, the labeling, the voyage documentation and the vehicles characteristics.

These recommendations don't have a force of law but are adopted by Organizations/Entities/Agencies in charge of the elaboration of the regulations concerning the transport and are also transposed into the international regulations.

It's worth stressing that the logistic cycle of dangerous goods is included in Port Security Plan elaborated according to the Regulation ECC 725/2004 and to the Directive 2005/65/EC.

Port Authority regulation and policies

- Law 28 January 1994, n. 84 and following modifications and integrations concerning the reform of Italian port legislation
- Circolare MSC 675 of 30/1/1995 by the International Maritime Organisation «Recommendations on the safe transport of dangerous cargoes and related activities in port areas»
- Art. 22 of Decreto Legislativo 27 July 1999, n. 272 gives to the Port Authority the duty of establishing the timeframe, the limitations and the conditions for temporary storage of dangerous cargo in the port areas (before loading or after unloading)
- Ordinanza 22 May 2001, n. 4 «Regolamento per il transito e per la sosta delle merci pericolose nel porto di Genova» modified by the Ordinanza n. 4/2004 and Ordinanza n. 4/2008

Coast Guard regulation and policies

- Codice della Navigazione, approved by the Regio Decreto 30 March 1942, n. 327
- D.P.R. 6 June 2005 n. 134 «Regolamento recante disciplina per le navi mercantili dei requisiti per l'imbarco, il trasporto e lo sbarco di merci pericolose» (Regulation concerning the discipline for the cargo vessels for loading, transport and unloading of dangerous goods)
- Decreto Dirigenziale n. 278/2006 concerning the procedures for the issue of the authorization to the

loading, the maritime transport and for the transshipment operations of dangerous goods

- Ordinanza n. 123/2004 «Regolamento per l'imbarco, lo sbarco ed il transito di merci pericolose nel Porto di Genova» (Regulation concerning loading/ unloading and the transit of dangerous goods in the port of Genoa)

Chemicals regulation and policies

- Art. 68 of the Codice della Navigazione
- Circolare 19 September 2009 2668PE by Comando Generale delle Capitanerie di porto
- Circolare 10 December 1999 by Italian Ministry of Transport and Navigation
- Ordinanza n. 8/2008 by the Genoa Port Authority «Analisi chimica dell'atmosfera interna dei contenitori (fumigazione)» (Chemical analysis of the atmosphere inside the containers (fumigation))

Shipping agents regulation and policies for Hazardous Materials

- Directive 2002/59/EC modified by Directive 2009/17/EC
- Decreto Legislativo 19 August 2005, n. 196 «Attuazione della direttiva 2002/59/CE relativa all'istituzione di un sistema comunitario di monitoraggio e di informazione sul traffico navale» (Implementation of the Directive 2002/59/EC concerning the establishment of a European system for monitoring and for taking information about ship traffic)
- Decreto legislativo 16 February 2011 , n. 18. «Attuazione della direttiva 2009/17/CE concernente la modifica della direttiva 2002/59/CE relativa all'istituzione di un sistema comunitario di monitoraggio del traffico navale e di informazione» (Implementation of Directive 2009/17/CE Directive 2002/59/EC about the establishment of a European system for monitoring and for taking information about ship traffic)

The financial framework of the BP is innovative particular in the context of the Italian port sector; the Genoa Port Authority with the agreement of the logistics operators of Genoa had established an additional tax on port traffics with the purpose to finance these actions. In this way the Logistics operators of the cluster have been directly involved in the development of the system and contemporarily, they can maintain a control on the results, on the performances and on the effort for the system realization by the Port Authority.

The part of the system developed by the Maritime Authority has been financed with funds from the Italian Ministry of Transport and Infrastructures.

Results/evaluation of measurable and qualitative facts/indicators

The VTS-PMIS new functions for managing declarations of dangerous goods on board ship and ashore

The VTS-PMIS is equipped with functions to ensure proper monitoring of dangerous goods in the port area and to facilitate storage procedures.

These functions will be used by Maritime Authority (Coast Guard) with regard to the authorization on the seaside and by the Port Authority as responsible for the authorization and monitoring of dangerous goods on the land side.

The following is a brief summary of the authorization procedures for loading and unloading of dangerous goods traffic in force in the Port of Genoa integrated with the new features of the VTS-PMIS.

This new System provides the sharing of information among functional areas controlling dangerous goods on board and on land to facilitate stakeholders entering information into the system in accordance with Regulations.

Final situation

Export

- The Freight Forwarder requests the Port Authority the authorization for containers' entrance and temporary storage issued by the authorities through telematics PMIS function to store DG
- The Ship Agent requests to Maritime Authority (Coast Guard) the authorization to loading containers through telematics PMIS function to controlling DG on board ship
- The Departure HAZMAT is automatically generated by the System.

For export goods, the freight forwarders are the first to send the request and they are also the first to enter the data and information of the containers to be loaded into the PMIS. The same data will be used by agents who will be conducting the boarding request without having to retype all the data of containers to be loaded.

Import

The Ship Agent requests from Maritime Authority (Coast Guard) the authorization to unload containers through telematics PMIS function to control dangerous goods on board ship.

The Ship Agent requests the Port Authority the authorization to store containers into the designated storage areas through telematics PMIS function to store DG.

The Freight Forwarder requests the Port Authority the authorization for containers' exit from designated storage areas through PMIS telematics function to store DG.

The Arrival HAZMAT is automatically generated by the System.



For import goods, the Ship Agents are the first to enter the data and information of the containers into the PMIS and to send requests for storage of DG on yards. Then, the freight forwarders will use the same data to ask the Port Authority the request to exit from designated storage areas.

Evaluation of measurable and qualitative facts/indicators

Some qualitative factors for logistics evaluation are listed below.

Financial goals:

- Decrease freight cost per unit
- Increase load capacity

Customer perspective:

- Decrease transit time (that is a direct way to improve customer satisfaction and loyalty)
- Improve loyalty

Logistics indicators:

- Freight cost per unit
- Transit time and losses
- One time shipment rate
- Customer order cycle time

Analysis of different indicators makes it possible to get the whole picture. These indicators are commonly known as key performance indicators (KPI) and differ from business to business.

In terms of performance, KPI involves

- Concerning the time, a drastic reduction of transit time has been obtained through the process computerization (i.e. reduction of time to send paper documents in relation to electronic documents or going to the appropriate offices of Port and Maritime Authority with the paper documentation);
- Concerning the cost, time saving can be considered into a generalized cost perspective, that is to say it generates a significant reduction of costs for both the operators and Public Authorities. On the other hand it has to be taken into account the time and the cost that is needed to get access to the System (investments, human resources training, etc.);
- Concerning the process, a reduction of transit time implied directly the customer satisfaction and the loyalty improvements;
- The security of the information flows;
- The reduction of the risk of losing paper documentation with relevant effects on time saving at the port accesses and terminals gates.

Lessons learnt/difficulties encountered

- The BP required a significant effort in the coordination and organization of all the people involved in the port cycle of the dangerous goods. The Genoa Port Authority and the Maritime Authority were in charge of the coordination of the initiative which required a great work in terms of a constant dialogue and an interaction among the subjects involved.
- The participation and consensus building of the port operators concerning this initiative has been a key element in the success of the BP. The involvement and the perspective of the private player are fundamental in the designing and tuning of the system and of its performances and functionalities. As a matter of fact, just the public and authoritative perspective and approach of the different Authorities and Bodies involved would have led to a useless system for the market and for the day- to-day port operations.
- The financial framework, with the direct involvement of the private operators, contributes to assure the involvement of the private side.
- The relevance of the data shared by the system not only on a commercial perspective (private side) but also on the safety and security perspective (public side) required an agreement and a team work with all the subjects involved. Furthermore, the importance of the data obliged on a high level of data protection and on information circulation. This is another fundamental point of the system, also in terms of convincing the private operators to participate in the initiative.
- The advantages in the use of the system about the port operators have to be concrete, otherwise this initiative is considered as a waste of time and a further bureaucratic burden by the private firms.
- The fast and on real time basis, information sharing concerning the flows of dangerous cargo in the ports can contribute in achieving a better utilization of the ports areas for these kind of good; considering the chronic lack of space in ports, especially in Genoa.
- The delay in the transposition of the international legislation in the National legal framework represents a relevant critical point in the correct application of the laws in the transport field.
- The different “Ordinanze/Decreti” (Ordinances/Decrees) issued by the Port Authorities and Maritime Authorities in each different Italian port for the transposition and application of the international legislation concerning dangerous goods transport, have created an inhomogeneous competitive frame in the Italian port sector. The lack of a level playing field can generate disadvantages for private firms and distortions of the Italian chemicals logistics market.
- Furthermore, the lack of homogeneity in the legal context in the Italian ports can have effects in term of safety, security and environmental protection.
- Moreover, the application of international legislation for dangerous goods and the legal frameworks in the ports among the European level is quite different.
- Therefore, a better harmonization at a national and European level should be achieved with relevant benefits for the chemicals transport.
- The use and the upgrading of the described BP in the rail transport can contribute to overcome some of the existing constraints in the use of rail modality for chemicals transport.





Additional information

Port Authority of Genoa

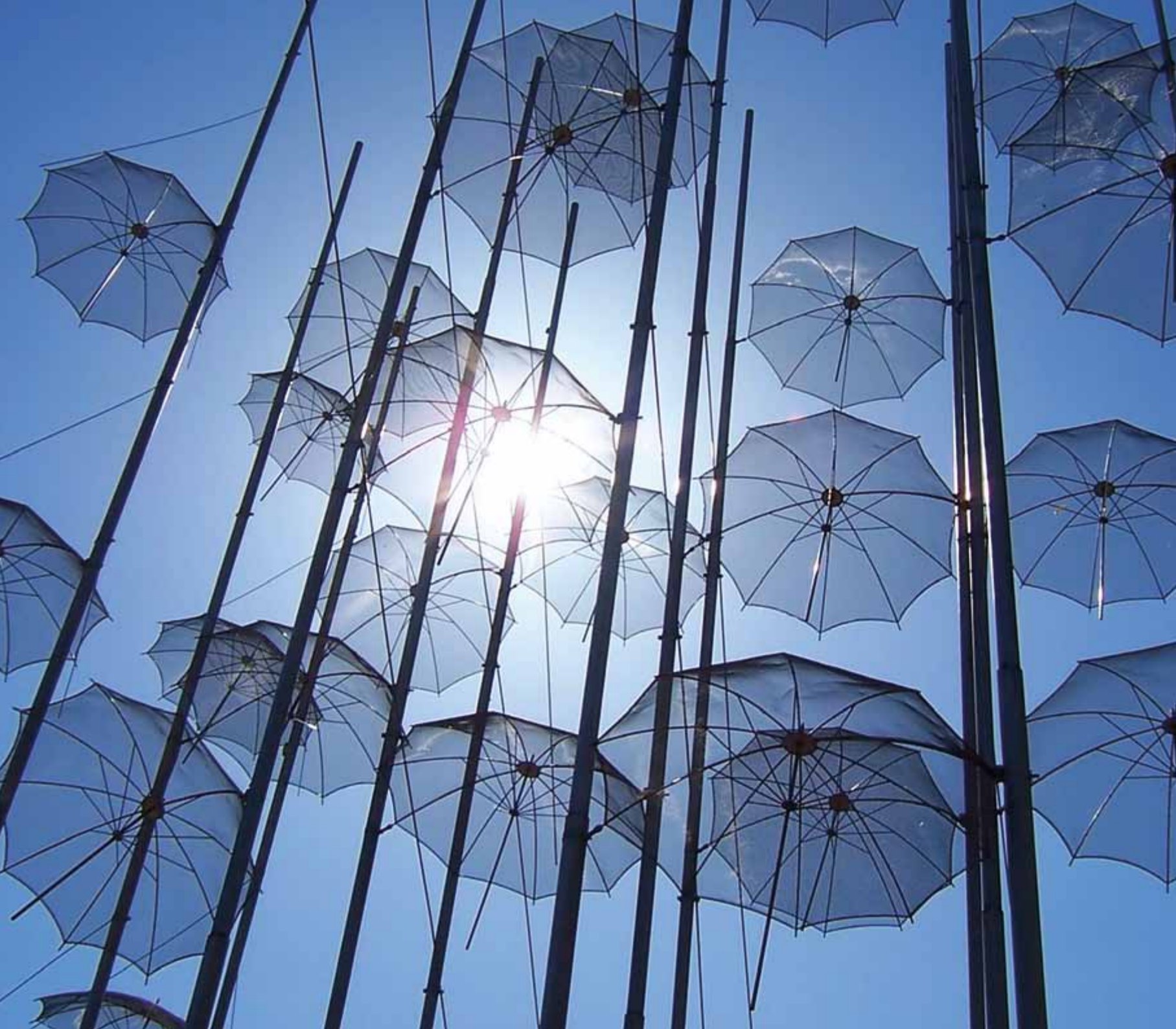
Luciano Boselli, Ufficio Pianificazione Informatica portuale

Egidio Ferretti, Ufficio Relazioni Enti per la Prevenzione e la Sicurezza Portuale

<http://www.porto.genova.it/>

Coast Guard of Genoa

<http://www.guardiacostiera.it/capitanerieonline/index.cfm?id=13>



Best practices of chemical logistics in the broader area of Thessaloniki



Thessaloniki Chamber Of Commerce And Industry (Tcci)

in co-operation with



Transeuropean Consultants For Transport, Development
and Information Technology S.A. (Tredit S.A.)

1. Introduction

The chemical industry generally, is the kingpin for the evolution of technologies, as it provides a model for imitation and also because it turns out to be more profitable for the innovating companies. Not only is the chemical industry very large, but it is also very complex. Most of the companies produce chemicals which are used for the production of other products. At the economic level, this leads a company to launch projects over the development of a sector, aiming at the introduction of successful procedures that affect the company's R&D and its market orientation. From the competitiveness perspective, infrastructures, product diversity, proximity of the markets, energy and overall supply chain structures are key attributes and performance criteria for flourishing enterprises. Today's chemical companies are faced with a number of challenges, from rising customers' demands and significant competition on prices to rising costs and regulatory compliance.

To remain competitive, chemical manufacturers must be innovative in terms of R&D and additionally throughout their operations to maintain profitability. Emerging global markets offer tremendous growth opportunities for manufacturers if they are able to successfully manage more complex distribution channels and supply chains, track information and product flow worldwide. The industry of chemicals and chemical related companies must also overcome geographically dispersed customers, sales offices, distribution centers, plants and suppliers and the unique cultural aspects of each region. In order to maintain and invigorate the whole value chain, the chemical industry, worldwide, makes great efforts to reduce production and transportation costs. In addition to the negative impact on profit margins and pricing flexibility, rising raw material costs are forcing many manufacturers to consider the capital expenditures associated with building new plants closer to the supply source. At the same time, the increases in energy and transportation costs force the same suppliers to consider locating their plants closer to their largest customers.

The comparative advantage of the region of Northern Greece and particularly Thessaloniki offers a significant opportunity to lower production and distribution costs. Generally, in Northern Greece the level of incorporated technical know-how in the field of the procedures in chemical industries is very high; therefore it is considered a really strong point. Although the level of transport infrastructure could be more satisfactory, chemical and related companies manage to, a high degree, successfully satisfy their customers' needs and get the right products in the right amounts in the right place and time. Namely the enterprises are able to provide reliable deliveries while controlling inventory costs.

2. First Case

Title of Best Practice: “Less is more” – Development of a model for incoming raw materials

Project Leader: Mr Kyriakos Loufakis- President and Managing Director of LOUFAKIS CHEMICALS SA- Thessaloniki Greece

2.1. Detailed description of the Best Practice

LOUFAKIS SA (www.loufakis.gr) is one of the largest manufacturing and distributing chemical companies in the region, which produces and distributes chemicals for the textile, food, water and metal industry, coatings and varnishes, building chemicals, detergents, animal feed supplements and solvents.

One of the practices adopted by LOUFAKIS SA was the import/ transportation of raw materials needed either for the production or for direct distribution in bulk and in house filling and packaging. The other, was the delivery of specific liquid products in dense form and in house subsequent dilution.

Both procedures had reduced transport costs since bulk or dense materials occupy less volume. Consequently a smaller number of cargos are needed for the same quantity; this fact added flexibility and convenience to the management. Besides that, they had both improved the environmental “footprint” of the company. The opportunity to use lower volume of packaging materials and their reuse has limited the necessity of their intense management.

2.2. Initial situation

The initial situation was the useless and undesired delivery of water, which costs the same with the raw material delivery and leads to a high environmental pollution caused by the plastic or other packaging material; combined with the inadequately organized plants for their effective removal from the premises had led to the decision of the implementation of this tactic. On the other hand the advantage of the added value coming out of this action was an additional reason.

2.3. Objectives of the procedure

- The first objective was the reduction of the final cost of the material unit, which partly benefits the customers by giving the opportunity of a greater market share to the company and by increasing the profit.
- The second but not less important objective was the environmental impact. Since the capacity of most of the packaging waste management meet this need is insufficient and results to an additional cost chargeable to the marketable material unit, the cooperation with them was not considered reliable and therefore not chosen. On the contrary, the preferred solution was the reuse or refill of the packaging materials and then prolonged utilization their forwarding to relevant manufacturing companies where they could be further used. This reduced the packaging waste and labor costs of handling both incoming shipments and waste disposal. At the end, plastic drums are given as scrub or second-rate raw material in plastic manufacturing companies and the paper cartons are given to paper manufacturing companies

to be added in the paper pulp, offering some extra profit to the company.

2.4. Results and evaluation

- Reduction of waste material management labor cost. As the volume of manageable recycled packaging material is too large, it is rather complicated to indicate the labor cost reduction in figures.
- Reduction of transportation cost which results in lower offered price for the specific raw materials and consequently in strengthening market position.
- Facilitation of purchase-delivery cycle follows up.

2.5. New premises- Legal framework

The new plant of the company is connected to the rail network. The board of directors and the president of the company consider the train to be by far the most proper transport mode for chemicals. A train station together with a railway track that comes right through the private land is built, in order to facilitate this delivery. The transported wagons or tanks will be detached from the train, remain parked inside the plant network for loading or unloading and in proper time they will be reattached to the train. The legal framework for this investment was not considerably complicated and the intention of the managers of TRAINOSE SA (the Hellenic Railways transport company) was supportive. However, several delays arose from the organization level of the railway company.



3. Second Case

Title of Best Practice: “Technology helps” – Introduction of informatics

Project Leader: Mr Panagiotis Kirgidis- President and Mrs K. Kirgidou- CEO of NITROFARM SA - Thessaloniki Greece

3.1. Detailed description of the Best Practice

NITROFARM SA (www.nitrofarm.gr) formulates and distributes a wide range of agrochemicals and other products with emphasis on export.

A practice implemented by NITROFARM SA is the introduction of remote management of the company with the contribution of information and communication technologies and the utilization of specially designed software adapted to the specific requirements of the enterprise. Principally, product categorization by code and by seasonality with the exploitation of adequately designed software improved the overall supply chain. As it is demanded for seasonal products, the previous (at least 1 month earlier) detailed organization of the sales is foremost important. Sorting in subcategories was crucial for this plan which could not be realized without the support of informatics. Given that the company handles around 2000 products of several, often unrelated, categories, sorting seemed the only key for effective management.

The owner(s)' obligation of absence over longer periods, due to business reasons made the need of access to the computers in the company's system crucial in order to have a clear view and effectively monitor the company even when physically not there.

3.2. Initial situation

The primary reasons for implementing a remote management system were to improve safety and increase productivity. Before incorporating this system the existing and adapted processes and solutions were time-consuming, inefficient and “looked up” to the problem after it incurred rather than actively managing it. The routine work was twisted within details and mistakes occurred. Procurement, order processing and distribution were toilsome realized. Regarding the remote connection external technical difficulties and delays existed as well since the state telecommunications company did not offer the necessarily expanded network and satellite coverage to support this action without difficulty.

3.3. Objectives of the concept

- Distant access

Remote network allows individuals to receive notification immediately. The ability to access other computers on the network remotely offers the advantage of having company access and control without physically going to the place and potentially monitoring dozens of functions surrounding the proper operation of the business. A problem can be diagnosed, prevented and solved on-line. An action can be recorded in detail immediately. Information is shared to every person designated to receive notification in “a moment's” terms.



- Reduction of time – Improvement of order processing

The faster the better! The restructure of the everyday business in order to achieve maximum efficiency without getting lost in details and to remain focused on the other complex issues surrounding the operation was rational. By employing ERP systems to perform routine business tasks e.g. inventory, safety stocks level control, sales, statistics etc, remote management is the primary tool used to improve the overall supply chain in terms of efficiency, services, time and profit. Dealing with raw materials coming from several sites of the planet and with customers being dispersed as well all over the world, distribution planning was of great importance

- Improved protection

Every use of the network can be closely protected by the system since a report is given to each computer connected creating a “tunnel” without the need of transferring data over the Internet. Remote computing is as secure as sitting in front of the machine itself. Every packet of data sent between the computers is encrypted using an authentication key shared between the computers.

3.4. Financial framework

The plan was stimulated by INTERREG III Greece - Fyrom, year 2008, the Cross Border Cooperation Program launched by the E.U. A great deal of capital was invested by the company to this initiative, but as the owner stated, “it was worth it”. Some parameters were determined by the Program with the company’s contribution to be adapted to the specific needs.

3.5. Results and Evaluation

- It is like being there even when you are not; having managed the access and control of the company with a stable, reliable, safe, useful, convenient and suitable system.
- The order processing and delivery status was significantly improved and increased the market share. The customer service branch operates without delays, gaining the best impression by the client, who feels “engaged” to the company and strengthens the company’s position in the market.
- Several decisions coming out as a result from the expertise and the over-time- improved utilization of the introduced concept and led to economies of scale for the company.

3.6. Time scale

The project was completed approximately 3 years ago and since then, the company’s overall knowledge and decision making policy were constantly improved.



4. Conclusion

The improvement of infrastructure network, rail in particular, could significantly improve the whole distribution chain of chemicals. The outcome benefits are not only cost reduction but environmental upgrading up to a significant degree as well.

Additionally, the expansion of the sea waterways in the inner land, specifically the interconnection with the islands which is at the moment mainly done from Piraeus' port and the establishing of vessels would increase the inland trade. The withdrawal of restrictive measures for road transfer i.e. during weekends and chemicals' transportation towards Attiki Motorway would present further positive effects.

The current elimination of railway stations, instead of building more, leads to stagnation of chemicals carriage by rail. Railway is, as internationally indicated, the most appropriate mode for the transport of chemicals both due to safety reasons and because it facilitates connectivity when corresponding nodes and networks are established.

Intermodal hubs are another issue. The creation of new intermodal hubs would lead to faster, less expensive and safer approach of the load/unload points and customers.



Slovenia Best Practice Analysis

AUTHORS

Port of Koper PLC

University of Maribor



Good practice A

1. Basic information of the Best Practice (BP)

Title of Best Practice:

Upgrade - modernization of computerized control equipment at filling station for road tankers and rail tankers

Project Leader:

Kodarin Alen – Technical department, Instalacija LLC, Sermin 10 a, 6000 Koper, Slovenia

Project Partner:

Genera LLC, Prevale 10, 1236 Trzin, Slovenija

Time scale:

- Start: January 2008

- End: December 2010

2. Tagging

Overall area of BP: **Logistics**

Detailed area of BP: **Warehousing and distribution**

Involved transport modes: **Road and Railway**

3. Detailed description of bp

a. Definition of bp

Instalacija, a member of the Istrabenz Group carries out the storage and handling of petroleum products. The Company's base is located at Sermin near Koper. Moreover, it operates the largest and best-equipped tank farm for petroleum products in Slovenia, achieving an almost 70% of the market share.

The petroleum products are shipped by road and railway. All the operations at filling stations are operated through computerized control equipment.

b. Initial situation

The software system controlling the filling operations at filling stations for road and rail tankers is obsolete. IT support is no longer provided.

When filling, the volume of liquid is measured and displayed; the operator has to calculate the weight of the load himself and to check if the maximum weight of vehicle is exceeded. It is important to mention



that several times some load had to be unloaded.

c. Objectives of the new solution

- On-line weight monitoring

During filling, even if simultaneously, the two different media in two chambers on a vehicle, the volume of media is measured, and the maximum weight is controlled; so when maximum weight is reached, a warning is displayed and the filling is stopped.

- Improvement in safety

By this way the need for unloading is practically eliminated. Moreover, the overloading of trucks and wagons is prevented; so there is a small improvement in safety in road and rail transport. The filling operation is simpler and safer for the operator.

- Increase of productivity

With upgrade - modernization of computerized control equipment is achieved an increase in productivity.

d. Financial framework

The capital expenditure value of this Best Practice case is approximately 150.000 Euro.

e. Results and evaluation

- On-line weight monitoring
- Unloading is practically eliminated.
- Improvement of safety for operators
- Increase in productivity

f. Time scale

The project was completed last year and, since then good results were achieved.

g. Lessons learnt

It is always a good strategy to have only two suppliers for everything in order to avoid a large competition and to keep a small one. Systems have to facilitate the work to people and to increase safety.

h. Additional information

www.Instalacija.Si, Koper, may 2011

Good practice B

1. Basic information of the good practice (gp)

Title of best practice: **The system for planning a supply to customers in melamin d.D. Kocevje**

Project leader: **Melamin d.D. Kocevje, slovenia**

Project partner: **Elemica, usa**

Time scale:

- Start: 2008
- End: the application of the system was concluded in 2008, but the use of the system is still in progress.

2. Tagging

- Overall area of bp: supply
- Detailed area of bp: planning a supply for customers
- Involved transport modes: road and oversea shipments

3. Detailed description of bp

a. Definition of bp

The company melamin d.D. Kocevje produces different kinds of melamine-formaldehyde resins. They follow stock levels in their buyers' warehouses by using an appropriate computer system. Then they organize the supplies according to the before agreed upper and lower stock level limits, without having any intervention from the buyers. The system for planning a supply to customers has been developed for rubber companies by the american company elemica.

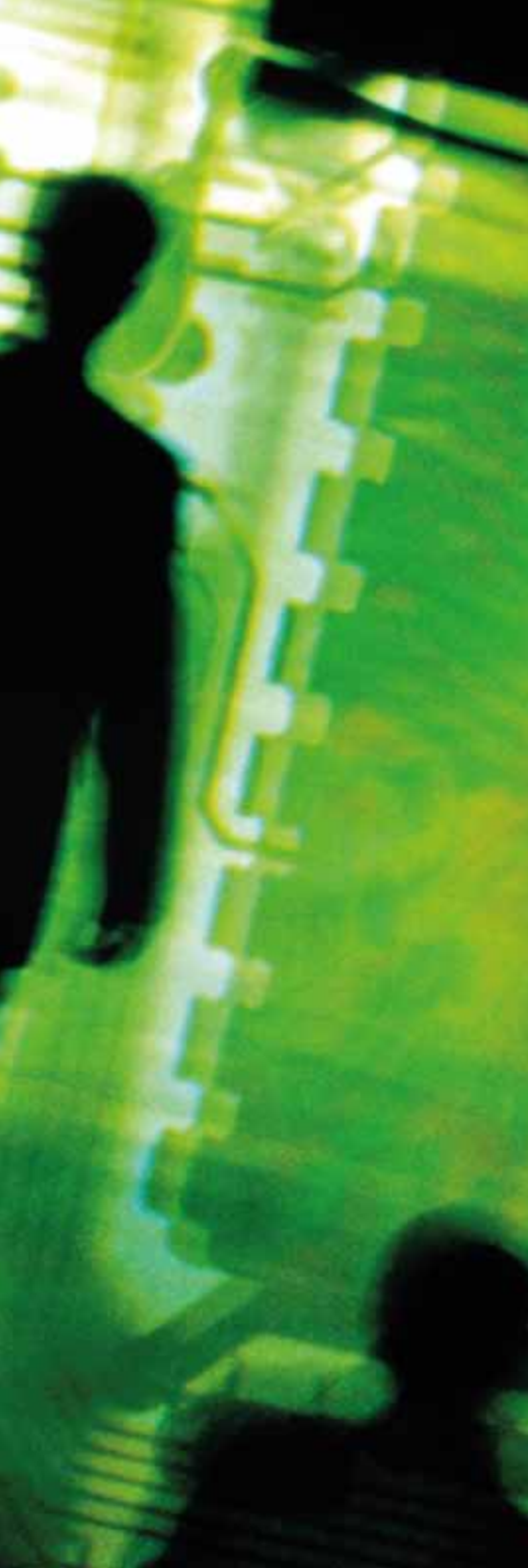
b. Initial situation

The system has advantages not only for the buyer but also for the vendor, who knows exactly when the buyer is going to need the stock. Thus, he enables better planning of the production, of the transportation and he delivers just in time so as to avoid any delays in searching the vehicle at the last minute. By this way there is a reduction to the cost.

c. Objectives of the new solution

- Customer management

Software enables the user to replace costly manual approaches with innovative automated capabilities



and systems that streamline the replenishment process. With the software, the user can manage inventory replenishment – consistently and efficiently – based on his client's inventory level, buying pattern, demand plan or rail car movement. Software solutions enable the user to leverage the benefits of state-of-the-art business process automation.

- Logistics management With the logistics management solutions, the user is in full command with an integrated network that seamlessly connects him to all of his logistics service providers (lsp) regardless of region, mode or capabilities. The software provides a comprehensive view – one point of visibility into customer's logistics network – giving the user immediate access to information and greater management control over lsp performance.
- Supplier management Collaborative supplier relationships result in an inbound flow of materials and services arriving at the right place and time driving the ideal balance of inventory, working capital, and service levels.
- Sourcing management Manufacturers are constantly looking to improve their financial performance so as to be more competitive in the global market. This increases the need to deliver immediate savings through better sourcing of materials, transportation, facility services and capital expenditures. Current sourcing resources are often limited and most managers are required to achieve greater results with fewer people. The sourcing management solutions allow the user to decrease administrative and operational costs through improved material, transportation and service contracts.

d. Financial framework

The company did not directly invest into the system. However, the company pays the costs of the system's application on a yearly base.

e. Results and evaluation

Reduced inventory levels (in the system as a whole)

More efficient planning schedules (in the system as a whole)

Reduced order changes and cancellations

Reduced administrative work.

f. Time scale

The project was completed three years ago, since then, good results were achieved. Now, not only the planning of production is much easier than it was but also the planning and organizing of supplies.

g. Additional information

www.elemica.com



Best practice recommendations in the transportation and logistics of chemical supplies in Malta and Gozo

AUTHORS

Shield security consultants Ltd

Specto Ltd

Associated consultant



Proposed best practice for chemical logistics.		Regulatory	Manufacturer	Freight forwarder	Wholesaler / stockist	End user
Part 1 - General Best Practice Measures						
1	Management System in place for the handling / shipment of chemicals.		X	X	X	
2	Periodical review (bi-annual) of chemicals activities and compliance in relation to work procedures, employee training, general housekeeping including marketing information.		X	X	X	X
3	Mapping of "Chemical Life Cycle" in order to identify the roles and responsibilities of each entity across the supply chain in order to ensure compliance across the value chain.		X	X	X	X
4	Report incidents including near misses. Repeated near misses may highlight emerging problem area.		X	X	X	X
5	Training of personnel including continuous professional development of key-personnel.		X	X	X	X
6	Forward Mapping of routes, in order to establish approved distribution routes and non-approved routes. Mapping to highlight any critical areas, populated areas, traffic black-spots including bottleneck.			X	X	
7	Alternative routes to be established in the event of disruption of primary routes listed above.			X	X	
8	Validate via risk assessment the maximum volume of product that can be handled by the organisation including maximum mixture(s) of product categories. This will determine the level of emergency response required.		X	X	X	X
9	Participate in vehicle breakdown service capable of handling chemicals to act as a backup.			X	X	
10	Communicate out-of-scope scenarios including: new products, new clients, new vendors, and new trade routes.		X	X	X	X
11	Understand legal requirements and compliance.		X	X	X	X
12	Understand packaging requirements and packaging markings		X	X	X	X

13	Cool temperature for storage and transpiration of chemicals in line with flash point requirements.		X	X	X	X
14	Initiate benchmarking studies and to keep aware and up to date of the best practices of other customers.		X	X	X	X
15	Minimisation of storage quantities		X	X	X	X
16	Safety marking, signage of transportation vehicles and storage areas.		X	X	X	X
17	Shipping documentation filled in accordance with legislation / intended use.		X	X	X	X
18	MSDS available with the product.		X	X	X	X
19	Do-and-Tell procedures for the handling of large volumes (tank-tainers etc). Companies to advise authorities in advance if handling / moving significant large volumes of chemicals. This applies to large volume handling / producers.		X	X	X	X

Part 2 - Specific BP-Measures

2A - Regulatory Authorities

20	Establish, select or recommend appropriate Guidelines and/or COP	X				
21	Clearly establish which goods are covered by Guidelines / COP	X				
22	Clearly establish places and establishments not covered by Guidelines / COP	X				
23	Determine precise difference between dangerous Goods and Hazardous substances to address chemicals under various legislations	X				
24	Determine inter-relationships between various legislations	X				
25	Determine Competency levels for various people carrying out chemical handling duties throughout the logistical chain	X				

Proposed best practice for chemical logistics.		Regulatory	Manufacturer	Freight forwarder	Wholesaler / stockist	End user
26	Introduce a system of Notifications for storage in large volumes*	X				
2B - Manufacturers						
27	Make safety information readily available on website.		X			
28	Ensure MSDSs are fully updated and readily available on request.		X			
29	Ensure that packaging arrangements are suitable and adequate.		X			
30	Ensure that suitable and adequate information regarding safety risk is available on all goods destined for retail.		X			
2C - Bulk Storage Operators & Freight Forwarders						
31	Implement a system of Notifications for storage in large volumes*			X	X	
32	Engage in active consultation with all known stakeholders			X	X	
33	Implement a Risk Management process comprising:			X	X	
34	Hazard Identification and Risk Assessment			X	X	
35	Recording the Outcomes of RAs, including risk controls			X	X	
36	Reviewing and Revising Risk Assessments under certain circumstances			X	X	
37	Implementing Risk Controls, including measures to:			X	X	

38	Determine acceptable levels of risk			X	X	
39	Reduce risk			X	X	
40	Design out risk where appropriate			X	X	
41	Obtain and keep file updated MSDSs for all chemicals stored on site			X	X	
42	Provide access to MSDSs to all authorised stakeholders			X	X	
43	Maintain an updated Register of all chemicals and Haz Materials			X	X	
2D - Training Best Practices						
44	Conduct a Training Needs Analysis		X	X	X	
45	Conduct planned Induction training		X	X	X	
46	Ensure continuous updating of Information		X	X	X	
47	Provide adequate competent supervision and on-the-job remedies		X	X	X	
48	Consider the need for further / specialist Education and Training		X	X	X	
2E - Signage						
49	Conduct an initial audit of signage requirements		X	X	X	X
50	Ensure all external signage is effective, visible, legible and up to the regulatory standard		X	X	X	X

Proposed best practice for chemical logistics.		Regulatory	Manufacturer	Freight forwarder	Wholesaler / stockist	End user
51	Ensure all signage on tanks is effective, visible, legible and up to the regulatory standard		X	X	X	X
52	Ensure all signage on packaged chemicals is effective, visible, legible and up to the regulatory standard		X	X	X	X
53	Ensure all signage on combustible materials is effective, visible, legible and up to the regulatory standard		X	X	X	X
2F - Risk Management [All Risk]						
54	Ensure adequate Personal Protective Equipment is made available at all times and worn.		X	X	X	
55	Take into account the safety of visitors.		X	X	X	
56	Take into account security of the premises.		X	X	X	
57	Ensure that specific risk controls are implemented.		X	X	X	
58	Maintain lowest quantities possible in storage.		X	X	X	
59	Control risk associate with plant, machinery and lifting equipment.		X	X	X	
60	Separate risk by effective barriers as and where appropriate.		X	X	X	
61	Store specific hazardous substances in adequate and suitable tanks.		X	X	X	
61	Implement an effective cleaning program.		X	X	X	
63	Protect stored substances from impact risks.		X	X	X	

64	Ensure that stored hazardous substances are always in a stable position / condition.		X	X	X	
65	Ensure that dangerous substances cannot come into contact with or contaminate processes, people welfare facilities, including neighbouring third parties.		X	X	X	
66	Ensure adequate fire protection is implemented through the process of risk assessment.		X	X	X	
67	Maintain an updated Emergency Plan of the installation, with suitable drawings.		X	X	X	
68	Implement emergency response procedures.		X	X	X	
69	Procure, install and maintain adequate fire fighting measures.		X	X	X	
70	Manage hazardous substances and related logistics through a suitable Safety Management System.		X	X	X	
71	Adapt Best Practice Guidelines to minor storage of hazardous substances.		X	X	X	



Best practice: case in the Castellón area

AUTHOR
FEPORTS



1. Introduction

After carrying out the swot analysis of the chemical and hazardous merchandise sector in the area of castellón, this document has been prepared with the objective of describing the case of best practices implemented by a company in the area involved in the aforementioned industrial sector, in order to optimise their business development processes.

The main objectives of this study include the analysis of innovative practices implemented in the area of chemical logistics, as well as the dissemination as a result of the cooperation between the different project participants; thus enabling the exchange between the experiences developed and the results obtained.

In this case is studied the implementation of a cleaning and fluid exchange system in pipelines connecting the dock with the bio-diesel plant belonging to infinita renovables in the south dock of the port of castellón through the use of pig. This company is at the cutting edge in europe in the production and marketing of bio-fuel, and has two plants in spain, one of which is located in castellón.

Maintenance and control of facilities of this kind are fundamental for the good operation there, which is why cleaning the different ducts comprising the production system is of utmost importance. In relation to these aspects, the implementation of the mentioned system has the objective of avoiding contamination between the different fluids transported, between the plant and the port, and vice-versa, in a safe, effective and economic way.

2. Best practice: case in the castellón area

The swot analysis carried out beforehand led to contacts with a number of companies, and to acquiring knowledge about the different innovative systems that have been implemented in order to improve the activities carried out, and also to optimize the logistics chain involved in each case. Among them, the system implemented at the infinita renovables plant at the port of castellón was considered to be of particular interest, with reference to the cleaning of the ducts used to transport fluids between the port dock and the plant itself.

2.1. Title of best practice

The best practice selected consists of the use of a cleaning and fluid exchange system in the connection



pipelines between the dock at the port of castellón and the infinita renovables plant through the use of pigs.

2.2. Project leader

The person in charge of this system at the bio-diesel plant is:

Mr. Alejandro veloz
plant project manager
infinita renovables castellón
dársena sur del puerto de castellón
12100 el grao (castellón) - sp

2.3. Project partner

The person responsible for the assembly and commissioning of the system is:

Mr. Javier moreno
exterior manager
isolux-corsán ingeniería
C / caballero andante, nº 8. 28021 Madrid - sp

2.4. Time scale

The system was implemented when the plant came into operation, in may 2009, there being no plans to replace it at present.

2.5. Tagging

Overall area of bp: internal to industry.

Specific bp application area: cleaning and maintenance of facilities.

Mode of transport involved: pipeline.

2.6. Description of the bp

This section includes a brief summary of the company operating service, the precedents, objectives to be met and the financial cost of implementation, the results obtained and any possible disadvantages related to it.

2.6.1. The company

Infinita renovables is a leading company in europe in production and marketing of bio-fuel, with a pro-

duction capacity of around 900,000 tonnes, which makes it the biggest bio-diesel producer in europe. The company has two plants in spain, one on the atlantic coast in ferrol (galicia) and the other in the mediterranean in castellón (valencian community).

The company was incorporated in march 2006, with its shares being distributed among the isolux corsán group, and santander investment, s.A., And solar de lukategi sociedad limitada acting as project developers, plant construction and maintenance managers. The overall investment for start-up of the mentioned plants reached figures of around 300 million euros.

The castellón plant is located on the new south dock at the port of castellón occupying a surface area of 65,000 m². It has an annual production capacity of 600,000 tonnes, making it the biggest bio-diesel production plant in europe, with two processing lines which have nominal performance of 75 t/h and 150,000 m³ storage capacity.

Communication with the outside for inbound raw materials and outbound finished products is mainly carried out by sea, through its own mooring, with a platform surface area of 450 m², a depth of 16 m and a ship designed to carry 70,000 tonnes measuring in at a length of 210 metres.

The technology used in the production process permits obtaining bio-diesel from vegetable oils extracted from soya, rape and palm from sustainable sources produced nationally and abroad.

The product obtained at the plant is for the spanish and european markets, in countries such as germany, italy, portugal, france and united kingdom.

2.6.2. Definition of the bp

The fluid exchange and cleaning system of the connection pipelines at the dock in the port of castellon to the plant comprises two pig launchers and receivers. These items circulate along the lines that could contain oil, methanol, bio-diesel or glycerine, and are driven by one of these four fluids so that there is internal dragging of residual fluid along the pipeline.

The following figure shows how the system works.

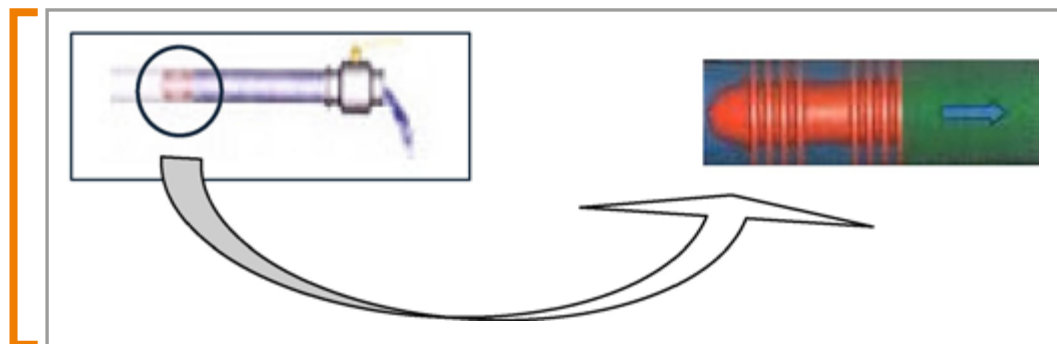
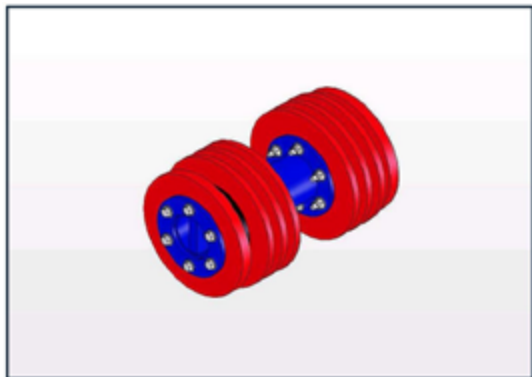


Figure 1. Internal dragging system of the product in the pipeline

Source: own elaboration.



The dragging item used, namely the pig (pipeline inspection gauge), consists of two support disks and six sealing disks, separated by disks assembled over a metallic front spacer. The front and rear parts are equipped with metal fixing flanges attached by means of an even number of hexagonal head bolts, washers and nylon nuts, as can be seen in the following figure.

Figure 2. Pig used in the system

Source: pipeline engineering & supply co. Ltd.

The technical specifications of this item are shown in the following table:

Table 1. Specifications of the pig used at the facility

Datasheet number	TD33-5
Tool designation	2-6D
Nominal size range	6"ns to 36"ns
Body Type	Multi bolt
Drive interface type	Seal Disc

Source: pipeline engineering & supply co. Ltd.

The technical specifications afforded by the complete system are as follows:

- Distance: 300 m.
- Flow: 175 m³/h.
- Speed: 0.67 M/s.
- Pig pipeline diameter: 12" (dn 300).
- Use (driving product): oil, methanol, bio-diesel and glycerine.
- Estimate pig pressure drop: 1,5 bar.
- Estimated pressure drop with glycerine (without pig): 0,26 bar.
- Estimated pressure drop with oil (without pig): 0,23 bar.
- When the pig reaches the receiver station, the whole facility can be cleaned, with the advantage of the pig itself being clean. Once this stage is completed, the sphere is returned to the launch station and the facility is ready for another production cycle.
- The plan shown on the following page illustrates a diagram of the line where this system has been implemented. Throughout the study, it has been shown on numerous occasions.

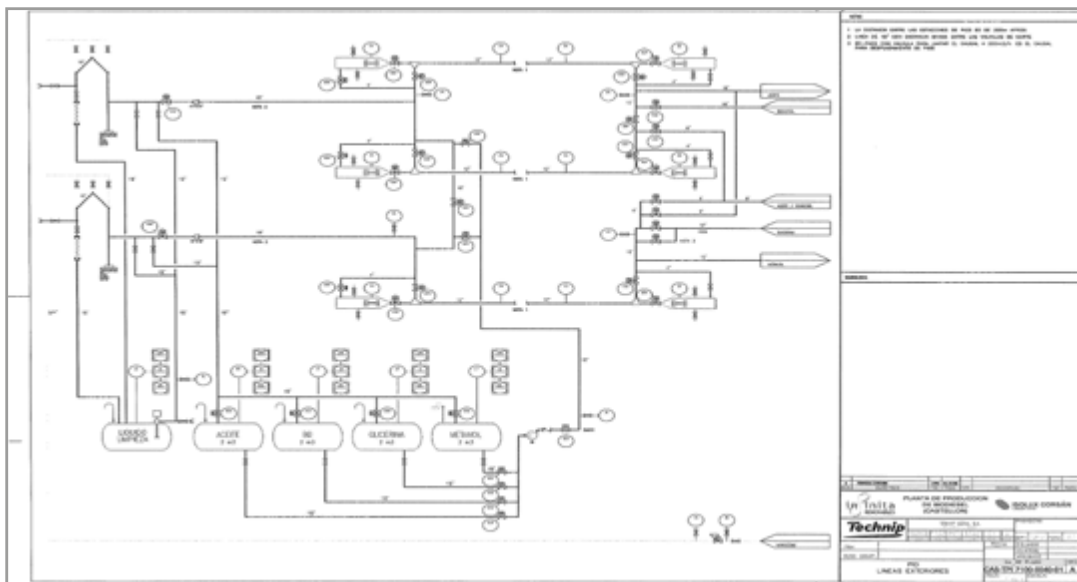


Figure 3. Plan of the carrier lines joining the mooring at the south dock of the port of castellón with the infinita renovables plant

Source: infinita renovables.

2.6.3. Background

Prior to this kind of system, the most common practice for production processes requiring the transport of different fluid types with a certain degree of viscosity, was to design and install a duct for each of the fluids to be transported. One of the main consequences of this, among others, was the high execution and implementation costs of the facilities, as well as the maintenance entailed, added to the higher complexity of the design required.

2.6.4. Objectives of the adopted solution

The principle objective of the system is to avoid contamination of the different fluids that are decanted from the plant to the port and vice versa. In this case these products are oil, metanol, bio-diesel and glycerine, thus reducing the costs associated with the existing systems used beforehand.

On the other hand, it is an ideal system for recovering the remaining fluid in a pipeline after transporting it, while at the same time reducing the volume of fluid to be sent to the treatment plant resulting in considerable energy and water savings.

2.6.5. Implementation cost

The approximate cost of implementation and commissioning of this system is 35,000 euros per line, including pumping stations and the pig. This value does not take the cost of the pipeline itself into account.

2.6.6. Results and evaluation

The use of the pig cleaning system provides the following results:

- It avoids mixing residues with other products, thus reducing contamination and the costs that this entails, as well as avoiding the risks associated with mixing products.
- Dragging and recovery of products in the pipeline, which permits maximum use of the fluids handled, as a result of elimination of losses through wasted products.
- Reduction in the volume of treated fluids, owing to the absence of contamination between fluids, which entails a significant saving in water and energy.
- Total cleaning of the pipeline, eliminating residues and thus avoiding wear and tear of the pipeline with use.
- Low installation cost and quick investment recovery, mainly because of the savings compared to traditional pipeline cleaning systems.
- Possibility of using different kinds of fluids with different degrees of viscosity.

2.6.7. Temporary costs of implementation

The installation process of this system was included in the execution and commissioning stage of the bio-diesel plant in the spring of 2009, and is the mechanism that has been used from the start for cleaning and maintenance of ducts connecting the dock at the port with the plant. Today, the company's other plant is also using this system.

2.7. Disadvantages and critical points in the system

Because of the high number of components that the facility requires, including pumping stations, valves and such like, is demanded a high degree of automation. It reduces the need for extreme manual surveillance at the operating post of all these components, thus ensuring optimum operation of the system. This signifies an increase in the implementation costs.

2.8. Additional information

The answer to any questions regarding the system can be found in the following websites:

- [Http://www.Infinitarenovables.Es](http://www.Infinitarenovables.Es) -> company using the system.
- [Http://www.Isoluxcorsan.Com](http://www.Isoluxcorsan.Com) -> company in charge of installation and maintenance of the system.
- [Http://www.Pipelineengineering.Com](http://www.Pipelineengineering.Com) -> company in charge of manufacturing and supplying the system components.



Best Practices of Chemical Logistics in Catalonia

AUTHOR

Cristian Bardaji

Barcelona Chamber of Commerce



Consell General de Cambres
de Catalunya

Best practice 1: PORTIC

1. Definition of the best practice

Global definition

PortIC is the technological platform used by the Barcelona Port Community.

It has been developed by the Port of Barcelona, through the Telematic Forum¹, with the aim of improving document flow and information exchange related to goods transport and logistics, specifically dealing with maritime and road transport.

The PortIC project has involved the substitution of inefficient paper documents and manual information exchanged by Electronic Document Interchange (EDI) in real time for most of the process.

PortIC also focuses on all the consultancy activity relating to the creation and usage of these EDI services.

PortIC is currently well implemented within the Port Community. Nevertheless, 12 years after its creation in 1999, it is still advancing, constantly developing new solutions to help overcome technological and economic barriers.

Since 2006 PortIC has started to widen its product offer and also to connect to other platforms such as INTTRA or GT Nexus. The connection with INTTRA has allowed exporters and freight forwarders to reach any ship-owner, including those who take part of the INTTRA network.

Some notes about PortIC technology

This technological platform is supported by SUN SOLARIS operating systems with high availability and workload balancing. The systems undergo demanding tests to guarantee their overall performance in critical situations and times of maximum load.

According to the Port of Barcelona, PortIC has a 99.9% availability, 24/7, with message delivery guaranteed in no more than 3 minutes.

Its modular design and scalability allows growth and ensures the quality of service for unlimited numbers of users, messages and transactions. PortIC audits the service parameters to guarantee optimum quality.

The technological platform is renewed and improved constantly in accordance with the latest developments. First-class technological partners guarantee the quality and reliability of service.

¹The Telematic Forum is a working group integrated by representatives of the whole Port Community. It aims at the definition of procedures which simplify and speed the processes of information exchange related with goods transport and logistics.

A PortlC solution for every client and information exchange

Portic offers solutions adapted to the needs of the port-logistics industry. This has very positive effects both for the port's clients (importers and exporters) and to the logistics community.

For port clients, PortlC offers all the information regarding the status of their cargo within the port and will allow them to follow its path through the logistics chain.

The solutions offered by PortlC include all the steps which take place along the logistics chain. All these solutions are included in specific applications that allow the port to manage the specific chains for every different activity:

- Shipping: Portic Consignatario allows monitoring of the entire cargo collection and delivery process, and also management of cargo lists for the communication between the ships' agents and the terminal.

In this field there is another product closely linked to the Import Control System (IECS; the European import procedure). This product allows the connection of the shipping companies with Spanish Customs.

- Forwarding: Portic Forwarding has been designed to facilitate the transactions with sea and land transport, by means of global container tracking and also to facilitate the managing of the documentation dealing with booking, shipping instructions and transport orders.

Portic services can be accessed on the Internet, by personalized e-mail notification or system integration, providing a real-time solution:

Cristal box: real-time information on the status of documents and the physical location of a container, with traceability of all relevant stages (date summary declaration activated, date of departure from terminal, inspections, SAD, etc.).

Calls: information on port-call permit numbers granted by the Port Authority of Barcelona (anticipated calls and modifications).

Hazardous cargo: information relating to the authorization of hazardous-cargo containers.

Shipment confirmation: real-time information on shipments included in the summary declaration.

Statistics: personalized statistics on container traffic in the Port of Barcelona.

Databases: Updated information on all codes used by the Logistics Community.

And also... implementation and operation support services

PortlC develops the services needed to cut the costs and time associated with the implementation and operation processes: advice on how to integrate systems; project management (including programming when needed); customer services (from 8 a.m. until 8. p.m., solutions for any technical and operational incidents); and personalized training.

2. Starting point, relevant problems and existing conditions

The starting point was an inefficient system of paper documents and manual information exchange.

Moreover, The Port of Barcelona is presently undergoing a major enlargement process, which will increase its capacity to 10 million TEU. So greater traffic growth will come in due time. A platform for Electronic Document Interchange will then be essential for the port.

The main problems encountered by PortIC appeared from the very beginning, during the implementation process are:

- Opposition to the change needed in the process management.
- The client's difficulties to deal with these new technologies (from the managing staff to the final users of the platform)
- The initial investment needed, with a long-term financial return (this subject will be dealt with in the chapter Financial / legal framework)
- The difficulty to achieve a minimal number of enterprises joining the platform, in order to give a proper value to it and thereby attract new enterprises.

The first client of PortIC was the Barcelona Port Authority, for whom PortIC created custom development according to its specific technological needs.

Regarding the attraction of new clients, the support of the shareholder companies and associations, which represent PortIC's potential clients, has been of great value. Specific commercial processes, including personalized visits and adaptation of the package services to the needs of each group (ship-brokers, freight forwarders, customs agents, container depots, haulage companies, terminals, etc) are essential.

3. Objectives

The mission of PortIC is to improve the competitiveness of the companies in the Port of Barcelona Logistics Community through a technological platform that facilitates interaction between members and makes processes more effective and efficient.

We must also take into account another objective of PortIC: greater transparency in the maritime field.

The initial idea of PortIC was taken from other similar solutions implemented in first class ports such as Rotterdam or Singapore. Nevertheless, it is intended to be an original solution, with an innovative character which should make it exportable to other ports.

In other words, PortIC has aimed to be much more than just a technological platform, allowing important improvements in the following fields:



Efficiency: less time required to search for and exchange information; and fewer documentation errors.

Operating costs: less need for couriers or phone calls, and even resources for managing files.

Technology costs: costs of developing and maintaining applications reduced by using a platform that allows for connecting the different formats of different systems.

Security: legal security by establishing a legal framework for the parties; commercial security by ensuring that users in each company receive all necessary authorizations; and security about data confidentiality by preventing unauthorized access.

Growth: increased capacity to handle cargo by planning and programming in real time, and proactive management of incidents.

Customer value: excellence in customer service achieved by offering new services (real-time information on the status of cargo, possibility of modifying transport services at any time, etc).

4. Financial / legal framework

The Port Logistics Community of Barcelona was the promoter of this project, with the total support of Barcelona Port Authority.

All the capital required for the start up of the project came from two banks, Banc Sabadell and La Caixa.

PortlC's shareholders are a variety of companies, associations, and other groups which actually represent the whole of the port community: the banks La Caixa and Banc Sabadell, the Association of Shipping Agents of Barcelona, the Association of International Forwarding Agents of Barcelona, the Official Association of Customs and Commission Agents of Barcelona, the Association of Port Stevedoring Companies of Barcelona, the Chamber of Commerce of Barcelona and the Port Authority of Barcelona.

ESADE business school has cooperated with PortlC for the external monitoring of the creation and implementation process.

PortlC also participates in projects financed by AEI (Spanish International Cooperation Agency) and collaborates with the European project MANTRAS.

Finally, some clients have obtained a CIDEM² subsidy for enterprise digitalization.

The enterprise invests approximately 50% of its sales revenue in R+D.

² The Centre d'Innovació i Desenvolupament Empresarial (CIDEM) is managed by the Industry and Work Department of the Catalonia Government. It aims to boost the Catalan enterprises. It offers a direct support to enterprises by the means of products, services and subsidies

5. Results / evaluation of measurable and qualitative facts / indicators

Since its start up in 2003, PortIC has largely grown:

Year	Number of messages
2003	170,000
2004	348,000
2005	982,000
2006	4,000,000
2007	8,580,000
2008	9,050,000
2009	n.a.
2010	>13,000,000

Today, PortIC serves more than 260 customers in the Port Community, which represents approximately 4,000 containers per day.

More than 90% of the communications related to container traffic in the Port of Barcelona are performed electronically.

Thanks to this success, PortIC is also being exported to other ports:

- In 2004 the first development abroad took place in the Port of Alexandria in Egypt. The project was presented to the authorities of this country in April 2005.
- In 2008, the Port Authority of Buenos Aires started the development of a technological platform called E-puertobue, with the cooperation of the Telematic Forum of the Port of Barcelona and taking PortIC as its reference.
- In 2009, the Spanish consortium Indra-Portel, in cooperation with the Barcelona Port Authority and PortIC, started the design and implementation project for a new technological platform for the Morocco Port Community.

6. Lessons learnt and new objectives

The easiest part of the project has been the development of the technology, whereas the most difficult thing has been the change of management. In other words: to get all the enterprises which develop their logistic activities within the port (more than 500) to change their procedures and adapt to the PortIC system.

Concerning hazardous cargo, Portic has provided a substantial improvement in the documentation process coming from the shipbrokers and/or ship agents.

Before Portic, very few of these agents could send all their information digitally to Barcelona Port Authority. Most agents had to register documentation in paper form and in triplicate physically at the SAU Office (Servicio de Acceso Unificado) in the Port of Barcelona. A few days later (4 days at the latest, except for the most hazardous cargo) the ship agent would get the authorization from the Port.

Now, Portic has accelerated the whole process, reducing the 4-days waiting process to 10 minutes.

Another lesson drawn from the whole Portic project (and extremely valuable in the case of hazardous cargo) is the greater transparency amongst the Port logistics community. More to the point, the forwarding and custom agents can check on line the status of the cargo, and this information will remain in the Port's files for a 36 month period after the beginning of the notification process.

To conclude, PortIC's success has made up for all the effort devoted to it.

From this experience, Barcelona's port has decided to take new steps towards a wider platform: that is to say:

- To take the PortIC services to the port's final clients.
- To provide services to other types of cargo, such as automobile.
- To incorporate other types of logistic chains, such as rail-port.

Best practice 2: The Tarragona petrochemical cluster

1. Definition of the best practice

Global definition

Tarragona region is located 100 km south-west of Barcelona, in the north-east of Spain. It hosts the second main commercial port of Catalonia.

Since 1960s, approximately 30 companies including some major international ones like Bayer, BASF and Dow, and Repsol, Spain's largest petrochemical company, have set up production sites in the chemical cluster of Tarragona.

This cluster consists of a northern and a southern industrial park, both linked to the port.

The North industrial park covers 470 hectares in the municipalities of La Pobla de Mafumet, El Morell, Constantí and Perafort. It is a refinery and cracker-based integrated petrochemical complex. Its main players are Repsol and Dow Chemical Iberica.

The South industrial park covers 717 hectares in the municipalities of Tarragona, Vila-Seca and Reus. It consists of multi-company intermediates including polymers and specialty chemicals sites such as Repsol, Dow Chemical Iberica, Bayer, BASF, Basell, Ercros and Solvay.

Enterprises in the North industrial park

CARBUROS METÁLICOS, S.A. (Air Products Group)

MESSER IBÉRICA DE GASES, S.A. Unipersonal

VINILIS, S.A.

DOW CHEMICAL IBERICA, S.L.

REPSOL, S.A.

Enterprises in the South industrial park

ASFALTOS ESPAÑOLES, S.A.

LYONDELLBASELL POLIOLEFINAS IBÉRICA, S.L.

BASF ESPAÑOLA, S.L.

BASF SONATRACH PROPANCHEM, S.A.

BAYER MATERIAL SCIENCE, S.L.

CELANESE CHEMICALS IBÉRICA, S.L.

CLARIANT IBÉRICA, S.A.



COMPAÑÍA LOGÍSTICA DE HIDROCARBUROS CLH, S.A.

DOW CHEMICAL IBÉRICA, S.L.

E.ON GENERACIÓN, S.L.

ERCROS INDUSTRIAL, S.A.

ASHLAND INDUSTRIES HISPANIA, S.A.

INDUSTRIAS QUÍMICAS ASOCIADAS, LSB, S.L.

KEMIRA IBÉRICA, S.A.

ELIX POLYMERS, S.L.

MESSER IBÉRICA DE GASES, S.A. Unipersonal

PRODUCTOS ASFÁLTICOS, S.A. (PROAS)

REPSOL S.A.

SEKISUI SPECIALTY CHEMICALS EUROPE, SL

TARRAGONA POWER, S.L.

TERMINALES PORTUARIAS, S.L.

TERMINALES QUÍMICOS, S.A.

TRANSFORMADORA DE ETILENO, AIE

VINILIS, S.A.

In the locations of Flix and Tortosa, about 100 km south of Tarragona, there are other smaller Ercros plants, producing chlorine, soda, formaldehyde and derivatives. Although they are well interconnected with the cluster in Tarragona, these plants are not part of it.

The value chain of this cluster is a typical refinery and cracker-based petrochemical complex.

The main raw materials (crude oil and natural gas) are all imported. Natural gas is imported liquefied and then processed in several gasification facilities along the coast around Barcelona and Cartagena.

Natural gas is also provided via the Trans-Pyrenean pipeline link (from Calahorra, Spain to Lacq, France), and from the Maghreb-Europe gas pipeline from Algeria to Spain.

How the cluster works

The Tarragona chemical cluster has its origins in the 1960s, when the first companies started to settle in the Southern industrial park.

There is a high integration between its companies, as one third of the products are used within the cluster as input to other manufacturing stages.

For instance:

- Repsol and Dow provide ethylene through a 100 km long pipeline to Solvay for its PVC manufacturing plant in Martorell.
- Ercros sends chlorine from its plant in Flix both to the Ercros plant in Vila-Seca for the production of EDC/VCM and to the Bayer plant for the production of MDI. Hydrochloric acid is then sent from Bayer back to the Ercros plant in Flix, where, combined with phosphoric rock received by train from the port of Tarragona, it is used for the production of dicalcium phosphate.

The majority of the Tarragona chemical cluster companies are members of the Tarragona Chemical Business Association (AEQT), which is, in turn, part of the national chemical association FEIQUE.

AEQT was funded in 1977. Its main role is to lobby the local, regional and national government with the aim of defending the interests of the chemical industry and to maintain and develop the chemical cluster's reputation as a whole.

This association has recently enlarged the Tarragona cluster structure from an industry-based focus to a wider framework of cooperation with governments and educational and research institutions.

The most remarkable results of the AEQT cluster have been the infrastructure and operation projects in which it has participated together with the local authorities:

- Assuring water supply from the Ebro river and other resources, thanks for the initiative of Aigües Industrials de Tarragona Societat Anònima (AITASA).
- Setting up a fire-fighting brigade for all the companies in the cluster. This project is called Security Chemical Parks of Tarragona.
- Developing the rack of pipelines from the port to the southern industrial park (Dixquimics). AITASA has also been involved in this project.

Water supply: AITASA

This association was created in 1965 with the aim to supply industrial water to the chemical companies of the South industrial park, and later on in the Northern industrial park.

Amongst other projects, AITASA is responsible for the water distribution to the Southern industrial park, from the 4 m³/s concession from the Ebro river for the Tarragona area, managed by the Consorci d'Aigües de Tarragona (C.A.T.).

The AITASA infrastructure includes 43.5 km of pipes for industrial water, 14 km of pipes for chlorinated water and 2 regulatory water tanks of 12,300 m³ and 15,200 m³. It distributes 10 Hm³ of water per year. It also maintains 14 km of optic fibre for data transmission of its quality control.

Apart from water distribution, AITASA is involved in the management and coordination of other construction projects such as the Racks of Dixquimics (see below) and South Zone, the future emissary for the petrochemical cluster, the reuse of recycled water, etc.

Security Chemical Parks of Tarragona

This project is the result of the cooperation of AEQT and the Autonomous Government of Catalonia (Generalitat de Catalunya, Departament d'Interior).

The parks were approved as a project in 1999 and started to operate in 2001 in the North and South industrial parks, and in 2004 in the Port.

The parks host all services needed for maintenance, a communication area and special/dedicated fire-fighting areas, apart from several permanent trucks fully equipped for fire extinction.

Dixquimics

Dixquimics represents the rack of over 60 pipelines connecting the port with the south industrial park. Several companies use the same pipeline complex for their product interchanges (ethylene oxide flowing from IQA to Dow Quimica and Clariant; chlorine flowing from Ercros to Bayer).

Started in 1998 with the participation of just 5 chemical companies, Dixquimics now involves 16 companies in Tarragona industrial complex, and moves 1.5 million tons/year of chemicals along a route of about 7 km.

Since its construction, Dixquimics has favored the development of logistics synergies between cluster players. In this respect, the case of Terminales Quimicos S.A. (Terquimsa) and Celanese is a good example: the Dixquimics rack of pipelines has allowed the elimination of the vinyl acetate road transportation towards Celanese, and as product handling has been completely outsourced to Terquimsa and its port facilities.

2. Initial situation, relevant problems and existing conditions

The location of the Tarragona petrochemical cluster is due to its strategic location, land availability and infrastructures: a good commercial port, which allows connections with the Mediterranean basin and other international ports, and a direct road connection with the whole of the Iberian Peninsula.

The Port of Tarragona has been particularly essential for the economic success of the Tarragona chemical cluster, as it enables the import of raw materials and competitive feedstock for the chemical manufacturing process³.

Business environment has been another key-factor. The first enterprise that settled in the area was Catalana de Abonos (nowadays Ercros) in 1958. The development of the South industrial park started in 1960, with the investments of Aliada Quimica. But it was in 1961 when the definitive entrepreneurial investment took place, with the creation of the Chemical Companies Association (Industrias Químicas Asociadas, IQA) with capital investment coming from ERT, Cepsa, Shell and Hoechst. This also meant the first entrepreneurial alliance of Spanish and foreign companies.

The 1960's were a time for change in Spanish politics, which started to open to the world and to encourage industrial development. This brought new arrivals of Spanish and foreign companies to Tarragona (firstly Dow, BASF and Industrias Aragonesas; later on, Bayer).

The presence of an important chemical industry in the area was a key for the establishment of the refinery plant in 1976. This was the definitive trigger for the development of the North industrial park and the arrival of more companies, which would become the Repsol Group in 1987. The ethylene production associated to it brought about the consolidation of the chemical complex as the leader of the sector in Southern Europe.

3. Objectives

The two key characteristics of a cluster are the proximity of individual activities in terms of geography and value creation.

The cluster concept differs substantially from the business as usual model which would be based on purely internal optimization within companies.

Clusters reflect the existence of spill-overs and linkages between companies. This provokes real economic value:

- Companies can achieve higher levels of productivity, because they have close access to specialized suppliers and can rapidly learn from the best practices of close competitors
- Companies can be more innovative, because they can turn ideas more efficiently into prototype products and services and get feedback more quickly on their market potential
- And companies in their start-up phase can quickly find and obtain the many external services and assets that they cannot provide internally but need to tap into to launch their operations.

In the particular case of the petrochemical cluster of Tarragona, this has meant the establishment of a competitive advantage, especially taking into account the ever increasing pressure from competing locations.

Another key factor that has impelled Tarragona to operate as a cluster has been the necessity to share capital investments on assets and infrastructure required for the manufacturing of chemicals. This is the reason for innovative projects such as Dixquimics.

It must be also noted that the need to lobby the local, regional and national government, with the aim of defending the interests of the chemical industry has also been an important aim.

³ This port, with a total traffic of 31.5 million tons in 2009 (before the global crisis, in 2007, the port had reached 36.5 million tons) is amongst the 15 largest European ports in liquid bulk traffic (20 million tons in 2009) and in dry bulk (10,5 million tons in 2009). In other words, petroleum products (crude petroleum, naphtha, fuel oil, propane, crude condensates, diesel) and chemical products represent around 50 % of the port's traffic.



4. Financial / legal framework

The main financial and legal notes regarding the most important projects of the cluster are explained below.

AITASA (Water supply)

This association is share-owned by the following enterprises:

AITASA shareowners

ARAGONESAS INDUSTRIAS Y ENERGÍA, S.A.

ASFALTOS ESPAÑOLES, S.A.

BASF ESPAÑOLA, S.L.

BAYER POLÍMEROS, S.L.

BIC IBERIA, S.A.

CLARIANT IBÉRICA PRODUCCIÓN, S.A.

COMETSA

C.I. TAQSA, A.I.E.

DOW CHEMICAL IBÉRICA, S.L.

ERCROS INDUSTRIAL, S.A.

FOMENTO DE CONSTRUCCIONES Y CONTRATAS, S.A.

HERCKELBOUT DAWSON IBÉRICA, S.A.

INDUSTRIA PANIFICADORA Y PASTELERÍA, S.A.

INDUSTRIAS REYCON, S.A.

INDUSTRIAS QUÍMICAS ASOCIADAS LSB, S.L.

MESSER IBÉRICA DE GASES, S.A.

FERTILIZANTES TARRAGONA, S.L.

PRODUCTOS ASFÁLTICOS, S.A.

REPSOL BUTANO, S.A.

REPSOL PETRÓLEO, S.A.

REPSOL QUÍMICA, S.A.

SHELL ESPAÑA, S.A.

URBANO RIFATERRA

Security Chemical Parks of Tarragona

The cooperation with the Catalan Government has given way to the following collaboration agreements:

- Collaboration agreement between AEQT and the General Directorate for Emergencies and Civil Security of the Interior Department of the Generalitat de Catalunya. It establishes a framework of joint actions in order to guarantee efficiency and safety for the staff. It also coordinates the resources of every part according to the Emergency Plan for the Tarragona Chemical Sector, PLASEQTA. There are also periodic joint practices.
- Agreement with the Catalan Public Security Institute for Basic Fireman Training. The objective of the courses is to qualify the enterprise firemen for prevention, fire extinction and rescue tasks in emergency situations, with the aim of protecting the workers and reducing the consequences of the accidents.

The parks belong to the Associacions d'Empreses Parc Químic de Seguretat dels Polígons Nord i Sud.

The organizational scheme is as follows: one general coordinator for both parks, one Park Chief and four permanent firemen. The service runs 24/24 and follows specific protocols.

The Dixquímics Rack

The prospect of significantly decreasing investment costs and unifying all the pipelines into one single legal entity, in order to obtain a simplified authorization process, led the chemical companies to embark on a collaborative project.

Dixquímics (Consorci de Distribució per Xarxa de Productes Químics) is a consortium comprising the most important enterprises of the South industrial park of the Tarragona cluster, the Industry Department of the Catalan Government and the Tarragona Municipality. It was created in 1997.

It owns the entire current pipeline infrastructure for the transport of chemical products in the cluster.

The private companies have covered the total cost of racks project (around 18 million euros).

5. Results / evaluation of measurable and qualitative facts / indicators

The petrochemical cluster of Tarragona plays a major economic and social role in a region inhabited by 500,000 people. Tarragona is the most important chemical manufacturing cluster in the southern Europe and Mediterranean area.

The global chemical production of the chemical companies in the Tarragona cluster amounts to 21 million tons per year (refinery: 8.3 million tons; chemical industry: 12,7 million tons), 25 % of which is exported mainly to the Mediterranean area.

Here are some notes which prove the Tarragona chemical cluster's leadership in the Mediterranean:

- It represents 44% of the Spanish plastics production
- It represents 25% of the Spanish chemical production
- It represents 0.75% of the world chemical production (in terms of value)
- It is the largest producer of ethylene in Europe.

6. Lessons learnt and new objectives

Lessons learnt: elements to maintain; elements to improve

The Port of Tarragona has proved to be the main source of the necessary inputs for the manufacturing processes of the cluster's chemical companies.

The appropriate flow of chemicals from the port to the refineries, the crackers and the storage locations is ensured by a profitable infrastructure. The Dixquimics pipelines rack, which involves both a high percentage of companies and the local authorities, emphasizes the importance of infrastructure in Tarragona cluster operations. It also points to the necessity of considering the longer term maintenance and growth of the cluster's and regional infrastructure.

The high concentration of chemical companies has also been also a key-factor, especially for the Logistics Service Providers (LSP). This has to do with the progressive specialization of the producers in the manufacturing of chemicals, and their subsequent outsourcing of industry-related services.

The presence of LSPs started 20 years ago. Their integration with the producers is gradually progressing, but it is not yet common for LSPs to maintain an on-site presence at the chemical producers for storage, handling and transporting of chemicals on a long term basis. The recruitment of well-qualified logistics and supply chain specialists is reported as being quite difficult for both chemical companies and LSPs.

There is still enough land available. However a clear limit of infrastructure which could potentially cross the chemical area has still to be definitely settled.

Finally, the correct distribution of the products from manufacturers to their customers requires new infrastructure projects. This could be an appropriate rail link to connect Tarragona cluster with its hinterland, which would consist of a direct rail connection from Tarragona's port and its cluster to a Mediterranean rail corridor adapted to UIC gauge. This depends entirely on the State Government's budget, and it is currently included in the official infrastructure planning.

The new demands of Globalization: time to act

Globalization has increased the role of clusters, in two ways. First, competitive advantages that reside in the intensive local interaction within a cluster have become relatively more important as other sources of competitive advantage related to unequal access to technology or other inputs have dried up. While a competitor can use the same supplier independent of his location, he cannot get access to the full flow of linkages and external infrastructure without being present in the cluster.

Second, knowledge has become a more important driver of value creation and this has strengthened the role of clusters. A key factor in “open systems” for innovation relies on ideas flowing between companies and research institutions in often unplanned and unstructured ways. While technology has become more widely available, the unstructured knowledge that provides superior value, remains tied to specific people and locations.

Tarragona needs to re-examine its competitive advantage in relation to other chemical clusters in Europe, which means solving all the problems mentioned above.

In other words take action in very different domains: industrial and commercial strategy, infrastructure operation, urban politics and infrastructure projects.

For this, all stakeholders (producers, LSP, Local, Regional and State authorities, infrastructure operators) should act according to a clear cluster leadership and in perfect coordination.





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