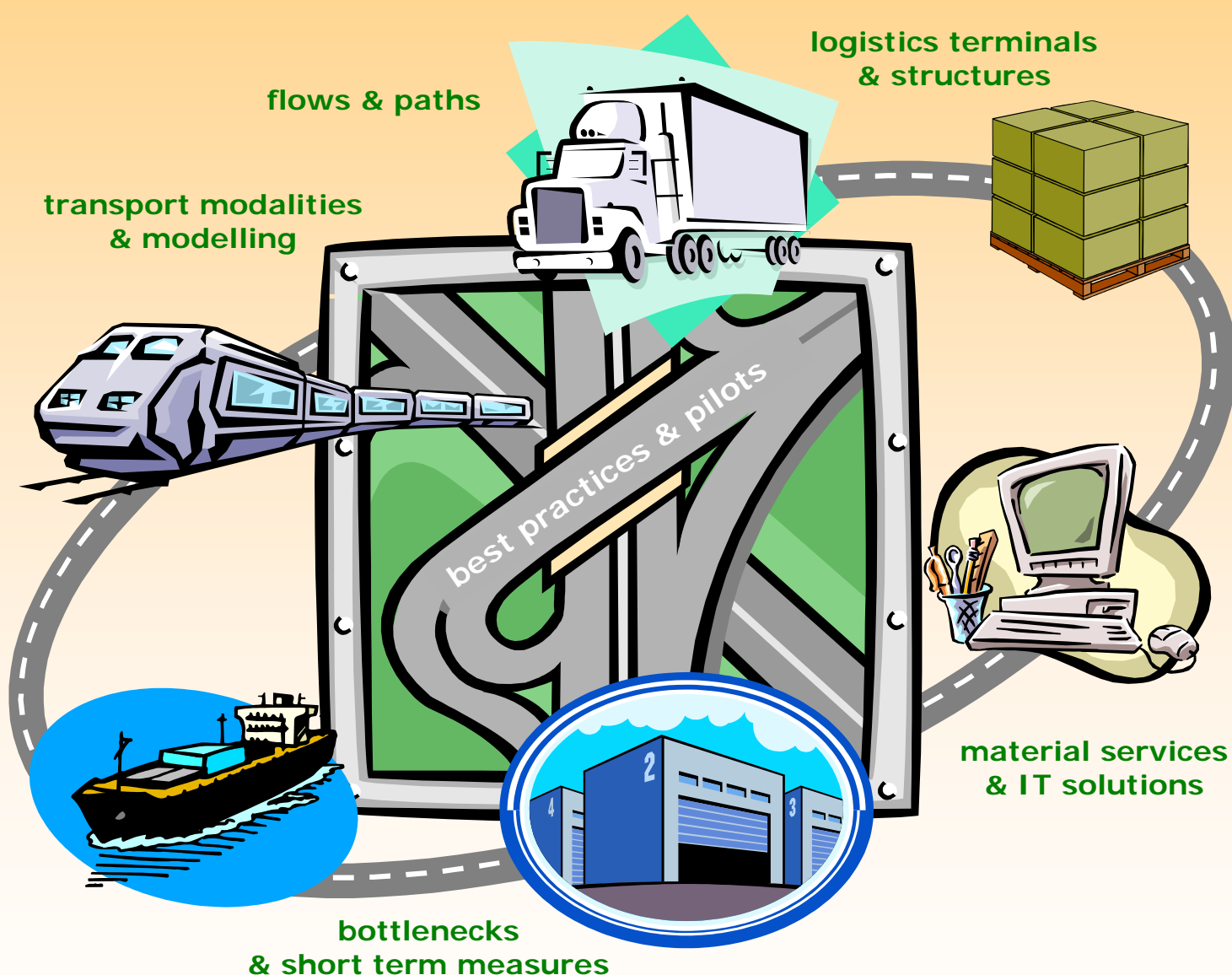


THE FRESH PRODUCE LOGISTICS CHAINS

Present situation and future development



Editor: Roberto Della Casa
in collaboration with

THE FRESH PRODUCE LOGISTICS CHAINS

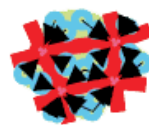
Present situation and future development



EUROPEAN UNION



INTERREG III B CADSES
INTERREG III B CADSES



IMONODE PROJECT

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INTERREG III B CADSES - IMONODE PROJECT

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In the last few years the fresh produce logistics chains have registered a high level of pressure as a consequence of the increasing traffics of this kind of product thanks to the markets globalisation and consumptions de-seasoning.

The road transport, that currently represents the main modality for fruit and vegetables, needs a series of organisational improvement to increase shipment efficiency and reduce costs as well as pollution. In parallel, it is necessary to consider new structural interventions able to support intermodal connection development in order to reduce the transport congestion on the roads, increase logistics performances and guarantee fresher and safer products to the consumers.

The Forlì-Cesena Province is one of the main areas in the European fruit and vegetables system, considering its geographic location and its agriculture level. For this reason our Chamber of Commerce joined eagerly to the Imonode project and in particular to the planning of the FreshLog demonstrator in the Municipality of Cesena. Thanks to the financial resources of the Interreg IIIB CADSES programme, the feasibility analysis of the territorial logistics structure for fresh produce in the context area, reported in this publication, represents one of the most advanced organisational models for fresh produce. This is the starting point both to develop the fruit and vegetables system in the territory and to implement a network among all the production basins in CADSES area also with the intermodality backing in time horizon 2015.

*Sergio Mazzi
President of Forlì-Cesena Chamber of Commerce*

The fresh produce represents one of the main sectors for the Taranto's economic system. Anyway, in the last few years it has faced a series of difficulties in consequence of its structural fragmentation and distance to the main consumption areas in Central and Western Europe. In this scenery, logistics is the new weakness for our fruit and vegetables system and its development represents the basis to "relaunch" the fresh produce division of Italy and all CADSES area Countries. In the context area, such as emerges from the analysis realized by the study team of the Imonode Project reported in this publication, thanks to the logistics organisation, the local production will benefit by new opportunities: by sea, through an integration with the production coming from the Southern side of the Mediterranean basin to complete our seasonality; by road, thanks to the groupage activities with other national production areas. Moreover, the IT tools available currently on the market, such as the Virtual Market Place prototype reported in this publication, could reduce in a significant way negative effects of the small cargo size typical of all parts of the fresh produce supply chain. Finally, in the demonstrators devoted to the fruit and vegetables reported in this publication emerge the key role of Public-Private Partnerships in the logistics systems development: without the needed collaboration and agreement among the parts - that produced original PPP schemes with refer to Cesena and Taranto territorial logistics structures - the fragmentation of competences would have made useless any effort performed by the study team.

*Emanuele Vito Papalia
President of Taranto Chamber of Commerce*

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STATISTICAL SOURCES AND BIBLIOGRAPHY

All the data/tables/figures reported in the present publication - except where otherwise stated - come from processing made by Agroter and other Imonode Consortium involved parties during the different steps of the project on the sources reported afterwards, on the basis of own experiences on the perishable goods market and with the assistance of the experts panels¹:

- Agency for Statistics of Bosnia and Herzegovina (BHAS)
- CIA - The World fact book
- Consiglio Nazionale delle Ricerche (CNR)
- Croatia Bureau of Statistics
- Croatian Chamber of Economy
- Croatian Employment Service
- European Union
- Eurostat statistics
- FAO - Food and Agriculture Organisation
- Federal Ministry for Transport, Innovation and Technology of Austria
- Federal Ministry of Agriculture, Forestry, Environment and Water Management of Austria
- Federal Ministry of Agriculture, Water Management and Forestry of Bosnia and Herzegovina
- Federal Ministry of Transport and Communication of Bosnia and Herzegovina
- Federal Office of Statistics of Federation of Bosnia and Herzegovina
- Federal Statistical Office of Serbia and Montenegro
- Federation of Bosnia and Herzegovina, Federal Office of Statistics
- Foreign Trade Chamber of Bosnia and Herzegovina
- Hellenic Ministry of Transportation and Communications of Greece
- Hungarian Central Statistical Office
- I distretti agro-alimentari nel sistema economico romagnolo: il caso ortofrutticolo, CCIAA Forlì-Cesena, 2003
- Institute of Statistics of Albania
- ISTAT - Istituto di Statistica Italiana
- Istituto Commercio Estero of Italy
- Ministry of Agriculture, Forestry and Food of Rep. of Albania
- Ministry of Agriculture and Forestry of Bulgaria
- Ministry of Agriculture and Rural Development of Hungary
- Ministry of Agriculture, Forestry and Food of Slovenia
- Ministry of Agriculture, Forestry and Rural Development of Kosovo
- Ministry of Agriculture, Forestry and Water Economy of FYR of Macedonia
- Ministry of Agriculture, Forestry and Water Management of Croatia
- Ministry of Agriculture, Forestry and Water Management of Republic of Serbia
- Ministry of Agriculture, Forestry and Water Management of Republic of Srpska
- Ministry of Agriculture, Forests, Waters and Environment of Romania
- Ministry of Economy and Transport of Hungary
- Ministry of Rural Development and Food of Greece
- Ministry of the Sea, Tourism, Transport and Development of the Republic of Croatia
- Ministry of Transport and Communications of FYR of Macedonia
- Ministry of Transport and Communications of Serbia and Montenegro
- Ministry of Transport and Communications of Bulgaria
- Ministry of Transport and Infrastructure of Italy
- Ministry of Transport and Telecommunications of Albania
- Ministry of Transport of the Republic of Slovenia
- Ministry of Transport, Constructions and Tourism of Romania
- National Institute of Statistics of Romania
- National Statistical Service of Greece
- National Statistical Institute of Bulgaria
- National Statistical Service of Greece

¹ With regard to the panel of experts, the Imonode Consortium built up a general panel made of nearly 40 people in representation on the production, trade, wholesale, retail and logistics area. Then, for every kind of analysis realized with the assistance of experts, the Consortium selected from the general panel the needed professionalism/skills to investigate each single topic.

- Republic Statistical Office of Montenegro
- Republic Statistical Office of Serbia
- Republic Statistical Office of Montenegro
- Republic Statistical Office of Serbia
- Serbia and Montenegro statistical office
- State Statistical Office of the FYR of Macedonia
- Statistical Office of Kosovo
- Statistical Office of the Republic of Slovenia
- Statistik Austria
- The Republic of Macedonia, State Statistical Office
- The Republika Srpska Institute for Statistics
- United Nations
- United States Department of Agriculture

All the data and inputs needed to realize and present the analyses reported in the present publication were processed on the bases of the following software:

- ESRI ArcView
- Microsoft Access
- Microsoft Excel
- Moover
- Route 66 geographic information
- ViaMichelin

All the data regarding the Transport and Logistics Terminals (TLTs) under analysis in CADSES area and the best practices outside CADSES area come from the sources reported afterwards (collected with a direct survey to the TLTs through a questionnaire and own integration on public statistics and direct on field surveys of the main transport logistics nodes selected for the analysis):

- Budapesti Nagyban Piac rt. (wholesale market of Budapest - HU)
- Caab Mercati (agro-industrial centre of Bologna - I)
- CEI - Wholesale Markets Foundation
- Central Market of Thessaloniki - Kath (wholesale market of Thessaloniki - GR)
- Consorzio Centro Agro-alimentare Fasano (agro-industrial centre of Fasano - I)
- Container Terminal of Thessaloniki (Thessaloniki - GR)
- Frigoterminal (Ravenna - I)
- Fruit Terminal Luka Koper (Koper - SI)
- Interport Quadrante Europa (interport of Verona - I)
- Istituto Geografico De Agostini
- Luka Beograd (Belgrade - YU)
- Maap Padova (agro-industrial centre of Padova - I)
- Magistrat der stadt Wien - magistratsabteilung 59 - Marktamt (wholesale market of Wien - AT)
- Mercabarna (wholesale market of Barcelona - ES)
- Organization of Athens Central Market (wholesale market of Athens - GR)
- Piata de Gros Bucuresti - PGB (wholesale market of Bucharest - RO)
- Port of Astakos - Akarport (Astakos - GR)
- Port of Durres (Durres - AL)
- Port of Piraeus (Athens - GR)
- Port of Zeebrugge (Zeebrugge - BE)
- Regional Wholesale Market Split, Joint Stock Company - Regionalna Veletrznica Split (wholesale market of Split - HR)
- Regionalna Veletrznica Benkovac (wholesale market of Benkovac - HR)
- Regionalna Veletrznica Rijeka-Matulji (wholesale market of Rijeka-Matulji - HR)
- Regionalna Veletrznica Osijek (wholesale market of Osijek - HR)
- Rungis (wholesale market of Paris - FR)
- Sh.a. Dinamo (wholesale market of Tirana - AL)
- Slatina Bulgarplod (wholesale market of Sofia - BG)
- SMA Centro Agro-alimentare "La valle della Pescara" (agro-industrial centre of Pescara - I)

- Taranto Container Terminal (Taranto - I)
- Terminal Frutta Trieste (Trieste - I)
- Veronamercato (agro-industrial centre of Verona - I)
- Wholesale Market for Fruit and Vegetables, Lushnja Joint Venture Company (wholesale market of Lushnja - AL)
- World Union of Wholesale Markets - WUWM
- Zagrebacka Veletrznica - Zagreb Wholesale Market Company - (wholesale market of Zagreb - HR)

All the input data needed to realize the business plan activity for the demonstrators areas was collected by Agroter and other Imonode Consortium involved parties with an on field analysis made both on the main territorial operators of transport and on the main public statistics available for the areas of Cesena and Taranto:

- Autostrade per l'Italia
- Eurostat statistics
- I distretti agro-alimentari nel sistema economico romagnolo: il caso ortofrutticolo, CCIAA Forlì-Cesena, 2003
- Istat
- United Nations

The main bibliographical reference to realize the analyses related in the Imonode project and reported in this publication are as follows:

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- "White Paper. European transport policies toward 2010: time to decide", European Commission, 2001
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- "World reefer market prospect and modal competition - Pallets v Containers v Breakbulk", Drewry, 1996
- EC Regulation 1059/2003
- Economic Commission for Europe (ECE)
- European Conference of Ministers of Transport
- Florida's Intermodal Planning Process, National Transportation Library, BTS

1.1 - PREMISES

In September 2003 a Consortium of 17 Organisations from Austria, Croatia, Greece, Italy and Slovenia signed a contract with the Managing Authority of the Interreg IIIB programme for co-financing by the Cohesion Fund of the project “Efficient Integration of Cargo Transport **Modes** and **Nodes** in CADSES area²” (acronym **IMONODE**).

The focus of this project is the innovative plans and concepts for the promotion of intermodal freight transport in CADSES area:

- innovative technical, administrative, business and organisational models of freight transport operation that gives emphasis to intermodality;
- formulation of a Master Plan for the development of intermodal transport and logistics terminals that would act as strategic focal points for transport chains along the main transport arteries of the area (Corridor V, Corridor X and Adriatic-Ionian Corridor).

The main goal of the project is to promote intermodal transport to shift cargoes from road to rail or sea and to improve the accessibility of this region to an intermodal network of transport services. As a matter of fact the Imonode project aims to study the options and suggesting solutions and solid actions that will enhance the greater use of transport modes and the accessibility to the transportation Corridor V, X and Adriatic-Ionian Corridor for freight transport with priority on rail and the co-operation between railways and freight terminals. Moreover the principal project objectives concern the sustainable transnational concepts to integrate goods transport modes and nodes between Adriatic Sea (Italy) and Central Europe (Intersection Corridor V and X), integrate goods transport modes and nodes in Southern Eastern Europe between Greece and Austria. Besides, the Imonode project have other objectives: develop a cooperation network and clear division of tasks between the transport nodes to be able to offer transport services and promote the reorientation of Central European transport flows from North Sea ports to Eastern Mediterranean ports (North/South Adriatic ports and Greek ports) to take advantage of EU enlargement opportunities. For these reasons it is needed a “new logistics” (developing new nodes and connections) to reduce the impact of traffic by road and increase alternative mode/modes (single and intermodal) of goods exchange, with the target of a more sustainable growth of the economic development in the near future.

The project work is complemented and finalized by specific demonstrators or pilots applications and evaluation of the innovative concepts. In particular, with regard to perishable products - the so-called **FreshLog case** - the demonstrators aim is to involve the logistical, productive and processing aspects of these goods in the Eastern part of Italy. The mentioned area is an important centre with refers to the growing and handling of produce, fresh and frozen meats and is characterized by state-of-the-art processing structures. The objective of these demonstrators is to show how co-ordination and organization of the flows may improve efficiency of the logistics system:

- in particular, the first final goal is to reach the critical masses required for coordination of flows to optimise cargoes (full lorries and mixed cargoes), to improve back logistics and to promote the use of road-railway intermodalities for destinations to the Centre and Middle Europe and sea transport for products coming and directed to the South of Italy (Sicilia, Puglia, etc..), Greece and Turkey and other Mediterranean basin African Countries and also Middle and Far East from the port of Ravenna and Taranto.
- the second goal is to project at the feasibility level territorial logistics structures for perishables in different areas, as for example the analysed cases (Forli-Cesena and Taranto), and then verify the possibilities to realize a network of complementary distriparks among these structures able to mix different kind of fresh products from different production areas, to provide handling and packing services, to add material and immaterial services, with the objective to fulfil the continuous changing requirements by the retailers based in Central and Middle Europe for improving quality and freshness of the products.

The expected output of demonstrators is to project a prototype of connected distriparks for perishable goods improving handling and intermodal services in the Eastern part of Italy, as best practice model that aims also to be repeated in other logistics contexts.

² CADSES area is defined in the following pages (Par. 1.3, page 12).

In this framework, this publication regards the fresh produce sector considering that at the beginning of the logistics chains analysis for the FreshLog case, the Imonode Consortium decided to focus demonstrators activities on fruit and vegetables for several reasons:

- the different macro-categories of perishable goods - nevertheless joined by the need of temperature control in the logistics activities - provide a limited number of possible areas of integration. As matter of fact, to integrate the activities of these macro-categories is needed a relevant investment with particular technologies not yet widespread in the market. So the choice of one category of perishable agro-food products to realize demonstrators was unavoidable;
- fresh produce is the main category of perishables traded in CADSES area with more than 28,1 MT of flows. In particular, in the territories in which are located the demonstrators areas analysed in this publication (i.e. Cesena, Emilia-Romagna - I and Taranto, Puglia - I, such as detailed afterward) fresh produce share on total perishables are as follows:
 - in Emilia-Romagna fruit and vegetables account for 80% of the total perishables flows under analysis in the Imonode project exported by Emilia-Romagna to the other NUTS 2 in Italy, 99,3% of the flows imported from the other NUTS 2 in Italy, 94,3% of the flows exported to foreign Countries and 96,3% of the flows in import from foreign Countries;
 - in Puglia fresh produce is for 98,8% of the total perishables flows under analysis in the Imonode project exported by Puglia to the other NUTS 2 in Italy, 84,8% of the flows imported from the other NUTS 2 in Italy, 99,9% of the flows exported to foreign Countries and 49,3% of the flows in import from foreign Countries.
- fruit and vegetables are the base of Imonode intermodal models realized during the project development, in consideration of their incidence in the perishables flows. And so, considering that the final goal of this project is the intermodality development, it seemed right to concentrate the project attention to this category;
- fresh produce logistics chains are those less developed in the perishables field and so able to give a wide range of development and modernization also with simple interventions;
- fruit and vegetables logistics chains are characterized by the wider fragmentation - in all their stages - in the perishables system;
- the main bottlenecks in the fresh produce system with particular reference to the structures and logistics organisation are more concentrated to the management aspects than those linked to the infrastructures and so provide a greater range of possible solutions in the short term also thanks a pilot/demonstrator development.

Coming from the flows, estimated by an original methodology, through logistics chains and paths used, the Imonode Consortium analysed in deep Transport and Logistics Terminals devoted to fresh produce in CADSES area in order to define critical bottlenecks and obstacles that prevent the development of intermodality, suggesting short term measures to solve them. Then, the activities were focused on best practices and long-term sceneries, building an intermodal transport modelling for the present situation and in time horizon 2015. Complete the contents of this publication the description of three demonstrators: two territorial logistics structures for fresh produce at the feasibility level consolidated with a Virtual Market Place Prototype.

In this context, considering the results of the logistics and supply chain analysis in the most probable scenery in time horizon 2015 such as reported in the second Chapter of this publication, the focus of the project and its aims, the Imonode Consortium decided to position the territorial logistics structures to be developed within the project in the areas of Cesena (Emilia-Romagna - I) and Taranto (Puglia - I).

As a matter of fact, the results of the analyses realized highlighted that Emilia-Romagna and Puglia are the main regions in production and trade of fruit and vegetables within CADSES area and play a relevant role in the logistics flows of produce in the reference area. In fact, Emilia-Romagna and Puglia are the top two regions within CADSES area in terms of total handling of fresh produce (import+export) with respectively 2 and 2,3 millions of MT/year handled in the reference period (average 2000-2001). Emilia-Romagna and Puglia are the only two regions in CADSES area able to handle more than 2 millions of MT/year.

Moreover, from the transport paths analysis comes that the roads connections made by A1/E35, A14/E55 and A22/E45 are the main routes used for the fresh produce trade within Italy and for the export activities of the main Italian production areas. These connections cross Puglia and Emilia-Romagna and this is the second important reason for the demonstrators positioning choice in the areas of Cesena and Taranto.

This publication is an attempt to reach a wider audience of all those public and private entities involved in the fresh produce business to support a great rationalization of the transport of fruit and vegetables and promote intermodal transport in South East Europe. As matter of fact, with the activities realized within the Imonode project, the Consortium has been able to draw up a new business model for fresh produce logistics ready to rationalize the traffic of fruit and vegetables and to highlight the basis of a possible future development of the intermodal transport for fresh produce in the reference area.

Many thanks to all the Colleagues who worked on the Imonode Project from all the partners Organisation: without their work this publication could not be written.

1.2 - TRANSPORT MODALITIES AND FRESHLOG KEY ASSUMPTIONS

Monomodal Transport of freight is the carriage of goods (not-containerised and containerised goods, palletised goods and packages) by just one mode of transport among starting point to the delivery point of the journey.

Definitions for Multimodal Transport of freight and Intermodal Transport of freight was provided by the Economic Commission for Europe (ECE), the European Conference of Ministers of Transport (ECMT) and the United Nations (2001) as included in CEN/BT WG 141, "Intermodal and interoperable transport - Telematics". These definitions are the following:

- Multimodal Transport of freight is the "Carriage of goods by two or more modes of transport" (the term freight broadly covers, in this context: not-containerised and containerised goods, palletised goods and packages).
- Intermodal Transport of freight is "The movement of goods in one and the same loading unit or road vehicle, which uses successively two or more modes of transport without handling the goods themselves in changing modes".

With these premises, in the Imonode project the term "intermodal transport system" refers to the "transport system that offers ample opportunities and even induces an user to use at least two different modes of transport for a substantial part of the journey and in an integrated and seamless way in order to complete door-to-door transport".

The following assumptions and work hypotheses were used in the context of the present study in order to define the potential intermodal transport for fresh produce:

- a distance from source to destination over 800 km, with interim nodes every 400 km, or with the sea between nodal points;
- a weekly minimum transport volume of one block train per week (20 wagons with each wagon of 25 MT of net weight);
- existence of appropriate terminal at both end of the path.

These assumptions and hypotheses are the results of an in-deep analyses realized with the experts panel of logistics operators during the Imonode project activities.

1.3 - DEFINITION OF STUDY AREA

The geographic area of reference of the Imonode project is the so-called CADSES area of Europe (Central, Adriatic, Danubian and Southeast European Space).

In detail, this area includes the following Countries:

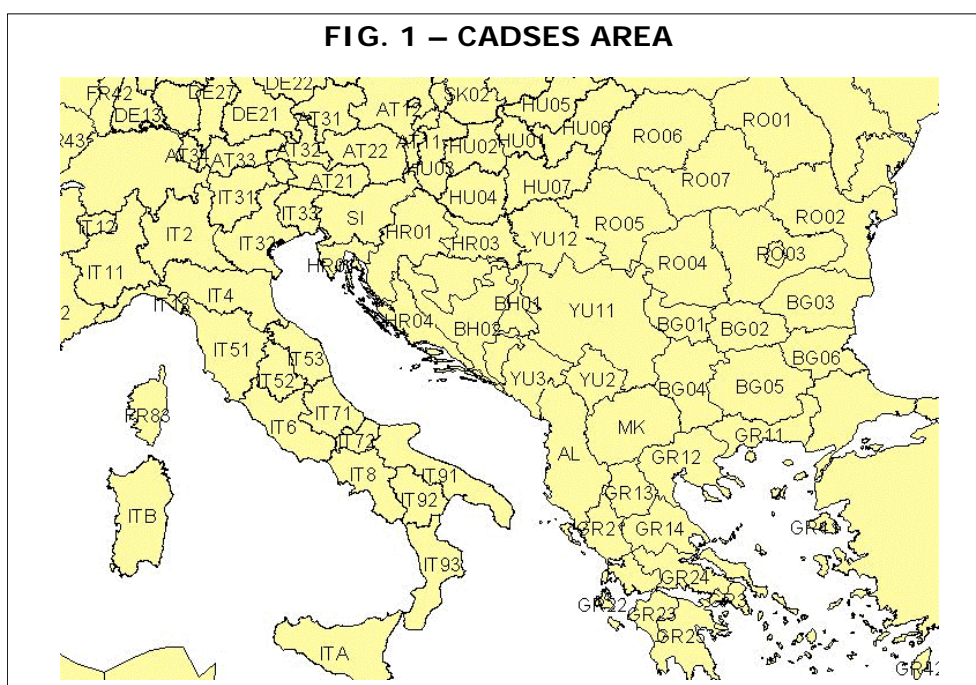
- Albania;
- Austria;
- Bosnia-Herzegovina;
- Bulgaria;
- Croatia;
- Former Yugoslav Republic of Macedonia (FYROM);
- Greece;
- Hungary;

- Italy (North and East part)³;
- Romania;
- Serbia and Montenegro;
- Slovenia.

In order to divide these Countries areas into homogeneous zones, each one of these States was subdivided into areas whose dimensions were based on administrative divisions within geographically homogeneous areas, according to the declared objectives of the project and compatible with existing divisions for which official data on perishable products are available or with the possibility to survey data suitable for the Imonode project aims in the areas not covered/surveyed. Following a detailed and careful preliminary analysis, the NUTS (**N**omenclature of **U**nits for **T**erritorial **S**tatistics) classification system was chosen as set out in EC Regulation 1059/2003, which officially sanctions this as the common statistical classification system.

In view of the logistical dynamics and distributive specifics of fresh produce such as highlighted by the preliminary analysis made in collaboration with the panel of experts of the products involved in the study, it was decided to use territorial divisions matching the NUTS 2 specifications or, for those Countries which have not yet adopted this territorial classification method, to use equivalent geographical and administrative areas. The NUTS 2 specifications has been judged to offer the best balance between the production profile and distributive demands typical of fresh produce, in terms of their transportation, with particular reference to intermodality.

EC Regulation 1059/2003 defines the territorial divisions for NUTS 2 for the Countries considered EU members. For the other Countries, territorial units equivalent to NUTS 2 were used, which are based on current administrative divisions, regional groupings used by the various national statistical offices and on analysis previously carried out (Eurostat Publication, "Statistical Regions for the EFTA Countries and CEC" published May 1999; EC Publication, "Nomenclature of territorial units for statistics, NUTS 2003", European Communities, 2003; Background report, "Strategies for Integrated Spatial Development of the Central European Danubian and Adriatic Sea" - compiled by Vision Planet for of Interreg II C, 2000).



³ Anyway, Italy was analysed as a whole in the survey realized for fresh produce. As a matter of fact, the transport chains analysis made during the first steps of the Imonode project highlighted that an investigation based just to the Eastern part of the Country would have provided underestimated results in term of flows. So it was decided to consider the whole Italian area to realize demonstrators structures projects the nearest possible to their real potentialities.

TAB. 1 - DEFINITION OF STUDY AREA

| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
|--------------------|----------------------|-----------------------------|------|
| ALBANIA | | | AL |
| | Albania | | AL |
| | | Albania | AL |
| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
| AUSTRIA | | | AT |
| | Ostoesterreich | | AT1 |
| | | Burgenland | AT11 |
| | | Niederoesterreich | AT12 |
| | | Wien | AT13 |
| | Suedoesterreich | | AT2 |
| | | Kaernten | AT21 |
| | | Steiermark | AT22 |
| | Westoesterreich | | AT3 |
| | | Oberoesterreich | AT31 |
| | | Salzburg | AT32 |
| | | Tirol | AT33 |
| | | Vorarlberg | AT34 |
| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
| BOSNIA-HERZEGOVINA | | | BH |
| | Bosnia-Herzegovina | | BH |
| | | Republika Srpska | BH01 |
| | | Federation | BH02 |
| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
| BULGARIA | | | BG |
| | Bulgaria | | BG |
| | | Northwestern Region | BG01 |
| | | Northern Central Region | BG02 |
| | | Northeastern Region | BG03 |
| | | Southwestern Region | BG04 |
| | | South Central Region | BG05 |
| | | Southeastern Region | BG06 |
| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
| CROATIA | | | HR |
| | Croatia | | HR |
| | | Central croatia | HR01 |
| | | Istria and Kvarner | HR02 |
| | | Slavonia | HR03 |
| | | Dalmatia | HR04 |
| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
| GREECE | | | GR |
| | Voreia Ellas | | GR1 |
| | | Anatoliki Makedonia, Thraki | GR11 |
| | | Kentriki Makedonia | GR12 |
| | | Dytiki Makedonia | GR13 |
| | | Thessalia | GR14 |
| | Kentriki Ellas | | GR2 |
| | | Ipeiros | GR21 |
| | | Ionia Nisia | GR22 |
| | | Dytiki Ellada | GR23 |
| | | Stereia Ellada | GR24 |
| | | Peloponnisos | GR25 |
| | Attiki | | GR3 |
| | | Attiki | GR3 |
| | Nisia Aigaiou, Kriti | | GR4 |
| | | Voreio Aigaio | GR41 |
| | | Notio Aigaio | GR42 |
| | | Kriti | GR43 |

Chapter 1

INTRODUCTION

| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
|-------------------|--------------------|-----------------------|------|
| HUNGARY | | | HU |
| | Hungary | | HU |
| | | Central Hungary | HU01 |
| | | Central-Transdanubia | HU02 |
| | | West-Transdanubia | HU03 |
| | | Southern Transdanubia | HU04 |
| | | Northern Hungary | HU05 |
| | | Northern great plain | HU06 |
| | | Southern great plain | HU07 |
| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
| ITALY | | | IT |
| | North West | | |
| | | Piemonte | IT11 |
| | | Valle d'Aosta | IT12 |
| | | Liguria | IT13 |
| | | Lombardia | IT2 |
| | North East | | |
| | | Trentino-Alto Adige | IT31 |
| | | Veneto | IT32 |
| | | Friuli-Venezia Giulia | IT33 |
| | | Emilia-Romagna | IT4 |
| | Centre | | |
| | | Toscana | IT51 |
| | | Umbria | IT52 |
| | | Marche | IT53 |
| | | Lazio | IT6 |
| | South | | |
| | | Abruzzo | IT71 |
| | | Molise | IT72 |
| | | Campania | IT8 |
| | | Puglia | IT91 |
| | | Basilicata | IT92 |
| | | Calabria | IT93 |
| | Islands | | |
| | | Sicilia | ITA |
| | | Sardegna | ITB |
| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
| FYROM | | | MK |
| | Macedonia | | MK |
| | | Macedonia | MK |
| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
| ROMANIA | | | RO |
| | Romania | | RO |
| | | North-East | RO01 |
| | | South-East | RO02 |
| | | South | RO03 |
| | | South-West | RO04 |
| | | West | RO05 |
| | | North-West | RO06 |
| | | Center | RO07 |
| | | Bucharest | RO08 |
| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
| SERBIA-MONTENEGRO | | | YU |
| | Republic of Serbia | | YU1 |
| | | Central Serbia | YU11 |
| | | AP Vojvodina | YU12 |
| | Kosovo and Metohia | | YU2 |
| | | Kosovo and Metohia | YU2 |
| | Montenegro | | YU3 |
| | | Montenegro | YU3 |
| NUTS 0 | NUTS 1 | NUTS 2 | CODE |
| SLOVENIA | | | SI |
| | Slovenia | | SI |
| | | Slovenia | SI |

1.4 - THE IMONODE CONSORTIUM

The Consortium of organisations involved in the Imonode project is formed by:

- CERTH/HELLENIC INSTITUTE OF TRANSPORT (Greece) - Lead partner;
- HELLENIC RAILWAYS ORGANISATION (Greece);
- PROODOS S.A. (Greece);
- CHAMBER OF COMMERCE OF RAVENNA (Italy);
- CHAMBER OF COMMERCE OF TARANTO (Italy);
- CHAMBER OF COMMERCE OF FORLÌ-CESENA (Italy);
- EMILIA-ROMAGNA REGION (Italy);
- VENETO REGION (Italy);
- FRIULI-VENEZIA GIULIA REGION (Italy);
- AGROTER (Italy);
- IC CONSULENTEN (Austria);
- GOVERNMENT OF CARINTHIA (Austria);
- BMVIT/MINISTRY OF TRANSPORT INNOVATION AND TECHNOLOGY (Austria);
- MINISTRY OF THE ENVIRONMENT, SPATIAL PLANNING AND ENERGY - NATIONAL OFFICE FOR SPATIAL PLANNING (Slovenia);
- MINISTRY OF ECONOMY (Slovenia);
- TRANSPORT LOGISTIC CLUSTER - TLG (Slovenia);
- MUNICIPALITY OF CELJE (Slovenia);
- COUNTRY OF PRIMORJE & GORSKI KOTAR (Croatia);
- COUNTRY INSTITUTE FOR SUSTAINABLE DEVELOPMENT AND SPATIAL PLANNING (Croatia).

1.5 - GLOSSARY AND DEFINITIONS

Cluster: it is a geographic concentration of interconnected companies, specialized suppliers, services providers, and associated institutions in a particular field that are present in a nation or region. Clusters arise because they increase the productivity with which companies can compete⁴.

Conventional full travel: the on field analysis made with the experts panel fixed that a lorry conventional full travel as a tractor+trailer of 33 pallets (height of 220 cm).

Conventional pallet: the on field analysis made with the experts panel fixed that a conventional pallet at 600 kg⁵ (gross weight) for fresh produce. So a full travel via lorry is 19,8 MT (gross weight) of fresh produce.

Concentration platform: structure used by producers/logistics operators to gather and delivery perishables to other facilities, to rationalize and increase logistics efficiency especially for road-road traffic.

Cross docking: an operation in which pallets are received on the loading door of the structure and then transferred to another loading door without any ground touch.

Distribution centre: private logistics platform owned by retail chains (multiples) or logistics providers destined to gather and to delivery perishables to other facilities or points of sale (supermarkets, for example).

Groupage: a management operation of pallets in the picking area or within the cross docking operation to optimise transport lines.

⁴ "On competition", Michael E. Porter, Harvard Business School.

⁵ This is an average weight in consideration of the different kind of fruit and vegetables in transport:

- nearly 500 kg for salads;
- nearly 700 kg for apples, pears, peaches and nectarines, table grape, kiwifruits and oranges;
- nearly 1.000 kg for potatoes, onions, tomatoes and carrots.

Interport: logistics platform used to rationalize and increase logistics efficiency especially for road-road traffic but in some case also for road-rail traffic. It could be defined as an area in which different transport related companies - such as forwarders, logistics service providers, etc. - are established. An interport is a transshipment area where, ideally, at least two transport modes are connected. Usually these transport modes consist of road and rail, but waterborne and air transport can also be integrated into this concept.

Lorry saturation: it is the percentage of the lorry full cargo utilised in the journey. The analysis made on field with the help of the specific experts panel highlighted as prudential and acceptable in CADSES area an average lorries saturation (domestic plus export/import travel) of 60-80% of the lorry full cargo (i.e. 19,8 MT/lorry), avoiding any consideration with regard to the fact that the return journey saturation is managed with other goods also non-perishables. 60% is the average saturation for return journey while 80% is for outward journey.

Picking: an operation in which pallets are received on the loading door of the structure, deposited in the picking area and reloaded within 24 hours from the receiving.

Reefer container terminal: terminal or part of container terminal specialized in the management of reefer container, equipped with plugs able to maintain active the refrigerating power of the container. They can provide or not provide areas for cross docking, picking and storage activities.

Reefer terminal: specialised terminal in the loading and unloading operations for perishable products. They provide - in the area of back docks - refrigerated areas for cross docking, picking and storage activities. Also the dock equipments are specific, in consideration of the possibility to realize loading and unloading of reefer shipments.

Short storage: an operation devoted to the storage for limited time of products waiting to be marketed or forwarded to the final destination market.

Transport line: it is the path from origin - included middle course stops - to destination/destinations following the scheduled sequence.

Wholesale market/Agro-industrial centres: logistics structures with the aim to gather and re-distribute perishables (fruit and vegetables especially). These are the "meeting place" of wholesalers, importers, exporters, retailers and small transporters/hauliers.

Chapter 2

FRESH PRODUCE LOGISTICS CHAINS AND FLOWS IN CADSES AREA

2.1 - FRUIT AND VEGETABLES FLOWS IN CADSES AREA

2.1.1 - FRESH PRODUCE TRAFFIC VOLUMES

The main objective of the logistics flows analysis was to highlight the fruit and vegetables traffic volumes in the reference period (i.e. 2000-2001) coming from the trade among the different NUTS 2 located in CADSES area as well as the volume of transit in the NUTS 0/1⁶ considered arising out of the trade among other Countries (where at least one of the parties is a Country included in CADSES area)⁷.

With this goal in mind, for each NUTS 0/1 located in CADSES area, the analysis made with a origin/destination matrix - such as reported in Appendix A.1 - was based on 4 different flows:

- internal flows among NUTS 2 located in the same NUTS 0/1;
- import from other Countries of each NUTS 2 located in the NUTS 0/1 in analysis;
- exports to other Countries of each NUTS 2 located in the NUTS 0/1 in analysis;
- transit flows within the NUTS 0/1.

The results of this analysis highlighted that the main exporting NUTS 2 are located in Italy, Greece, Austria, Hungary and Romania, while the main importing NUTS 2 are different but in the same way located in Italy, Greece, Austria, Romania and Hungary.

The analysis developed at NUTS 2 level highlighted that Puglia, Emilia-Romagna, Trentino-Alto Adige, Veneto, Peloponnisos and Kentriki Makedonia are the main exporting NUTS 2 in CADSES area, while Lombardia, Attiki, Veneto, Puglia and Emilia-Romagna are the main importing NUTS 2.

**TAB. 2 - MAIN EXPORTING AND IMPORTING NUTS 2
IN CADSES AREA - FRESH PRODUCE (in MT)**

| CODE | NUTS 2 | EXPORT | CODE | NUTS 2 | IMPORT |
|------|----------------------|-----------|------|-----------------------|-----------|
| ITA | Sicilia | 1.925.682 | IT2 | Lombardia | 1.815.637 |
| IT91 | Puglia | 1.764.015 | GR3 | Attiki | 1.526.230 |
| IT4 | Emilia-Romagna | 1.497.297 | IT8 | Campania | 837.691 |
| IT31 | Trentino-Alto Adige | 1.146.812 | IT6 | Lazio | 824.404 |
| IT93 | Calabria | 1.142.840 | IT51 | Toscana | 705.223 |
| IT8 | Campania | 921.431 | IT11 | Piemonte | 688.148 |
| GR25 | Peloponnisos | 755.545 | IT32 | Veneto | 564.214 |
| GR12 | Kentriki Makedonia | 582.860 | IT91 | Puglia | 561.067 |
| IT32 | Veneto | 541.617 | ITA | Sicilia | 555.283 |
| GR23 | Dytiki Ellada | 496.211 | IT4 | Emilia-Romagna | 510.128 |
| AT12 | Niederösterreich | 472.215 | RO08 | Bucharest | 396.312 |
| IT71 | Abruzzo | 449.521 | HU01 | Central Hungary | 354.490 |
| HU06 | Northern Great Plain | 429.583 | IT13 | Liguria | 350.746 |
| GR24 | Sterea Ellada | 315.482 | AT13 | Wien | 337.992 |
| GR43 | Kriti | 294.166 | IT93 | Calabria | 286.758 |
| HU07 | Southern Great Plain | 273.943 | GR12 | Kentriki Makedonia | 275.908 |
| RO07 | Center | 273.212 | RO02 | South-East | 269.103 |
| BG05 | South Central Region | 272.662 | IT53 | Marche | 240.558 |
| IT6 | Lazio | 264.779 | IT33 | Friuli-Venezia Giulia | 231.183 |
| IT92 | Basilicata | 241.346 | ITB | Sardegna | 230.296 |

⁶ Where NUTS 0/1 highlights the Country, such as reported in detail in TAB. 1 for CADSES area.

⁷ The detailed methodology regarding the fresh produce flows and paths analyses is reported in the Appendix A.1 of this publication.

Chapter 2

FRESH PRODUCE LOGISTICS CHAINS AND FLOWS IN CADSES AREA

In the same way, the analysis highlighted that Puglia, Emilia-Romagna, Lombardia, Attiki, Trentino-Alto Adige, Veneto, Kentriki Makedonia, Peloponnisos and Niederoesterreich are the main NUTS 2 of CADSES area in terms of fresh produce handling volumes (export+import) in the reference period.

Puglia and Emilia-Romagna are the only two NUTS 2 in CADSES area able to handle (outgoing and incoming flows) more than 2.000.000 MT of fruit and vegetables in the average period 2000-2001.

Moreover, the analysis highlighted that there are another NUTS 2 able to handle more than 2.000.000 MT of fresh produce in the reference period. It is Sicilia. This region is outside CADSES area but strictly connected with road paths considered in the analyses reported in this publication (i.e. those along Adriatic-Ionian corridor).

**TAB. 3 - TOTAL FRESH PRODUCE HANDLING:
THE MAIN NUTS 2 IN CADSES AREA (in MT)**

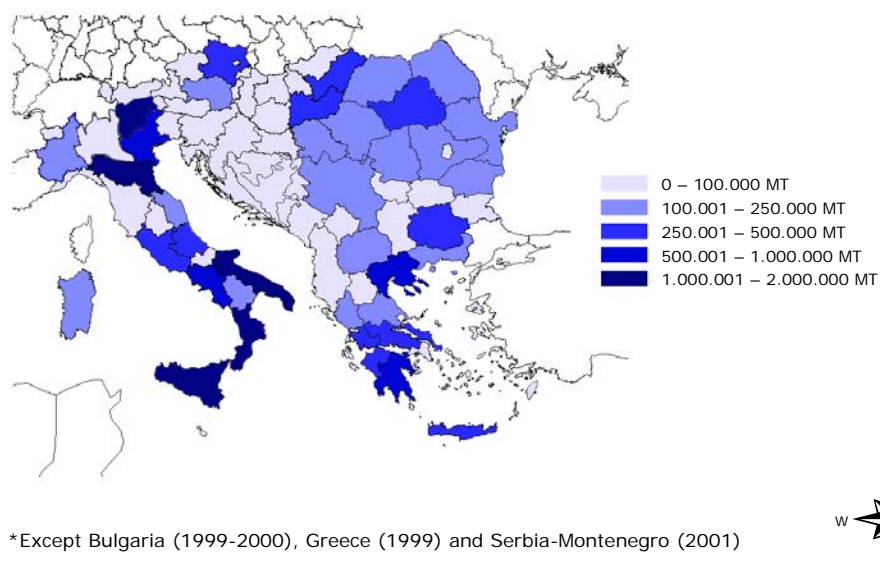
| CODE | NUTS 2 | EXPORT | IMPORT | TOTAL |
|------|----------------------|-----------|-----------|-----------|
| ITA | Sicilia | 1.925.682 | 555.283 | 2.480.965 |
| IT91 | Puglia | 1.764.015 | 561.067 | 2.325.083 |
| IT4 | Emilia-Romagna | 1.497.297 | 510.128 | 2.007.425 |
| IT2 | Lombardia | 9.729 | 1.815.637 | 1.825.366 |
| IT8 | Campania | 921.431 | 837.691 | 1.759.122 |
| GR3 | Attiki | 4.838 | 1.526.230 | 1.531.069 |
| IT93 | Calabria | 1.142.840 | 286.758 | 1.429.598 |
| IT31 | Trentino-Alto Adige | 1.146.812 | 173.081 | 1.319.893 |
| IT32 | Veneto | 541.617 | 564.214 | 1.105.831 |
| IT6 | Lazio | 264.779 | 824.404 | 1.089.183 |
| IT11 | Piemonte | 175.187 | 688.148 | 863.335 |
| GR12 | Kentriki Makedonia | 582.860 | 275.908 | 858.767 |
| GR25 | Peloponnisos | 755.545 | 36.060 | 791.605 |
| IT51 | Toscana | 0 | 705.223 | 705.223 |
| AT12 | Niederoesterreich | 472.215 | 169.344 | 641.559 |
| IT71 | Abruzzo | 449.521 | 190.430 | 639.951 |
| GR23 | Dytiki Ellada | 496.211 | 68.187 | 564.398 |
| RO02 | South-East | 235.336 | 269.103 | 504.439 |
| HU06 | Northern Great Plain | 429.583 | 70.223 | 499.807 |
| RO07 | Center | 273.212 | 163.626 | 436.839 |
| ITB | Sardegna | 199.450 | 230.296 | 429.746 |
| RO01 | North-East | 240.486 | 169.213 | 409.699 |
| RO08 | Bucharest | 5.342 | 396.312 | 401.655 |
| GR24 | Stereia Ellada | 315.482 | 86.107 | 401.589 |

In the following page it is presented in form of GIS maps for each NUTS 2:

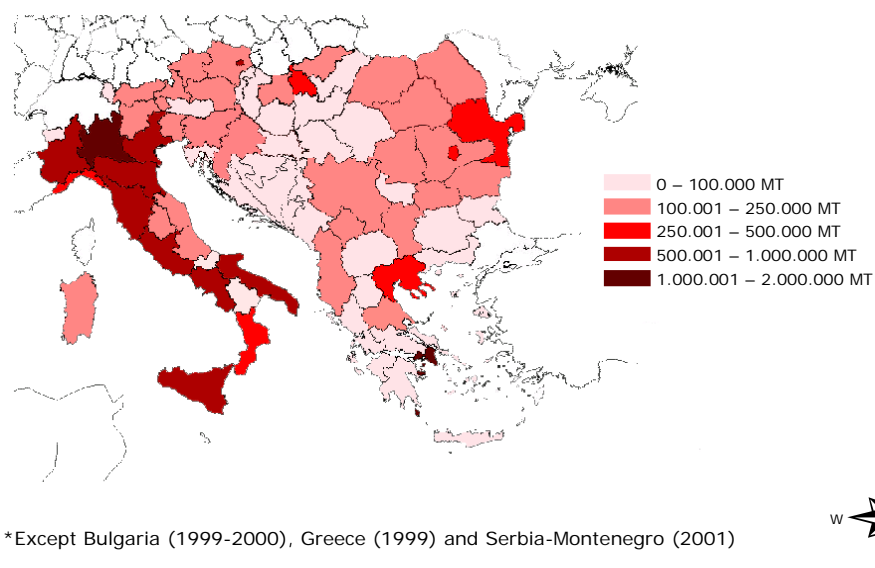
- outgoing flows;
- incoming flows.

In the GIS maps, the export and import potential for fresh produce in each NUTS 2 areas are indicated by different colours and shades to highlight different range of volumes and potentialities.

**FIG. 2 - FRESH PRODUCE: TOTAL OUTGOING FLOWS
(MT in 2000-2001 *)**



**FIG. 3 - FRESH PRODUCE: TOTAL INCOMING FLOWS
(MT in 2000-2001 *)**



2.1.2 - LOGISTICS CHAINS IN CADSES AREA

To completely identify the existing physical logistics chains for fresh produce present in CADSES area, the Imonode Consortium decided to realize an in deep qualitative analysis using the experience of the involved parties integrated on the basis of a focus group analysis with the experts panel⁸. From the in deep analysis emerged a huge presence of different real situations due to a big fragmentation in all stages of the supply chain that determine a number of specific cases however referable to a few number of basic logistics chains.

So, the fresh produce basic logistics chains present in CADSES area for fresh produce was identified and presented in summary form in the following pages to highlight the single peculiarities and so verify the possibility to develop an intermodal connection in the trade of fresh produce.

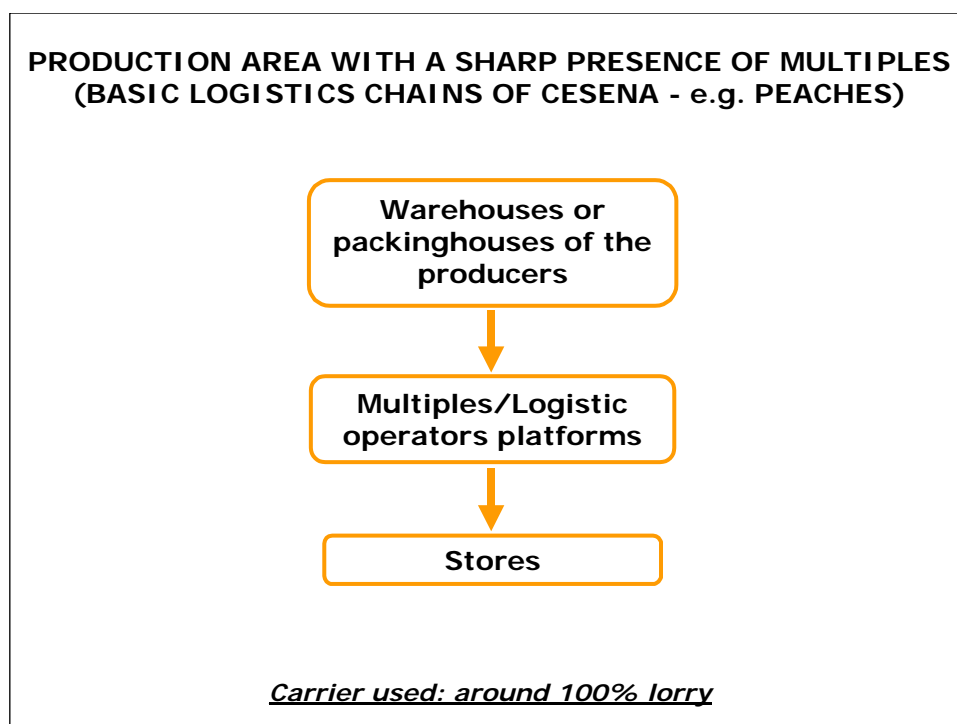
The figures presented are the basic logistics chains for fruit and vegetables while the real ones are frequently integration of the basic ones.

During the analysis the Imonode Consortium identified that the logistics chains of fruit and vegetables products vary greatly depending on two key factors:

- the area is a producer or an importer of the product category;
- the distribution of the product category is delegated in prevalence to multiples or traditional trade.

2.1.2.1 - Production area with a sharp presence of multiples

Generally, in this case, Producers Organizations (co-operative, consortium, etc.) fill orders from multiples delivering fruit and vegetables to the logistics platforms directly managed by multiples or by logistics operators. These platforms distribute fruit and vegetables to the stores.



⁸ Ref. note n. 1.

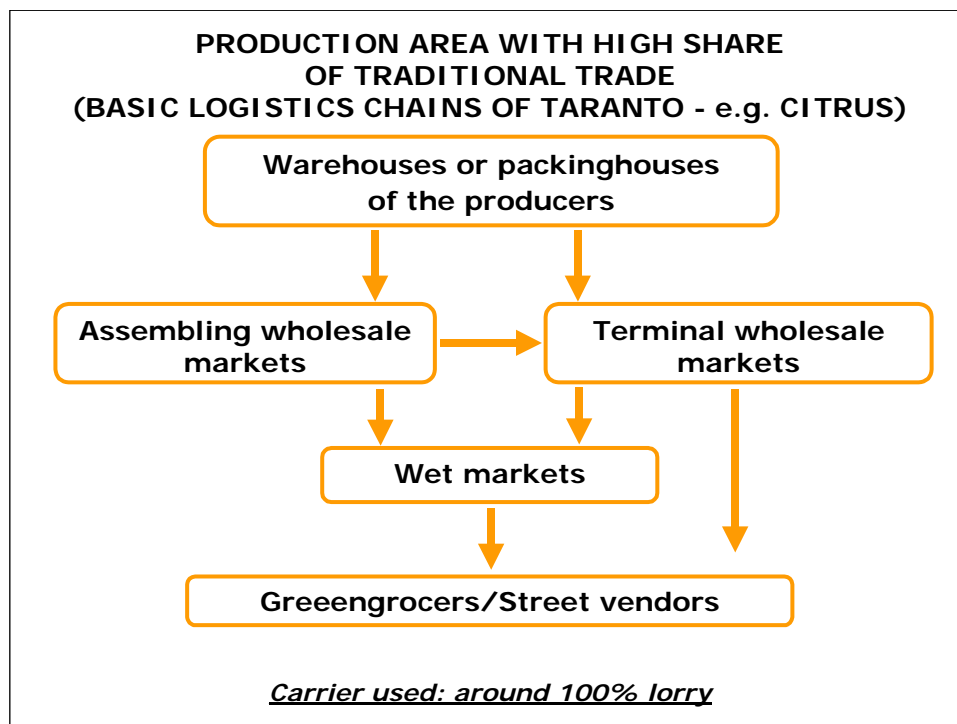
2.1.2.2 - Production area with high share of traditional trade

The usual pattern of this kind of logistics chain is made up of two level of brokers/middlemen:

- a first level that could be an assembling or a terminal wholesale market.
 - in the first case, the purpose is to concentrate local producers goods;
 - in the second case, the aim is to supply local wholesalers and retailers with a complete products range;
- a second wet market with the purpose of supplying local greengrocers or consumers directly.

Generally, however, there are two commercial and logistics transactions between production and retail.

Seldom there is only one transaction and sometimes there are three.

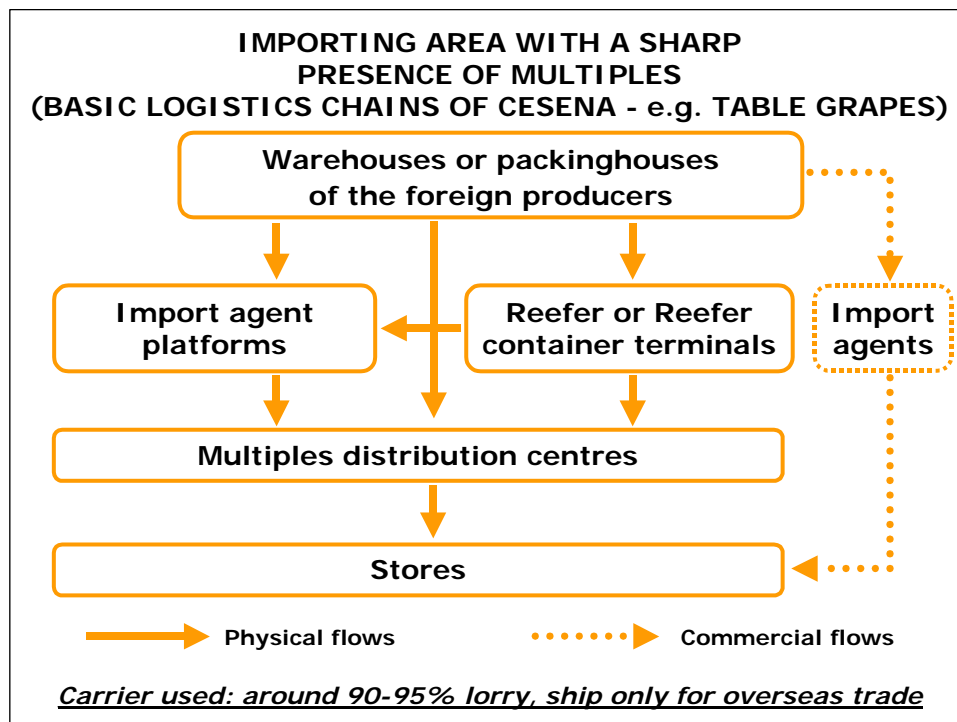


2.1.2.3 - Importing area with a sharp presence of multiples

In this case, normally among foreign producers (warehouses or packinghouses) and multiples (distribution centres) there is an import agent which has generally only a trading function but does not act as a logistics provider.

Sometimes the import agent directly operates a logistics platform instead of the multiples one. Therefore the logistics platform of the import agent supplies the multiples stores.

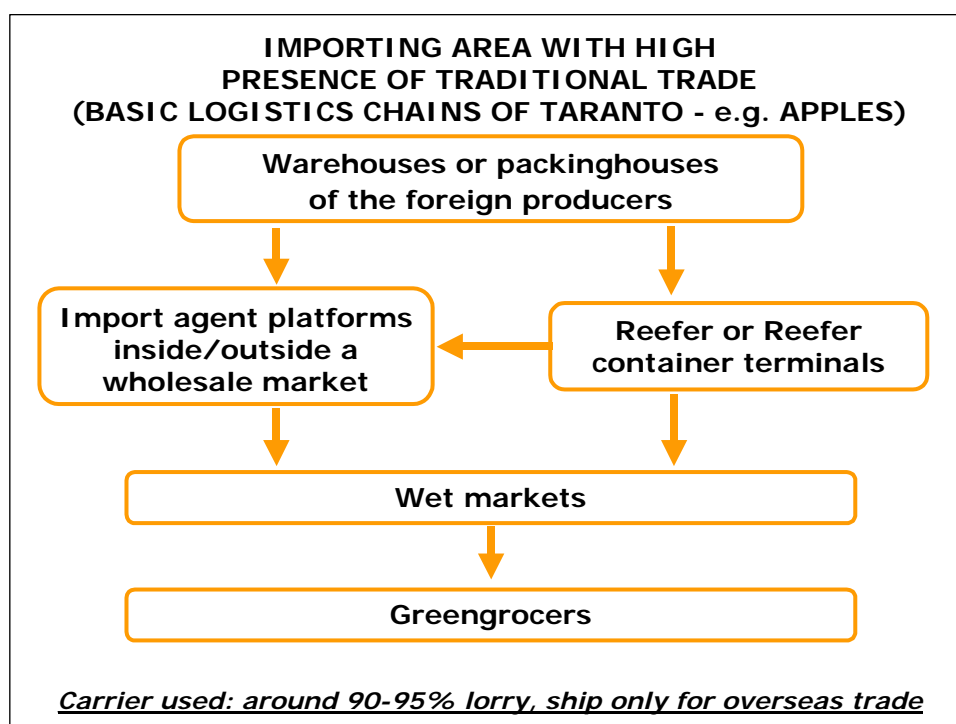
In other cases, the warehouses of the foreign producers supply directly the multiples distribution centres.



2.1.2.4 - Importing area with high presence of traditional trade

In this case, there is an import agent that directly operates a logistics platform located inside a wholesale market or in an autonomous site. This platform usually supplies the wet markets having the role of provisioning traditional greengrocers.

There are generally two/three commercial and logistics transactions between producers and greengrocers.



2.1.3 - PATHS

From the logistics chains analysis emerged that presently with regard to fresh produce the usage of intermodality is almost all limited to the ship-lorry connection, and just where needed (i.e. in the situation in which destination and source are divided by long crossing distance by sea and where there are not easy ways by road to connect source area to destination area⁹). It is the case of the product from the southern part of the Mediterranean Sea (i.e. North Africa and Middle East) to the European Market, or products from Greece to the Northern and Central Europe. But, also in these cases, the route by sea is limited to the bare necessities, preferring the faster road route for the greater part of the way (where possible).

Moreover, within fruit and vegetables system, the road-train connection is hardly ever used, and where it is utilised it is for case histories than for development of best practices to develop this kind of intermodality, because the case histories are determined by particular situation not easy to be repeated.

⁹ In this context it is import to underline that the experts panel for trade and transport of fresh produce highlighted that the road connections are basically preferred even if the road routes are longer than those by sea.

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For these reasons, considering that almost all the trade of fresh produce within CADSES area are made by lorry, as emerged from the study of physical logistics chains and confirmed by several bibliographical refers¹⁰, the analysis of the paths have been concentrated to the road traffic to determine which are the main ones in terms of transit¹¹ for fruit and vegetables in the reference area.

This part of the analysis highlighted that in the reference period the main routes of transport for fresh produce in CADSES area - in terms of transit volumes - are located in Italy, Austria and Greece, both such as transit routes from origin to destination NUTS 2 and such as routes within the origin/destination NUTS 2.

The first routes outside these Countries are located in Serbia and FYR of Macedonia, mainly such us transit routes for the international traffic that moves from Greece to Austria and Northern Europe.

In particular, the analysis highlighted 43 road segments with more than 365.000 MT of flows per year, with an average of more than 1.000 MT per day.

Pursuing in the analysis, such as reported in the following table, emerged that the main routes in CADSES area are:

- the routes from South Italy to Germany: A14/E55 highway that starting in the deep South of Italy (in the Puglia Region - IT91) crosses all the Adriatic coast of Italy (Adriatic-Ionian Corridor) to Bologna, where it merges in A1/E35 to Modena and then it takes the A22/E45 to Brennero; in this point it crosses the Austria/Italy border to Innsbruck (E45) and goes to Kufstein where it crosses the Germany/Austria border;
- the routes from Greece (Peloponnisos across Athens to Thessaloniki) to North Europe across the Corridor X (Greece, FYR of Macedonia, Serbia, Croatia, Slovenia and Austria);
- the routes that connect the Northeastern part of Italy to the border line Austria/Italy (Tarvisio).

The traffic volumes emerging from the analysis confirmed the first assumption of the project and highlighted the necessity to verify the needs in terms of integration among CADSES area Countries to improve the logistics activities (transport, handling, etc.) for fresh produce that for their peculiarities need a state-of-the-art logistics system to reduce any waste of time and so to an higher level of freshness of the products subject of transport.

In particular, apparently the volume of transit in some of the highlighted routes call for an increase of a better integration in transport activities among Countries in CADSES area and also among different types of carriers to reduce the impact of the number of lorries on the streets and develop a new sustainability in the traffics. This integration has been verified in deep as reported in the following Paragraphs.

¹⁰ Such as demonstrated by several analysis made in the past (among which a research made by Roberto Della Casa and Giovanni Scola Gagliardi of the research institute Nomisma in 1991 for the Italian magazine *Largo Consumo* on the fresh produce transport in Europe and titled *"L'ortofrutta viaggia ancora on the road"*; a survey of Censis in 1998 about a development of a logistic platform in the area of Cesena titled *"Cesena piattaforma logistica. Soggetti e processi per la verifica di una ipotesi di sviluppo"*, that highlight the transport by road in the main European Countries; a study on the future trends of transportation in Italy realized by CSST in 1998 and titled *"Prospettive del trasporto merci a medio lungo termine in Italia"*; a study realized in 2003 by MCC on the Italian transport system and titled *"Talking about a revolution"* and a study realized by Confetra on the *"European Transport of Goods"*) and confirmed by the Imonode Consortium experience on perishable agro-food market and by the verification with the specific experts panel.

¹¹ A = Motorways; SS = First grade roads; SP = Second grade roads; SC = Third grade roads.

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**TAB. 4 - MAIN PATHS USED IN THE FRESH PRODUCE TRANSPORT
IN CADSES AREA (in MT)**

| ROUTE | ROAD | FRUIT | VEGETABLES | TOTAL | LOCATION |
|-----------------------------------|------------------|-----------|------------|-----------|---------------|
| Modena - Bologna | A1/E35 | 2.924.481 | 1.983.407 | 4.907.888 | ITALY |
| Modena - Verona | A22/E45 | 1.975.760 | 1.206.306 | 3.182.066 | ITALY |
| Verona - Trento | A22/E45 | 2.044.877 | 1.025.076 | 3.069.953 | ITALY |
| Brennero - Bolzano | A22/E45 | 1.438.489 | 943.628 | 2.382.116 | ITALY |
| Bolzano - Trento | A22/E45 | 1.438.489 | 943.628 | 2.382.116 | ITALY |
| Brennero - Innsbruck | E45 | 1.438.489 | 943.628 | 2.382.116 | AUSTRIA |
| Kufstein - Innsbruck | E45 | 1.357.224 | 918.095 | 2.275.319 | AUSTRIA |
| Ancona - Giulianova | A14/E55 | 1.090.648 | 831.183 | 1.921.832 | ITALY |
| Bologna - Cesena | A14/E45 | 1.066.254 | 835.785 | 1.902.039 | ITALY |
| Cesena - Ancona | A14/E55 | 1.046.512 | 822.235 | 1.868.747 | ITALY |
| Parma - Modena | A1/E35 | 948.721 | 777.101 | 1.725.822 | ITALY |
| Giulianova - Termoli | A14/E55 | 951.318 | 558.603 | 1.509.921 | ITALY |
| Termoli - Foggia | A14/E55 | 945.037 | 518.400 | 1.463.438 | ITALY |
| Lamia - Athina | A1/E75 | 843.515 | 518.331 | 1.361.846 | GREECE |
| Foggia - Bari | A14/E55 | 846.607 | 447.151 | 1.293.758 | ITALY |
| Larissa - Lamia | A1/E75 | 847.565 | 425.780 | 1.273.345 | GREECE |
| Venezia - Padova | A4/E70 | 680.005 | 358.543 | 1.038.549 | ITALY |
| Thessaloniki - Larissa | A1/E75 | 712.756 | 298.841 | 1.011.597 | GREECE |
| Korinthos - Athina | A1/E94 | 538.575 | 429.813 | 968.388 | GREECE |
| Korinthos - Tripoli | A/E65 | 523.251 | 213.750 | 737.001 | GREECE |
| Bari - Potenza | SP96 | 402.162 | 279.106 | 681.268 | ITALY |
| Venezia - Udine | A4/E70 + A23/E55 | 414.674 | 248.452 | 663.126 | ITALY |
| Bologna - Firenze | A1/E35 | 406.110 | 248.164 | 654.274 | ITALY |
| Wien - Graz | E59 | 347.142 | 261.128 | 608.270 | AUSTRIA |
| Padova - Bologna | A13 | 371.408 | 202.642 | 574.050 | ITALY |
| Beograd - Cicevac | A1/E75 | 297.392 | 261.217 | 558.610 | SERBIA |
| Cicevac - Nis | A1/E75 | 295.399 | 255.943 | 551.342 | SERBIA |
| Tarvisio - Udine | A23/E55 | 343.739 | 159.642 | 503.381 | ITALY |
| Linz - Wien | E60 | 159.666 | 339.726 | 499.392 | AUSTRIA |
| Klagenfurt - Villach | E68 | 339.429 | 156.064 | 495.492 | AUSTRIA |
| Graz - Klagenfurt | E66 | 321.662 | 172.694 | 494.356 | AUSTRIA |
| Verona - Padova | A4/E70 | 314.485 | 158.125 | 472.609 | ITALY |
| Budapest - Szeged | M5/E75 + SS5 | 146.884 | 305.933 | 452.818 | HUNGARY |
| Brasov - Ploiesti | SS1/E60 | 47.396 | 391.597 | 438.993 | ROMANIA |
| Kumanovo - Skopje | A1/E75 | 277.393 | 145.963 | 423.356 | FYR MACEDONIA |
| L'Aquila - Giulianova | A24 + SP150 | 139.795 | 282.769 | 422.565 | ITALY |
| Milano - Verona | A4/E64 | 306.788 | 102.472 | 409.260 | ITALY |
| Kumanovo - Nis | SS1 + A1/E75 | 260.257 | 138.066 | 398.323 | SERBIA |
| Veles - Skopje | A1/E75 | 288.432 | 104.595 | 393.027 | FYR MACEDONIA |
| Bosanska Gradiska - Zagreb | A4/E70 | 191.656 | 185.289 | 376.946 | CROATIA |
| Bosanski Brod - Bosanska Gradiska | A4/E70 | 182.237 | 193.451 | 375.688 | CROATIA |
| Buzau - Ploiesti | SS1B | 38.553 | 329.799 | 368.352 | ROMANIA |
| Gyor - Budapest | M1/E60/E75 | 126.760 | 238.238 | 364.998 | HUNGARY |

2.2 - FRESH PRODUCE TLTs IN CADSES AREA

To complete the supply chain analysis for fresh produce in CADSES area, the Imonode Consortium analysed also the Transport and Logistics Terminals (TLTs) typologies identified in the previous pages:

- Wholesale Markets/Agro-industrial centres;
- Distribution Centres;
- Interports;
- Reefer terminals and reefer container terminals (ports).

Reefer terminal and reefer container terminal in airports are not analysed considering that they handle a really marginal share of fruit and vegetables, even if in increase. A volume that it is not

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relevant for the target of the Imonode project and considering that the cost of air transport is justified just for high added value products and only in the case where the transport with other means is really hard when not impossible, due to perishability of the products.

Once the different kinds of nodes under analysis have been identified, in order to select the main areas/nodes used by the operators, it was necessary to:

- analyse the information collected by flows survey (coming from the origin/destination matrix), to identify the main nodal areas for fresh produce trade (i.e. NUTS 2 with an average of outgoing+incoming flows of fresh produce of about 250.000 MT/year that means about 1.000 MT/day without seasonality). Moreover, to extend the analysis to an higher number of NUTS 2 it was selected also NUTS 2 with a traffic of 200.000-250.000 MT/year;
- identify the main nodal points for fruit and vegetables handling on the basis of the classification above mentioned;
- verify the data with the specific experts panel of operators and users of logistics services.

Once identified the NUTS 2 with more than 200.000 MT/year of traffic flows it was refined the selection picking up:

- NUTS 2 in proximity of Corridor X, Corridor V and Adriatic-Ionian Route;
- with regard to NUTS 2 without a short connection with the mentioned corridors just those NUTS 2 with interesting traffic flow in export or/and in import (it is the case of Romania and Bulgaria).

With refer to Distribution Centres, the selection has been made on the basis of statistical data regarding distribution system of each NUTS 0/1 in analysis. So, on the basis of the available ranking from the main statistical institution of the retail system in each NUTS 0/1 of CADSES area and for the Countries without any official ranking, with information collected through desk analysis, the Imonode Consortium selected the top retail chains (for a total of 32 in Cadses area) in terms of turnover and analysed the Distribution Centres of these chains.

These steps provide the possibility to outline a map enough detailed of the main nodes used for the traffic of fresh produce within the areas of interest.

In the following pages will be highlighted the main information - collected with a direct survey to the TLTs through a questionnaire, own integrations on public statistics¹² and direct on field surveys of the main public transport logistics nodes selected for the analysis. The data reported refer to the period 2001-2003.

CAAB MERCATI (AGRO-INDUSTRIAL CENTRE OF BOLOGNA - I)

| | | | |
|---|-------|--|--|
| Address: Via Paolo Canali, 1 - BOLOGNA - ITALY - Web site: www.caabmercati.it | | | |
| TOTAL AREA | | WORKING HOURS | |
| 352.000 sq.m | | 11 hours/day - 6 days/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 340.000 MT (99,9% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 6 km | 8.000 sq.m | |
| Closest railway | 6 km | 15 loading docks/doors | |
| Closest sea/river port | 80 km | 15 unloading docks/doors | |
| Closest airport | 15 km | PICKING AREA | |
| Closest custom | 10 km | | |
| Closest phytosanitary office | 0 km | | |
| EQUIPMENT | | INFORMATION SERVICES | |
| 60 forklifts | | Track & Tracing | |
| 1 bar code scanners | | RFID or bar code for recognize boxes/pallets | |
| 80 transpallets | | Phone, fax, internet | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Phytosanitary service | | Quality control | |
| Packing | | Labelling | |

¹² CEI - Wholesale Markets Foundation, World Union of Wholesale Markets - WUWM and direct survey on the TLTs web sites.

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MAAP PADOVA (AGRO-INDUSTRIAL CENTRE OF PADOVA - I)

| | | | |
|---|--------|-------------------------------|--|
| Address: Corso Stati Uniti, 50 - PADOVA - ITALY - Web site: www.maap.it | | | |
| TOTAL AREA | | WORKING HOURS | |
| 200.000 sq.m | | 6,5 hours/day - 6 days/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 285.000 MT (95% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 1 km | 20.000 sq.m | |
| Closest railway | 6 km | 58 loading docks/doors | |
| Closest sea/river port | 30 km | 58 unloading docks/doors | |
| Closest airport | 40 km | | |
| Closest custom | 0,5 km | PICKING AREA | |
| Closest phytosanitary office | 0 km | | |
| EQUIPMENT | | INFORMATION SERVICES | |
| Forklifts | | Phone, fax, internet | |
| Transpallets | | | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Custom services | | Quality control | |
| Phytosanitary services | | Telematics connection | |
| Packing | | Maintenance/repair facilities | |
| Labelling | | | |

REGIONALNA VELETRZNICA BENKOVAC (WHOLESALE MARKET OF BENKOVAC - HR)

| | | | |
|---|--------|---|--|
| Address: Benkovacke bojne, 17 - BENKOVAC - CROATIA - Web site: www.veletrznica.mps.hr | | | |
| TOTAL AREA | | WORKING HOURS | |
| n.a. | | 8 hours/day - 5 days/week (in some periods 6 days/week) | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| n.a. | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 3 km | 3.144 sq.m | |
| Closest railway | 0,5 km | 18.015 cu.m | |
| Closest sea/river port | 25 km | | |
| Closest airport | 30 km | | |
| Closest custom | 30 km | PICKING AREA | |
| Closest phytosanitary office | 35 km | | |
| EQUIPMENT | | INFORMATION SERVICES | |
| 6 forklifts | | Phone, fax, internet | |
| Fruit sorting equipment | | | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Maintenance/repair facilities | | | |

CONSORZIO CENTRO AGRO-ALIMENTARE FASANO (AGRO-INDUSTRIAL CENTRE OF FASANO - I)

| | | | |
|---|-------|---|--|
| Address: Contrada S.Angelo - FASANO (BR) - ITALY - Web site: www.agralfasano.it | | | |
| TOTAL AREA | | WORKING HOURS | |
| 20.000 sq.m | | 12 hours/day - 5 days/week and 7 hours/day - 1 day/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 127.000 MT (100% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 53 km | 3.780 sq.m | |
| Closest railway | 3 km | | |
| Closest sea/river port | 52 km | PICKING AREA | |
| Closest airport | 52 km | 16.000 sq.m | |
| Closest custom | 52 km | Inside cold store (35 sq.m per box)/open air square | |
| Closest phytosanitary office | 2 km | Unity of picking: single boxes, pallets and blints | |
| EQUIPMENT | | INFORMATION SERVICES | |
| Forklifts | | Phone, fax, internet | |
| Transpallets | | | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Phytosanitary service | | Quality control | |
| Labelling | | Telematics connection | |

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SH.A. DINAMO (WHOLESALE MARKET OF TIRANA - AL)

| | | | |
|--|-------|--|--|
| Address: Rr. "Ferit Xhajko" - TIRANA - ALBANIA | | | |
| TOTAL AREA | | WORKING HOURS | |
| 50.000 sq.m | | 24 hours/day - 7 days/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 16.000 MT* (80% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | - | 10.000 sq.m (not refrigerated) | |
| Closest railway | 1 km | | |
| Closest sea/river port | 35 km | | |
| Closest airport | 20 km | | |
| Closest custom | 5 km | PICKING AREA | |
| Closest phytosanitary office | 5 km | Outside cold store (unity of picking: pallets) | |
| EQUIPMENT | | INFORMATION SERVICES | |
| 5 forklifts | | Phone, fax | |
| 5 transpallets | | | |
| CRITICAL IMMATERIAL SERVICES | | | |

* estimated

PIATA DE GROS BUCURESTI S.A. - PGB (WHOLESALE MARKET OF BUCHAREST - RO)

| | | | |
|--|--------|----------------------------|--|
| Address: 132 Metalurgiei Blvd. Bucharest, Sector 4 - BUCHAREST- ROMANIA - Web site: www.pgb.ro | | | |
| TOTAL AREA | | WORKING HOURS | |
| 160.000 sq.m | | 10 hours/day - 6 days/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 262.800 MT* (90%* of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 25 km | 13.500 cu.m | |
| Closest railway | 15 km | | |
| Closest sea/river port | 300 km | | |
| Closest airport | 30 km | | |
| Closest custom | n.a. | PICKING AREA | |
| Closest phytosanitary office | n.a. | | |
| EQUIPMENT | | INFORMATION SERVICES | |
| Forklifts | | Phone, fax, internet | |
| Walkie High Lift Trucks | | | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Custom service | | Quality control | |
| Phytosanitary service | | Fuel station | |

* estimated

ORGANIZATION OF ATHENS CENTRAL MARKET (WHOLESALE MARKET OF ATHENS - GR)

| | | | |
|---|-------|----------------------------|--|
| Address: Kennedy Street & Pyrgou Street, 18233, Ag Ioannis Renti - ATHENS - GREECE Web site: www.okaa.gr | | | |
| TOTAL AREA | | WORKING HOURS | |
| 300.000 sq.m | | 10 hours/day - 5 days/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 264.000 MT (80% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 0 km | Yes | |
| Closest railway | 1 km | | |
| Closest sea/river port | 6 km | | |
| Closest airport | 30 km | | |
| Closest custom | n.a. | PICKING AREA | |
| Closest phytosanitary office | n.a. | | |
| EQUIPMENT | | INFORMATION SERVICES | |
| | | Phone, fax, internet | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Phytosanitary service | | Fuel station | |
| Telematics connection | | | |

Chapter 2

FRESH PRODUCE LOGISTICS CHAINS AND FLOWS IN CADSES AREA

BUDAPESTI NAGYBANI PIAC RT. (WHOLESALE MARKET OF BUDAPEST - HU)

| | | | |
|--|--------|---|--|
| Address: Nagykörösi út - 53 - BUDAPEST - HUNGARY - Web site: www.nagybani.hu | | | |
| TOTAL AREA | | WORKING HOURS | |
| 340.000 sq.m | | 8-9 hours/day - 6 days/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 418.000 MT (95% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 1 km | 830 sq.m | |
| Closest railway | 4 km | | |
| Closest sea/river port | 40 km* | | |
| Closest airport | 8 km | | |
| Closest custom | n.a. | PICKING AREA | |
| Closest phytosanitary office | n.a. | | |
| EQUIPMENT | | INFORMATION SERVICES | |
| Forklifts | | RFID/bar code for recognize boxes/pallets | |
| Pallet racking | | Phone, fax, internet | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Custom service | | Packing | |
| Phytosanitary service | | | |

* estimated

WHOLESALE MARKET FOR FRUIT AND VEGETABLES, LUSHNJA JOINT VENTURE COMPANY (WHOLESALE MARKET OF LUSHNJA - AL)

| | | | |
|---|--------|-----------------------------------|--|
| Address: Lagjia "18 Tetori" - LUSHNJE - ALBANIA | | | |
| TOTAL AREA | | WORKING HOURS | |
| 10.000 sq.m | | n.a. | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 25.000 MT (100% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 0,5 km | | |
| Closest railway | 2 km | | |
| Closest sea/river port | 41 km | | |
| Closest airport | 90 km | | |
| Closest custom | n.a. | | |
| Closest phytosanitary office | n.a. | PICKING AREA | |
| | | Yes | |
| EQUIPMENT | | INFORMATION SERVICES | |
| Loading cranes | | Information technology facilities | |
| Container cranes | | Wireless technology | |
| | | Phone, fax, internet | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Transit points | | Maintenance/repair facilities | |
| Fuel station | | | |

REGIONALNA VELETRZNICA OSIJEK (WHOLESALE MARKET OF OSIJEK - HR)

| | | | |
|--|--------|--|--|
| Address: SV.L.B. Mandica - OSIJEK - CROATIA - Web site: www.veletrznica.mps.hr | | | |
| TOTAL AREA | | WORKING HOURS | |
| 29.500 sq.m | | 8 hours/day - 6 days/week (in the main season 24 hours/day - 7 days/week) | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 10.000 MT (100% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 1,5 km | 900 cu.m | |
| Closest railway | 2 km | | |
| Closest sea/river port | n.a. | | |
| Closest airport | 10 | | |
| Closest custom | n.a. | PICKING AREA | |
| Closest phytosanitary office | n.a. | | |
| EQUIPMENT | | INFORMATION SERVICES | |
| 1 forklift | | Phone, fax, internet | |
| 10 transpallets | | | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Maintenance/repair facilities | | | |

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FRESH PRODUCE LOGISTICS CHAINS AND FLOWS IN CADSES AREA

REGIONALNA VELETRZNICA RIJEKA-MATULJI (WHOLESALE MARKET OF MATULJI - HR)

| | |
|---|----------------------------------|
| Address: 51 213 Jurdani, Jusici 69c - MATULJI - CROATIA - Web site: www.rvrm.hr | |
| TOTAL AREA | WORKING HOURS |
| 13.900 sq.m | n.a. |
| FRESH PRODUCE HANDLED/YEAR | |
| 11.700 MT (90% of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway | 480 sq.m |
| Closest railway | 2.000 cu.m |
| Closest sea/river port | |
| Closest airport | |
| Closest custom | |
| Closest phytosanitary office | |
| | PICKING AREA |
| | |
| EQUIPMENT | INFORMATION SERVICES |
| Forklifts | Phone, fax, internet |
| Transpallets | |
| Plugs for reefer container | |
| CRITICAL IMMATERIAL SERVICES | |
| Custom service | |

REGIONAL WHOLESALE MARKET SPLIT, JOINT STOCK COMPANY - REGIONALNA VELETRZNICA SPLIT (WHOLESALE MARKET OF SPLIT - HR)

| | |
|---|----------------------------------|
| Address: Put Vrbovnika bb, Stobrec - SPLIT - CROATIA - Web site: www.rvt-split.hr | |
| TOTAL AREA | WORKING HOURS |
| 18.000 sq.m | n.a. |
| FRESH PRODUCE HANDLED/YEAR | |
| 70.000 MT (100% of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway | 500 cu.m |
| Closest railway | |
| Closest sea/river port | |
| Closest airport | |
| Closest custom | |
| Closest phytosanitary office | |
| | PICKING AREA |
| | |
| EQUIPMENT | INFORMATION SERVICES |
| Pallet racking | Storage location software |
| | Phone, fax, internet |
| CRITICAL IMMATERIAL SERVICES | |
| Custom service | Transit point |

CENTRAL MARKET OF THESSALONIKI S.A. - KATH (WHOLESALE MARKET OF THESSALONIKI - GR)

| | |
|--|--|
| Address: N. Menemeni - P. O. BOX 54628 - THESSALONIKI - GREECE - Web site: www.kath.gr | |
| TOTAL AREA | WORKING HOURS |
| 247.000 sq.m | 7 hours/day - 5 days/week and 5 hours/day - 1 day/week |
| FRESH PRODUCE HANDLED/YEAR | |
| 175.000 MT (75% of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway | 3.200 sq.m |
| Closest railway | |
| Closest sea/river port | |
| Closest airport | |
| Closest custom | |
| Closest phytosanitary office | |
| | PICKING AREA |
| | |
| EQUIPMENT | INFORMATION SERVICES |
| | Phone, fax, internet |
| CRITICAL IMMATERIAL SERVICES | |
| Custom service | |

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MAGISTRAT DER STADT WIEN - MAGISTRATSABTEILUNG 59 – MARKTAMT (WHOLESALE MARKET OF WIEN - AT)

| | |
|---|--|
| Address: Marktamtsabteilung GWI 23, Laxenburger Strasse 365 - WIEN - AUSTRIA Web site: www.magwien.gv.at/ma59/gwi/mae24e.htm | |
| TOTAL AREA | WORKING HOURS |
| 300.000 sq.m | 8,5 hours/day - 5 days/week and 9,5 hours/day - 1 day/week in May-Septmeber it is open also on Sunday for 4 hours |
| FRESH PRODUCE HANDLED/YEAR | |
| 160.000 MT (80% of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway 3 km | 77.000 sq.m |
| Closest railway 0 km | |
| Closest sea/river port 12 km | |
| Closest airport 13 km | |
| Closest custom 0 km | |
| Closest phytosanitary office 0 km | |
| EQUIPMENT | PICKING AREA |
| Forklifts | Inside and outside cold store |
| Transpallets | |
| Container terminals | |
| Weigh bridge | |
| | INFORMATION SERVICES |
| | Phone, fax, internet LAN |
| CRITICAL IMMATERIAL SERVICES | |
| Custom service | Transit point |
| Phytosanitary service | Quality control |
| Packing | Continuous replenishment |
| Labelling | Telematics connection |

ZAGREBACKA VELETRZNICA D.D. - ZAGREB WHOLESALE MARKET COMPANY (WHOLESALE MARKET OF ZAGREB - HR)

| | |
|--|---|
| Address: Slavonska avenija bb - ZAGREB - CROATIA - Web site: www.zagrebbackaveletrznica.hr | |
| TOTAL AREA | WORKING HOURS |
| 38.699 sq.m | 10 hours/day - 5 days/week and 8 hours/day - 1 day/week |
| FRESH PRODUCE HANDLED/YEAR | |
| 30.000 MT* (100%* of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway 0,1 km | Yes |
| Closest railway 7 km | |
| Closest sea/river port 200 km | |
| Closest airport 15 km | |
| Closest custom n.a | |
| Closest phytosanitary office n.a | |
| EQUIPMENT | PICKING AREA |
| Forklifts | |
| Pallet racking | |
| Plugs for reefer container | |
| Weigh bridge | |
| | INFORMATION SERVICES |
| | Storage location software |
| | Information technology facilities |
| | Track and tracing |
| | Phone, fax, internet |
| CRITICAL IMMATERIAL SERVICES | |
| Maintenance/repair facilities | |

* estimated

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FRESH PRODUCE LOGISTICS CHAINS AND FLOWS IN CADSES AREA

SLATINA BULGARPLOD (WHOLESALE MARKET OF SOFIA - BG)

| | | | |
|---|--------|-------------------------------|--|
| Address: 13 "Prof. Tzvetan Lazarov" Bldr. - SOFIA - BULGARIA - Web site: www.slatina-bulgarplod.com | | | |
| TOTAL AREA | | WORKING HOURS | |
| 450.000 sq.m | | 9 hours/day - 7 days/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 153.600 MT (96% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 3 km | 10.000 sq.m | |
| Closest railway | 0 km | | |
| Closest sea/river port | 500 km | | |
| Closest airport | 3 km | | |
| Closest custom | n.a. | | |
| Closest phytosanitary office | n.a. | PICKING AREA | |
| EQUIPMENT | | INFORMATION SERVICES | |
| Forklifts | | Phone, fax, internet | |
| Transpallets | | | |
| Pallet racking | | | |
| Truck weighing machine | | | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Custom service | | Maintenance/repair facilities | |
| Transit point | | Fuel station | |
| Quality control | | | |

VERONAMERCATO (AGRO-INDUSTRIAL CENTRE OF VERONA - I)

| | | | |
|--|-----------|---|--|
| Address: Via Sommacampagna, 63 d/e - VERONA - ITALY - Web site: www.veronamercato.it | | | |
| TOTAL AREA | | WORKING HOURS | |
| 550.000 sq.m | | 14 hours/day - 5 days/week and 6 hours/day - 1 day/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 401.800 MT (98% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 2 km | 110.000 sq.m | |
| Closest railway | 1 km | 350 loading docks/doors | |
| Closest sea/river port | 100/40 km | 350 unloading docks/doors | |
| Closest airport | 3 km | | |
| Closest custom | 1 km | PICKING AREA | |
| Closest phytosanitary office | 0 km | Close the cold store | |
| EQUIPMENT | | INFORMATION SERVICES | |
| Forklifts | | Storage location software - Information technology facilities | |
| | | Wireless technology - Track & tracing | |
| | | Rfid/bar code for recognize boxes/palltes | |
| | | Rfid/bar code for picking | |
| | | Phone, fax, internet | |
| | | LAN - EDI | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Custom service | | Quality control | |
| Phytosanitary service | | Continuous replenishment | |
| Packing | | Telematics connection | |
| Labelling | | Maintenance/repair facilities | |
| Transit point | | Fuel station | |

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FRESH PRODUCE LOGISTICS CHAINS AND FLOWS IN CADSES AREA

SMA CENTRO AGRO-ALIMENTARE "LA VALLE DELLA PESCARA" (AGRO-INDUSTRIAL CENTRE OF PESCARA - I)

| | |
|--|---|
| Address: Via Nazionale km 51+355 - CEPAGATTI (PE) - ITALY - Web site: www.lavalledellapescara.it | |
| TOTAL AREA | WORKING HOURS |
| 170.000 sq.m | 8 hours/day -3 days/week and 10,5 hours/day - 3 days/week |
| FRESH PRODUCE HANDLED/YEAR | |
| 110.000 MT (100% of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway 0,5 km | 2.000 sq.m |
| Closest railway 12 km | 12.000 cu.m |
| Closest sea/river port 10 km | |
| Closest airport 6 km | PICKING AREA |
| Closest custom 9 km | Close the cold store and in open air square |
| Closest phytosanitary office 0 km | Unity for picking: single boxes |
| EQUIPMENT | INFORMATION SERVICES |
| Forklifts | Phone, fax, internet |
| Transpallets | LAN |
| CRITICAL IMMATERIAL SERVICES | |
| Phytosanitary service | Telematics connection |
| Quality control | Maintenance/repair facilities |

FRUIT TERMINAL LUKA KOPER (KOPER - SI)

| | |
|--|---|
| Address: Vojkovo nabrezje 38 - KOPER - SLOVENIA - Web site: www.luka-kp.si | |
| TOTAL AREA | WORKING HOURS |
| 4.700.000 sq.m (port of Koper) | 24 hours/day - 7 days/week |
| FRESH PRODUCE HANDLED/YEAR | |
| 64.000 MT (80% of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway 25 km | 13.000 sq.m - 8.000 pallets |
| Closest railway 0 km | 1 loading dock/door - 1 unloading dock/door |
| Closest airport 120 km | CONTAINER AND RO-RO TERMINAL |
| Closest custom 0 km | 250.000 sq.m - 11.500 teus |
| Closest phytosanitary office 0 km | 200 plugs for reefer container |
| PICKING AREA | CROSS DOCKING AREA |
| EQUIPMENT | INFORMATION SERVICES |
| Forklifts | Phone, fax, internet |
| Transpallets | LAN |
| 3 Container cranes | |
| 2 Loading cranes | |
| CRITICAL IMMATERIAL SERVICES | |
| Custom service | Quality control |
| Phytosanitary service | Maintenance/repair facilities |
| Packing | Fuel stations |
| Labelling | |

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FRESH PRODUCE LOGISTICS CHAINS AND FLOWS IN CADSES AREA

LUKA BEOGRAD (BELGRADE - YU)

| | | | |
|---|--------|---|--|
| Address: Francuska 81. St. - BELGRADE - SERBIA - Web site: www.port-bgd.co.yu | | | |
| TOTAL AREA | | WORKING HOURS | |
| 1.000.000 sq.m | | 8-11 hours/day - 6 days/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| n.a. | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 5 km | CONTAINER AND RO-RO TERMINAL 3.500 sq.m + an extension of 6.000 sq.m - 12.000 teus/year 10 plugs for reefer container (in construction) | |
| Closest railway | 1,5 km | | |
| Closest airport | 20 km | | |
| Closest custom | 0 km | | |
| Closest phytosanitary office | 0 km | | |
| PICKING AREA | | CROSS DOCKING AREA | |
| EQUIPMENT | | INFORMATION SERVICES | |
| 41 forklifts | | Phone, fax, internet | |
| 2 container cranes | | LAN | |
| 10 rail mounted gantry cranes | | CRITICAL IMMATERIAL SERVICES | |
| 2 push tugs | | | |
| 4 motorcar hoists handling 12-40 tons | | | |
| Custom service | | Labelling | |
| Phytosanitary service | | Maintenance/repair facilities | |
| Packing | | | |

PORT OF DURRES (DURRES - AL)

| | | | |
|---|--------|------------------------------|--|
| Address: PR "Tregtare" Lagja nr. 1 - DURRES - ALBANIA | | | |
| TOTAL AREA | | WORKING HOURS | |
| 1.200.000 sq.m | | 14 hours/day - 6 days/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 27.660 MT (100% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 0 km | CONTAINER AND RO-RO TERMINAL | |
| Closest railway | 0,5 km | | |
| Closest airport | 22 km | | |
| Closest custom | 0,3 km | | |
| Closest phytosanitary office | 40 km | | |
| PICKING AREA | | CROSS DOCKING AREA | |
| | | Yes | |
| EQUIPMENT | | INFORMATION SERVICES | |
| 21 forklifts | | Phone, fax, internet | |
| 40' tug master (10) | | | |
| 40' semi-trailers (20), | | | |
| electric cranes (25), mobile cranes (2) | | | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Custom service | | Quality control | |
| Phytosanitary service | | | |

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FRESH PRODUCE LOGISTICS CHAINS AND FLOWS IN CADSES AREA

PORT OF PIRAEUS (ATHENS - GR)

| | |
|--|---|
| Address: 10, Akti Miaouli Str. - PIRAEUS - GREECE - Web site: www.olp.gr | |
| TOTAL AREA | WORKING HOURS |
| 1.200.000 sq.m | 24 hours/day - 7 days/week |
| FRESH PRODUCE HANDLED/YEAR | |
| 1.286.000 MT (5,6% of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway 5 km | CONTAINER AND RO-RO TERMINAL |
| Closest railway 2 km | |
| Closest airport 55 km | |
| Closest custom 0 km | |
| Closest phytosanitary office 0 km | 1.200.000 sq.m - 30.500 teus - 9.500 cars |
| | 288 plugs for reefer container |
| PICKING AREA | CROSS DOCKING AREA |
| EQUIPMENT | INFORMATION SERVICES |
| 19 forklifts | Phone, fax, internet |
| 14 rail mounted gantry cranes | |
| 1 ship-to-shore crane | |
| 1 mobile crane | |
| 32 yard tractors, 50 straddle carriers | |
| CRITICAL IMMATERIAL SERVICES | |
| Custom service | Continuous replenishment |
| Phytosanitary service | |

FRIGOTERMINAL (RAVENNA - I)

| | |
|--|--|
| Address: Darsena San Vitale - RAVENNA - ITALY - Web site: www.sapir.it | |
| TOTAL AREA | WORKING HOURS |
| 5.000 sq.m | 24 hours/day - 7 days/week |
| FRESH PRODUCE HANDLED/YEAR | |
| 40.000 MT (100% of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway 10 km | CONTAINER AND RO-RO TERMINAL* |
| Closest railway 0 km | |
| Closest airport 37 km | |
| Closest custom 0 km | |
| Closest phytosanitary office 0 km | 300.000 sq.m - 250.000 containers - 38.800 trailers |
| | 50 plugs for reefer container |
| PICKING AREA | CROSS DOCKING AREA |
| EQUIPMENT | INFORMATION SERVICES |
| 8 forklifts | Phone, fax, internet |
| 6 transpallets | |
| 6 fix cranes rail mounted cap 30 MT | |
| 6 cranes automotive rubber tyred cap 120 MT | |
| 2 lines of conveyer belt for unload fruit in boxes | |
| 4 rail mounted gantry cranes * | |
| 4 ship-to-shore crane * | |
| CRITICAL IMMATERIAL SERVICES | |
| Custom service | Maintenance/repair facilities (in the port of Ravenna) |
| Phytosanitary service | Fuel station (in the port of Ravenna) |

* these data are for container terminal in the port of Ravenna (Sapir Spa)

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FRESH PRODUCE LOGISTICS CHAINS AND FLOWS IN CADSES AREA

TARANTO CONTAINER TERMINAL (TARANTO - I)

| | |
|---|-------------------------------------|
| Address: SS 106 - Molo Polisetitoriale - TARANTO - ITALY - Web site: www.tct-it.com | |
| TOTAL AREA | WORKING HOURS |
| 930.000 sq.m | 9 hours/day - 7 days/week |
| FRESH PRODUCE HANDLED/YEAR | |
| 4.900 teus* (70%* of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway 12 km | CONTAINER AND RO-RO TERMINAL |
| Closest railway 2 km | |
| Closest airport 20 km | |
| Closest custom 0 km | |
| Closest phytosanitary office 0 km | |
| PICKING AREA | CROSS DOCKING AREA |
| EQUIPMENT | INFORMATION SERVICES |
| 7 forklifts | Phone, fax, internet |
| 5 transpallets | LAN |
| 10 container cranes | EDI |
| 22 rail mounted gantry cranes (transtainer) | |
| Portainer - Quay side gantry cranes | |
| 2 overhead travelling cranes | |
| 1 loading crane | |
| CRITICAL IMMATERIAL SERVICES | |
| Custom service | Labelling |
| Phytosanitary service | Quality control |
| Document management | Maintenance/repair facilities |
| Tracking & tracing | Fuel station |

* estimated

CONTAINER TERMINAL OF THESSALONIKI (THESSALONIKI - GR)

| | |
|---|-------------------------------------|
| Address: P.O. Box 10467 - THESSALONIKI - GREECE - Web site: www.thpa.gr | |
| TOTAL AREA | WORKING HOURS |
| 200.000 sq.m | 24 hours/day - 7 days/week |
| FRESH PRODUCE HANDLED/YEAR | |
| 1.348 teus (0,5% of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway 0 km | CONTAINER AND RO-RO TERMINAL |
| Closest railway 0 km | |
| Closest airport 15 km | |
| Closest custom 0 km | |
| Closest phytosanitary office n.a. | |
| PICKING AREA | CROSS DOCKING AREA |
| EQUIPMENT | INFORMATION SERVICES |
| 10 forklifts | Phone, fax, internet |
| 1 rail mounted gantry crane | |
| 17 rubber tyred gantry cranes | |
| 4 ship-to-shore cranes | |
| Mobile harbour crane | |
| CRITICAL IMMATERIAL SERVICES | |
| Custom service | |

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FRESH PRODUCE LOGISTICS CHAINS AND FLOWS IN CADSES AREA

TERMINAL FRUTTA TRIESTE (TRIESTE - I)

| | | | |
|---|-------|------------------------------|--|
| Address: Punto Franco Nuovo Mag. 5 - TRIESTE - ITALY - Web site: www.tft.it | | | |
| TOTAL AREA | | WORKING HOURS | |
| 36.000 sq.m | | n.a. | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 96.000 MT (80% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 1 km | 11.000 sq.m - 5.000 teus | |
| Closest railway | 0 km | CONTAINER AND RO-RO TERMINAL | |
| Closest airport | 35 km | | |
| Closest custom | 0 km | | |
| Closest phytosanitary office | n.a. | | |
| PICKING AREA | | CROSS DOCKING AREA | |
| EQUIPMENT | | INFORMATION SERVICES | |
| 4 forklifts | | Phone, fax, internet | |
| 2 transpallets | | | |
| 1 container crane | | | |
| 1 loading crane | | | |
| Elevators | | | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Custom service | | | |

PORT OF ASTAKOS - AKARPORT (ASTAKOS - GR)

| | | | |
|--|-------|-------------------------------------|--|
| Address: 18-20 Anarousiou-Halandriou - AMOROUSIOU - GREECE - Web site: www.akarpot.com | | | |
| TOTAL AREA | | WORKING HOURS | |
| 1.600.000 sq.m | | 24 hours/day - 7 days/week | |
| FRESH PRODUCE HANDLED/YEAR | | | |
| 8.750 MT (25% of the total handled) | | | |
| ACCESSIBILITY | | WAREHOUSE FOR FRESH GOODS | |
| Closest motorway | 42 km | 10.000 sq.m | |
| Closest railway | 73 km | CONTAINER AND RO-RO TERMINAL | |
| Closest airport | 80 km | | |
| Closest custom | 0 km | | |
| Closest phytosanitary office | 0 km | | |
| PICKING AREA | | CROSS DOCKING AREA | |
| 25.000 sq.m | | 8.000 sq.m | |
| EQUIPMENT | | INFORMATION SERVICES | |
| 10 forklifts | | Phone, fax, internet | |
| 20 bar code scanners | | | |
| 10 transpallets | | | |
| 2 container cranes | | | |
| 3 ship-to-shore cranes | | | |
| 2 loading cranes | | | |
| Straddle carriers and rich stackers | | | |
| CRITICAL IMMATERIAL SERVICES | | | |
| Custom service | | Labelling | |
| Phytosanitary service | | Quality control | |
| Documents management | | Maintenance/repair facilities | |
| Tracking & tracing | | Fuel station | |
| Packing | | | |

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INTERPORT QUADRANTE EUROPA (VERONA - I)

| | |
|--|--|
| Address: Via Sommacampagna, 61 - VERONA - ITALY - Web site: www.quadranteeuropa.it | |
| TOTAL AREA | WORKING HOURS |
| 2.500.000 sq.m | 24 hours/day - 7 days/week |
| FRESH PRODUCE HANDLED/YEAR | |
| 800.000 MT (80% of the total handled) | |
| ACCESSIBILITY | WAREHOUSE FOR FRESH GOODS |
| Closest motorway 2 km | 6.000 sq.m - 5.000 pallets |
| Closest railway 0 km | |
| Closest sea/river port 120 km | PICKING AREA |
| Closest airport 1 km | |
| Closest custom 0 km | CROSS DOCKING AREA |
| Closest phitosanitary office 0 km | |
| EQUIPMENT | INFORMATION SERVICES |
| Forklifts | Rfid/bar code for transfer load lists to pickers |
| Transpallets | Rfid/bar code for recognize boxes/pallets |
| Container cranes | Rfid/bar code for picking |
| 8 rubber tyred gantry cranes | Phone, fax, internet |
| | LAN - EDI |
| CRITICAL IMMATERIAL SERVICES | |
| Custom service | Maintenance/repair facilities |
| Phytosanitary service | Fuel station |
| Telematics connection | |

2.3 - BOTTLENECKS AND LOGISTICS OBSTACLES IN THE FRESH PRODUCE SYSTEM OF CADSES AREA

From a series of on-site analysis of the main TLTs devoted to fresh produce and a focus group survey made with five experts¹³ specialised in trade and transport of fresh produce within CADSES area, it was possible to highlight a series of bottlenecks and logistics obstacles to the trade and traffic of fruit and vegetables. The focus group allowed to the Imonode Consortium to analyse the main logistics obstacles of the whole supply chain in CADSES area and to complete the information collected on-site with a dynamic discussion with operators that interacting each other were able to refine and complete the survey, to determine the main strengths and weaknesses of the supply chain.

From an operational point of view, the focus group analysis was made submitting the results of the on-site bottlenecks survey to the focus experts and discussing with them about the results achieved on each area of analysis.

In this way, main bottlenecks and logistics obstacles identified were:

- high level of congestion in the grater part of the road in entrance and exit from the nodal point under analysis. The road congestion will reach a "dramatic" level in the near future, with particular reference to the connections in Northern Regions of Italy and the routes to Austria;
- restriction of operating hours, particularly in the public area services (i.e. custom and phytosanitary services);
- lack of workers in wholesale markets - above all in Italy - in the current working hours;
- increasing role of distribution centres. These structures do not foresee the use of intermodal connection;
- lack of railways connection, in particular for wholesale markets. The greater part of the rail connection within the wholesale market area are in disuse and in the new modern agro-industrial centres this kind of connection is not considered strategic, due the preference of final client for the door to door services;
- lack of transshipment structures and intermodal services equipment with particular reference to modal switch toward railways;
- preference of the main operators for the monomodality door to door;
- lack of state-of-the-art infrastructures to change the modality in the ports area in consideration of the continuous increase of the flows coming from "new" fruit and

¹³ Coming from the general panel of experts such as stated in note n. 1.

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vegetables suppliers around the World and flows of product in counter season (i.e. during the period of no production in Europe);

- lack of material equipment and, in particular, storage and plugs for reefer containers;
- low performance indices in the equipment area of the nodal points in analysis (wholesale markets, reefer terminals and reefer container terminals), with particular reference to information technology: above all with regard to track and tracing and administrative-trading systems;
- low level of cargo balancing between incoming and outgoing flows both for wholesale markets and reefer/reefer container terminals;
- fragmentation of the cargoes both at supply and destination level.

In particular, “lacks” in the areas of material and immaterial services prevent the ability to gather the needed critical masses of fruit and vegetables and prevent the possibility to manage the shipment in the way of an optimisation of the cargoes and the back logistics: it will result as the main bottleneck for the development of the intermodality.

The analysis of the bottlenecks was focused also to the forecast of short-term probable development of these in CADSES area on the basis of the trade and transport possible evolution. The results of these analysis confirmed, also for the short-term, that the main bottlenecks would be the same detected for the present situation.

2.3.1 - SHORT-TERM MEASURES FOR SOLVING BOTTLENECKS, INCREASE EFFICIENCY AND PREVENT NEW OBSTACLES

With regard to short-term measures for solving bottlenecks, increasing efficiency and prevent new obstacles and bottlenecks in the area of fresh produce, in the following pages are reported the main solution ideas to reach these objective coming from the focus group survey.

To improve accessibility to the nodes, excluding infrastructural interventions that are outside the scope of the Imonode project and interventions related to all cargo categories, the only areas of specific investments for fruit and vegetables are:

- optimisation of cargoes organisation, by increasing the number of full cargoes and reduce the number of lorries along the roads. In particular, the lorries that move empty or with a limited volumes of cargo transported (low level of saturation);
- switch from the road transport to the railways, to reduce the level of congestion along the road connections.

These prioritising come from the characteristics of fruit and vegetables. As a matter of fact, the latter have in the low shelf life the main obstacles in the usage of the multimodal systems of transport in comparison with other type of cargoes without problem of shelf life and level of freshness.

Limited seems the possibility to switch the operations in alternative hours in the fresh produce transport, in consideration that currently as much as possible the transport is already made during the night time.

Moreover, the possibility to optimise the operating hours and the availability of operation 24 hours a day/7 days a week is strongly linked to the ability to concentrate in a restricted number of nodal points critical masses of fruit and vegetables able to reduce the services cost. To this end, it seems needed a prioritisation of the nodal points within CADSES area to improve their operations in order to concentrate in these nodes the public intervention, to support flows concentration and provide the needed level of services.

With regard to wholesale markets, the ability to attract the needed critical masses depends on:

- a right supply of equipment (available spaces and services above all);
- ability to attract within the market area or the neighbouring area the distribution centres of the multiples.

To this second goal it seems necessary an involvement of the public sector to promote an approach among wholesale markets and multiples operations.

Along these public interventions, in the private area seems necessary to integrate the current role of wholesale markets such as places of product trading with a role of logistics centres able to provide advanced logistics services. So, wholesale markets have to provide an added value: i.e. places able to supply a high number of these services to match the higher number of needs of a modern fresh produce trade.

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Development of wholesale markets as areas able to attract distribution centres of multiples chains - better if in defined cluster areas - is maybe the first assumption to develop the intermodality road-rail and sea-rail in a broad way also for fruit and vegetables.

To this end it is important to consider two aspects:

- up to now in CADSES area Countries with a better development of modern retail system (Italy, Austria and Greece), the multiples chains have placed their distribution centres in barycentric areas with regard to their point of sale and have not considered the intermodality to connect producing areas to redistribution areas. The high level of fragmentation of these structures in the consumption areas is an obstacle to their direct connection to the railways. Currently, these kind of connections would result in a heaviness of the logistics management and a prolongation of the lead-time. In this scenery it seems possible just to intervene in:
 - new settlements in consideration of the “obsolescence” of the existing structures, as a consequence of the user basin increase that make these facilities quickly small in respect to the market size;
 - enlargement of the current distributive network;
- in the other Countries, with a modern retail system in development and for the greater part not equipped with own distribution platforms, it seems possible to start right now to implement all the needed intervention to support cluster areas of distribution centres linked also by railways to the national and international rail system and in this way develop the use of intermodality in the trade of fresh produce.

The development of the intermodality, but also the general trade of fruit and vegetables, is based also on the improvement of the specific equipment needed to handle fresh produce, immaterial services above all, and in particular in the following two areas:

- unification/grouping of products and improvement of back logistics achievable just with a better information circulation able to optimise shipments and reduce the empty routes. Obviously it refers to information about demand and supply of fruit and vegetables in order to draw up a better planning of the handling activities;
- documents for track and tracing and administrative-trading management. The development of these areas is based on a better information technology tools use. To this end it seems useful a better facilitation in the introduction and utilization of these equipments and also a development of specific training activities for these kind of software.

In the area of cargo balancing, with particular refer to the ports area and products shipping activities toward overseas market, the solution interventions regard only in a marginal way the logistics activities. It is a task of the general economic policies toward a development of the competitiveness of fresh produce of CADSES area Countries with particular attention to the demand coming from the destination market located overseas.

2.4 - THE FRESH PRODUCE TLTs NETWORK

From the survey regarding the main public TLTs in CADSES area and the bottlenecks of the fresh produce supply chain, such as reported in the previous pages, the Imonode Consortium deepened the analysis of the existing sites to realize a multicriteria evaluation of each one of the nodal points under analysis with the aim to identify a series of TLTs to be included in the cargo transport network in CADSES area for fruit and vegetables.

In this way, after the function profile survey of each TLT¹⁴, a multicriteria analysis has been realized identifying a series of quantitative/qualitative criteria and indicators in terms of geostrategic location, connection, appropriateness of land, property status and planning of each TLT, assigning them a specific rating range, grading each indicator and, finally, calculating an overall performance index for each site. Once calculated the TLT grading for each selected site, it was realized a comparative analysis of TLTs to list the nodal points that will represent the Imonode network. Just those nodes that matched - in terms of overall performance both qualitative and quantitative - the criteria fixed by the Imonode Consortium have been selected for the network.

¹⁴ Based on a series objective and criteria (competitiveness, development, transport policy, cohesion and quality of life) fixed by the Imonode Consortium, with the specific aim to draw up a qualitative profile of each TLT.

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Moreover, the Imonode Consortium, to deepen and complete the survey, analysed also the main paths and routes of traffic in the fruit and vegetables trade within study area, realising an analysis of the potential sites and/or nodal points - on the basis of their location¹⁵ - to be evaluated to develop new and efficient terminals devoted for fruit and vegetables handling.

In this way, with these activities, the Imonode Consortium selected a series of sites able to realize a desired first assessment for nodal points devoted to fresh produce in CADSES area. It means a suggested network of TLTs to be considered in the planning activities to implement the intermodality in the fruit and vegetables flows.

So, with regard to fresh produce, on the basis of the TLTs analysed in the Imonode context and the potential sites identified in the way stated above comes the network made up by the TLTs reported in the following table and figure.

In this network are included also the demonstrators areas/TLTs coming both from the multicriteria analysis and the potential site/nodal points survey. As a matter of fact, one TLT (Port of Astakos) is an already active nodal point that Imonode partner decided to improve/develop in consideration of its strategic location in the Adriatic Sea. While three demonstrators areas (Cesena, Ravenna and Taranto) are potential sites in which develop new territorial logistics structures in consideration of the fresh produce needs in the context area, as emerging from the analysis realized in the project an reported in the following part of this publication.

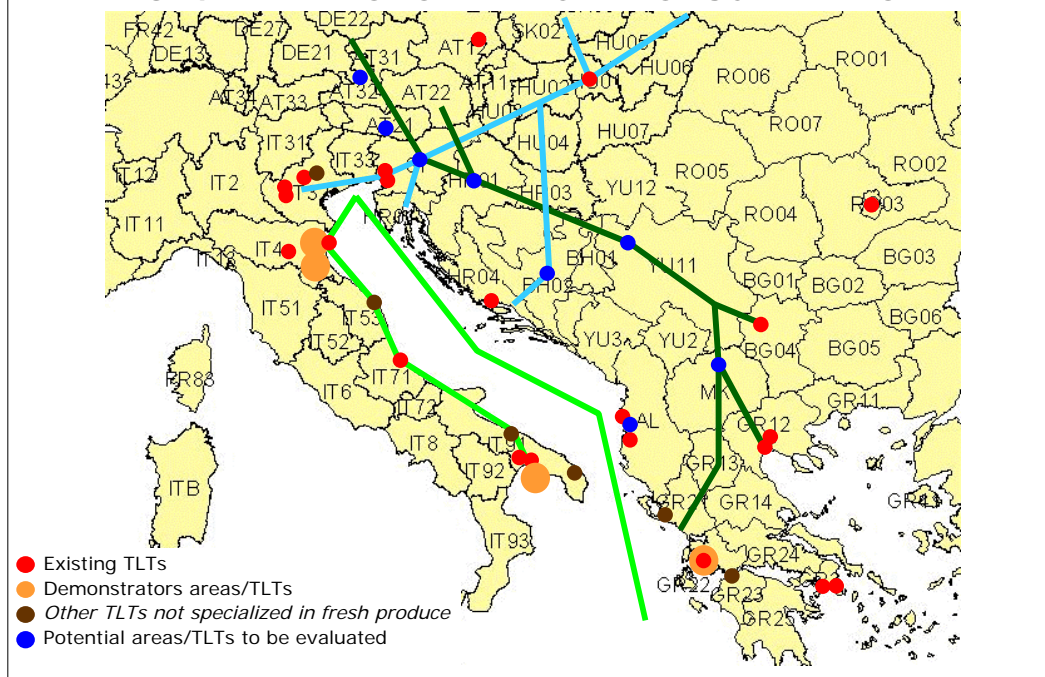
TAB. 5 - THE IMONODE NETWORK

| EXISTING TLTs | DEMONSTRATORS AREAS/TLTs |
|---|--|
| Interport Quadrante Europa - Verona - I | Cesena - I |
| Port of Astakos-Akarport - GR* | Ravenna - I |
| Port of Piraeus - GR | Taranto - I |
| Port of Durres - AL | Port of Astakos-Akarport - GR* |
| Container Terminal of Thessaloniki - GR | |
| Fruit Terminal Luka Koper - SI | POTENTIAL AREAS/TLTs TO BE EVALUATED |
| Frigoterminal - Ravenna - I | Belgrade - YU |
| Taranto Container Terminal - I | Ljubljana - SLO |
| Trieste Fruit Terminal - I | Salzburg - A |
| Agro-industrial centre of Bologna - I | Sarajevo - BH |
| Wholesale market of Athens - GR | Skopje - MAK |
| Wholesale market of Bucarest - RO | Tirana-Durres - A |
| Wholesale market of Budapest - HU | Villach-Graz - A |
| Wholesale market of Lushnja - HR | Zagreb - HR |
| Agro-industrial centre of Padova - I | |
| Agro-industrial centre of Pescara - I | OTHER TLTs NOT SPECIALIZED IN FRESH PRODUCE |
| Wholesale market of Sofia - BG | Interport of Padova - I |
| Wholesale market of Split - HR | Port of Ancona - I |
| Wholesale market of Thessaloniki - GR | Port of Bari - I |
| Agro-industrial centre of Verona - I | Port of Brindisi - I |
| Wholesale market of Wien - A | Port of Igoumenitsa - GR |
| Wholesale market Taranto - I | Port of Patras - GR |

*This is both an existing TLT and a demonstrator site

¹⁵ In proximity of polycentric area, in position along important routes of traffic, in junction among import routes of traffic, in proximity of European Union Corridors, in areas of wider consumption, in areas of wider production.

FIG. 4 - THE IMONODE FRESH PRODUCE NETWORK



2.5 - FUTURE FUNCTION PROFILE OF TLTs

The function profile analysis of the main categories of logistics nodes for fresh produce realized during the Imonode project highlights that they have to evolve in a significant way to be part of an intermodal network.

In the following pages it is reported “what is expected for the future” for each category of TLT under analysis as evolution of the present one and also for a new category of TLT - the concentration platform - such emerges from the long-term scenery analysis reported in the following Paragraphs.

As a matter of fact, TLTs have to evolve their role and services to develop the fresh produce supply chain in the direction of a greater rationalization in the way indicated above, to introduce on a regular basis the intermodal connection in the trade of fruit and vegetables and for a perishable terminal development and networking.

2.5.1 - WHOLESALE MARKETS/AGRO-INDUSTRIAL CENTRES

ATTRACTION ACTIVITIES

| Current function profile | What is expected for the future |
|----------------------------|---|
| Transport services centres | From transport services centres to logistics services centres |

MAIN TRANSPORT SYSTEM

| MAIN TRANSPORT SYSTEM | |
|--------------------------|--|
| Current function profile | What is expected for the future |
| Road-road | Located in sites with a direct (within the wholesale market) road-rail connection to develop the intermodality |

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ACTIVITIES

| Current function profile | What is expected for the future |
|--|--|
| Unload | Unload |
| Short storage | Short storage |
| Quality control | Quality control |
| Picking | Picking |
| Groupage | Groupage |
| Handling | Handling |
| Management of recycle and reuse of pallets and packaging | Management of recycle and reuse of pallets and packaging |
| Supply chain price control | Supply chain price control |
| Traceability (very limited) | Development of traceability activities |
| | Development of cross docking activities |
| | Development of packaging activities |
| | Information technology network |

2.5.2 - CONTAINER AND REEFER CONTAINER TERMINALS

ATTRACTION ACTIVITIES

| Current function profile | What is expected for the future |
|--|--|
| Transport and logistics services centres | Transport and logistics services centres |

MAIN TRANSPORT SYSTEM

| Current function profile | What is expected for the future |
|--------------------------|---------------------------------|
| Sea-road/road-sea | Development of rail connections |

ACTIVITIES

| Current function profile | What is expected for the future |
|--------------------------------|---|
| Unload | Unload |
| Medium and long period storage | Medium and long period storage |
| Quality control | Quality control |
| Traceability | Traceability |
| Full load cargoes | Full load cargoes and development of (limited) mixed cargoes activities |
| | Integration of reefer terminals with reefer container terminals |

2.5.3 - DISTRIBUTION CENTRES

ATTRACTION ACTIVITIES

| Current function profile | What is expected for the future |
|--|--|
| Company/territorial attraction centres | From company/territorial attraction centres to regional attraction centres |

MAIN TRANSPORT SYSTEM

| Current function profile | What is expected for the future |
|--------------------------|---|
| Road-road | Located in sites near terminal equipped with road-rail connection |

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ACTIVITIES

| Current function profile | What is expected for the future |
|--|--|
| Unload | Unload |
| Short storage | Short storage |
| Quality control | Quality control |
| Picking | Picking |
| Cross docking (limited) | Development of cross docking activities |
| Groupage | Groupage |
| Management of recycle and reuse of pallets and packaging | Management of recycle and reuse of pallets and packaging |
| Traceability | Traceability |
| | Development such as city distribution centres (i.e. services of city delivery with environmentally sensitive technologies) |
| | Information technology network |

2.5.4 - INTERPORTS

ATTRACTION ACTIVITIES

| Current function profile | What is expected for the future |
|----------------------------|---|
| Transport services centres | From transport services centres to logistics services centres |

MAIN TRANSPORT SYSTEM

| Current function profile | What is expected for the future |
|---------------------------------|---------------------------------|
| Road-road, road-rail, rail-road | Development of rail connections |

ACTIVITIES

| Current function profile | What is expected for the future |
|--|--|
| Unload | Unload |
| Short storage | Short storage |
| Picking | Picking |
| Cross docking | Cross docking |
| Groupage | Groupage |
| Management of recycle and reuse of pallets and packaging | Management of recycle and reuse of pallets and packaging |
| Traceability | Traceability |
| | Development such as city distribution centres (i.e. services of city delivery with environmentally sensitive technologies) |
| | Groupage |
| | Information technology network |
| | Development such as areas able to receive and host a carrier and drivers replacement/switch |
| | Hospitality services |

2.5.5 - CONCENTRATION PLATFORMS

ATTRACTION ACTIVITIES

| Current function profile | What is expected for the future |
|--------------------------|---------------------------------|
| n.a. | Regional attraction centres |

MAIN TRANSPORT SYSTEM

| Current function profile | What is expected for the future |
|--------------------------|---|
| n.a. | Located in sites near terminal equipped with road-rail connection |

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ACTIVITIES

| Current function profile | What is expected for the future |
|--------------------------|---|
| n.a. | Unload |
| | Collection of goods |
| | Short storage |
| | Quality control |
| | Picking |
| | Handling |
| | Management of recycle and reuse of pallets and packaging |
| | Development of traceability activities |
| | Development of cross docking activities |
| | Groupage |
| | Information technology network |
| | Development such as areas able to receive and host a carrier and drivers replacement/switch |
| | Hospitality services |

2.6 - BEST PRACTICES

Once analysed the TLTs in CADSES area, designed a desired first assessment for nodal points devoted to fresh produce and realized an analysis on what is expected for the future with regard to the nodal points under analysis in the direction of a greater rationalization of the logistics/supply chains, it was realized also a survey on a series of best models and experiences in different fields and territories outside CADSES area, with the aim to develop a study report highlighting opportunities coming from these best models to be verified in terms of possibilities to be replicated also in CADSES area and in particular for the territorial logistics structures under project in the demonstrators context (Astakos, Cesena, Ravenna and Taranto).

In this way, the Imonode Consortium analysed a series of TLTs outside CADSES area (fruit terminal system of South Africa, port of Miami, port of Zeebrugge, port of Antwerp, port of Genoa, port of Marseille, wholesale market of Paris and wholesale market of Barcelona). From these surveys emerged that the main opportunities and ideas to be verified in terms of possibilities to be replicated and taken into consideration in the demonstrators project activities are port of Zeebrugge (Belgium), wholesale market of Paris (France) and wholesale market of Barcelona (Spain).

2.6.1 - PORT OF ZEEBRUGGE

This is a modern port recently established, which meets all the expectations of modern shipping and handling techniques, providing handling, storage and distribution of perishables with state-of-the-art equipment. Besides, Zeebrugge, nevertheless is smaller than other facilities located in the Northern Europe, is growing at a faster rate than its competitors and it is taking away market share to the main fruit and vegetables port of Europe: so, in the last few years port of Zeebrugge evolved from a pure transit port into a centre for European distribution.

At the fruit terminal, the reefer operators Belgian New Fruit Wharf offers a wide range of activities (storage, stevedoring, specially adapted cold storage, repalleting system to handle break bulk and palletised shipments, repacking equipment for the Zespri kiwifruits, pre-packaging equipment for other items) that make Zeebrugge a state-of-the-art TLT for fresh produce trade.

In this way, as already stated, Zeebrugge is more than just a quick transit port, because in the port itself new activities come into being, which provide added value to the goods. At the fruit terminals the distribution functions is being increasingly important.

In the inner port a terrain was provided for the "Distributiepark Zeebrugge", in which the customers can either build and operate their own installations for storage and distribution or have it done by local companies also for perishables, following the new demand trends from clients. Moreover, in the inner port Zeebrugge has two specialized terminals for the export and distribution of fresh fruit, mainly bananas and kiwis.

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In 2004 Port of Zeebrugge enjoyed an 18% rise in fruit traffic, with some 610.000 MT of fruit and vegetables passing through the port. Container volumes grew significantly and are increasingly becoming the mainstay of Zeebrugge's business.

The role of Zeebrugge convinced Del Monte Fresh Produce to develop a weekly banana service from Cameroon in January 2005, with around 1.500 pallets of the fruit every week.

At port of Zeebrugge calls also Jamaica Producers (bananas), Tropicana (fruit juices) and the reefer ships that are supplying Zespri kiwifruit.

The port Authority stated that Port of Zeebrugge have the critical mass and the expertise to send mixed loads of refrigerated fresh fruit products to various destinations in Europe.

Coming to the means of transport, considering the whole traffic at the port, 64% of the freight is transported by road, rail transport accounts for 17,5% of land transport and the inland navigation, especially to ports along the Rhine, is on the increase.

2.6.2 - RUNGIS - WHOLESALE MARKETS OF PARIS

The wholesale market of Paris (Rungis) is widely known as an example of wholesale operation in consideration of the wide process of reorganisation of the activities and services provided to wholesalers undergone in the last years to respond to the new logistics chains in the fresh produce system. In particular, during last few years, Rungis experienced a merge/aggregation of companies to increase their competition power.

The last tendency for wholesale operators is to focus their activities on certain products, because it is a competitive advantage to manage a small range of goods as specialist in the new competition environment.

Recently, within Rungis it has been funded a new pavilion exclusively for fruit and vegetable cold storage. Moreover the 12 ha plot south of the existing site is in the final stage of completion. Some 40.000 sq.m of buildings and warehouses are growing up.

The 12 ha site was built with a view to make rooms for firms that add value to fresh food, such as processing, treatment and logistics companies, as well as to create space for existing market companies that need to expand. This latest development serves as a strong indication that the wholesale market is not only moving with the times, but has renewed confidence in its industry position.

Today, with these investments, Rungis serves as a point of central purchase for large retailers, food service companies and services providers. It is the "fresh produce centre" of France. In the fruit and vegetable section alone - the market's largest component in terms of sq.m and money earned - around 1 million MT are handled each year, half of which are imported.

It is considered the focal point in Europe for the fresh produce industry, both in terms of infrastructure and storage facilities. Moreover, in the last few years Rungis invested in modernization, specialization and concentration of the activities: development of a better temperature-controlled system, consolidation of delivery services and export activities, increasing attention and emphasis on quality, new logistics areas for telesales, preparation for orders, packaging, stock control and deliveries.

Thanks to these new services and the great attention to the quality of the products sold, Rungis has even starting to win back market share lost in the 1970's, 1980's and 1990's to supermarkets distribution centres.

2.6.3 - MERCABARNA - WHOLESALE MARKET OF BARCELONA

The wholesale market of Barcelona (Mercabarna) is a best model of logistics structure in consideration of its role of main agro-food market in southern Europe (with nearly 1 million MT of products handled yearly) and on the basis that it is the first example of the so-called "third generation" wholesale markets. It means that it is able to offer products and services to suit the needs of every customer, as well as purchasing platforms for the large food distribution chains which are situated in the Alimentary Unit in order to be able to purchase fresh produce. Furthermore, in the wholesale market of Barcelona there are a number of companies specialised in providing services to businesses in the agro-food sector, such as refrigerator companies, logistics services and quality control laboratories.

Moreover, Mercabarna host offices and warehouses (and, in some cases, stalls) of exporters with trading connection with Eastern Europe. Besides, Mercabarna - such as all the wholesale market of Spain belonging to Mercasa network - is developing more and more activities to improve its

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relationship with multiples, providing advanced logistics service dedicated to this kind of retailers. In particular, they are going to improve their role as logistics platform and provide services like processing, packaging, transport and telecommunications.

The 90-hectare Alimentary Unit houses more than 900 companies belonging to the agro-food sector:

- 400 firms devoted to the wholesale trade are located in the Central Markets;
- 500 firms located in the Complementary Activities Area (Zona d'Activitats Complementàries, ZAC). The ZAC houses companies devoted to the handling, preparation, packaging, storage, sale and distribution of fresh produce, as well as all kinds of specialised services.

These data highlight that the accessory activities outpace in numeric terms the traditional activities of the wholesale market, confirming that these services (handling, preparation, packaging, etc.) are becoming the new focus in the perishable agro-food goods business.

Mercabarna is the first example of the so called "third generation wholesale market", i.e. TLT that provide an increasing incidence of logistics activities and a decreasing role of the traditional activities of trade.

The main activities of the "third generation wholesale markets" are:

- supply of logistics services;
- logistics platform to producers, small retailers and multiples;
- support services for a deep range of products;
- processing centre for fresh produce;
- cold storage of products;
- stock exchange area;
- supporting policies for niche products;
- price "fixing" area for perishables;
- purchasing behaviour "trendsetter" in terms both of prices and seasonality;
- IT technologies for the implementation of the e-commerce for perishable goods.

In the idea of management of Mercabarna, these activities are those needed to:

- rationalize agro-food supply chain;
- reduce distribution costs;
- improve goods transport;
- improve operations of wholesale market toward any kind of any link of the supply chain (from producer, small retailers and multiples);
- development of new distribution techniques environmental friendly.

2.7 - LONG-TERM SCENERIES FOR LOGISTICS CHAINS

With regard to the demonstrators projects it was requested a forecast of the logistics chains evolution, in consideration of the progressive development of the fresh produce scenery and the related supply chain, with the aim to plan and project the demonstrators structures on the basis of the most probable situation in time horizon 2015.

For these activities, with regard to fresh produce, the Imonode Consortium outlined three possible evolution sceneries. The latter have been drawn up with regard to the modification and evolution of logistics chains and function profile of each kind of TLT handling fruit and vegetables, also taking in consideration that just modifications at these levels are the preconditions able to directly influence the application and use of the intermodality for fresh produce.

As a matter of fact, demand and supply of fruit and vegetables - considering their limited changes foreseen in time horizon 2015 (as emerges from the socio-economic analysis made during the Imonode project activities) - will have a marginal effect on the intermodal introduction and utilization, while socio-economic evolutions in the consumption habits will really speed up the changes in supply chain modifications. Finally, considering general transport, logistics infrastructures and links evolution, these issues are project and planned for all type of cargoes and they are not easily influenced by a specific category of goods such as produce.

Taken into consideration these premises, the analysis was concentrated on the sceneries forecast for logistics chains, function profile of TLTs and integration among nodal points. From these forecasts emerged three possible sceneries in time horizon 2015, on which the Imonode Consortium realized a map of the future logistics chains with regards to nodal points function

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profile and foresaw the possible future developments of the fresh produce system also with regard to the intermodality.

The forecasting analysis - in consideration of the lack of official assessments and estimates for the fresh produce supply and logistics chains evolution with time horizon 2015 and due to the single peculiarities of fruit and vegetables system - has been realized in qualitative way with the following input:

- on the basis of the present logistics chains characteristics, such as reported in Par. 2.1.2;
- on the available studies regarding the recent evolution of the producing, trading and retailing organisation in CADSES area, with the aim to have a picture of the progress registered by the fresh produce supply and logistics chains in the near past;
- on the basis of the Imonode Consortium partners experience in the fresh produce system to foresee the future evolution of the supply and logistics chains;
- with the help of the specific panel of experts to verify, adapt and validate the sceneries foreseen at two different level:
 - compatibility with the tendencies in the different supply chain rings;
 - sustainability in technical and economical terms.

From an operative point of view, after an in deep survey of the available studies realized by the main research institution and companies around the World on recent evolution of the supply chain, analysis of the present retail, trade and producing systems for fruit and vegetables within CADSES area, the Imonode Consortium began to draw up a qualitative analysis of the possible evolution of the fresh produce supply chain.

First of all, the survey made with regard to fresh produce highlighted as feed back a supply chain scenery for fruit and vegetables in CADSES area based on a non-organised production system - even in the logistics area - without the presence of significant concentration platform of the production to ship fresh produce to the redistribution market (wholesale/retail system). A condition that highlight also a non-organised shipping system with a huge and fragmented number of point of consignment without organisation and management of the flows, as well as fragmented volumes of goods to be shipped.

On the other hand, in the redistribution markets, there are a series of wholesale markets - of public ownership or private-public ownership - in proximity or within the city centres devoted to gather and delivery by road fruit and vegetables to the traditional retail system (greengrocers, street vendors, etc.) and a series of distribution centres of multiples or independent wholesalers - of private ownership - located in private area in barycentric position with regard to the point of sales, to better delivery by road fresh produce to the stores or to other logistics centres. These kinds of TLTs are presently hardly linked each other.

Moreover, there are a series of reefer/reefer container terminals devoted to receive the overseas production and delivery them to the wholesale/retail system. Nevertheless, in the present supply chain, these terminals do not provide a very efficient integration with the redistribution system.

The forecasting analysis began on the basis that - such as emerged as feed back from the desk analysis - except Italy, Austria, Greece and Slovenia, the main part of the other Countries of CADSES area are transition economies or middle income Countries.

In particular these Countries, like a general trend¹⁶, will see:

- increasing urbanisation of the population;
- modification of the rural environment with a modernisation of the agricultural sector that should lead a reduction of the huge fragmentation in the producing system and a reduction of the production made for the consumption of the growers and rural population (self-consumption);
- modernisation of the distribution system, with a wide development of the multiples and decreasing role of the traditional retail outlets (wet markets, street vendors, greengrocers, etc.), thanks to investments also of foreign supermarkets chains (in particular from France, Germany, UK and The Netherlands). And so, an increasing role of the distribution centres and a decreasing importance of wholesale markets;

Moreover, in the most advanced Countries - Italy, Austria, Greece and Slovenia - the social changes registered in the last 15-20 years suppose a slightly modification in different area of the

¹⁶ Obviously this trend will see different level of development in the different Countries and regions of CADSES area. The general trend reported are just a common tendency of the modification of the main socio-economic indicators that affect the perishables supply chain.

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socio-economic scenery: in Italy, just to give an example, it is foreseen a further concentration of the retail sector - in the wake of the evolution registered in the Northern Europe Countries - that will affect the procurement system of fruit and vegetables in terms of increasing role of the distribution centres. Besides, in Italy it is foreseen an increasing demand for value added products even in the fresh produce area, and this, will influence also the supply chain of this category of goods.

So, on the basis of these socio-economic changes, a first forecast has been drawn up. It excludes steady scenery in time horizon 2015. In other words, the Imonode Consortium expects a modification of the present supply chain of fruit and vegetables in CADSES area.

With these premises in mind, the forecasting analysis outlined three sceneries in time horizon 2015 to foresee the evolution of the role of each kind of operator and structure within the supply chain, in terms of production system, trading system, retail system - and in particular of the main operators - keeping in mind also the emerging and new consumer behaviour that could affect the supply chain.

2.7.1 - SCENERY #1

The evolution hypothesis foreseen in this scenery does not expect any intermodality development, in consideration of the supposed increasing role of distribution centres and a consequent reduction of wholesale markets importance, a steady role for reefer/reefer container terminals, interports and increasing fragmentation of the cargoes at the production level.

In particular, the increasing role of distribution centres is one of the keys of the non-development of the intermodality: as a matter of fact, these nodal points are private structures of multiples. A situation that highlights a huge critical aspect for the development of intermodality in the fresh produce trade. Distribution centres procurement is based on road transport, considering they are located in private area in barycentric position with regard to the point of sales to be served: these are areas hardly served by rail roads and it seems really unpredictable that multiples will invest own money to connect their structures to the public rail roads.

Moreover, considering that the main part of CADSES area Countries are experiencing the development of modern retail trade structures and that the main operators in the Eastern Europe countries of CADSES area are foreign chains - such as Carrefour, Spar, Metro, etc. - this scenery foresees an increasing role of the distribution centres in the flows/trade of perishable goods¹⁷.

Also industrialized Countries like Italy - that have a dominant, strong and established role of traditional neighbourhood stores for fresh produce retail - is registering and will register in the near future an increasing role of multiples. This situation will reduce also the role of wholesale markets¹⁸.

On the other side of this scenery, the foreseen non-organisation of producers at logistics level in the greater part of the Countries of CADSES area is an actual obstacle to the concentration of the cargoes at production level, in particular for fresh produce. Even in Italy, the most advanced Country of CADSES area with regard to the fresh produce system, the organised system (cooperatives, consortium, producer organisation) controls nearly 40% of production (in terms of value) of the sector¹⁹. And, even if, it is long time that the market analysts call for a better concentration - at least at logistics level - there are some external problems and internal resistance to achieve this goal. So, the fragmentation of the goods supply is one of the main obstacles to concentrate the needed volumes to develop the usage of intermodality.

¹⁷ Such as emerges from the "Planning viable food wholesale markets in Eastern European cities: a review of progress made in recent years" (2001), page 12, made by H.J. Mittendorf of CEI Wholesale Markets Foundation (www.ceiwmfoundation.org); and such as emerges in the working paper of H.J. Mittendorf of CEI Wholesale Markets Foundation for the "Workshop on diversification of wholesale market commercial activities", 8-10 September, 2003, Budapest, Hungary, pag. 1.

¹⁸ Ref. Note n. 17.

¹⁹ Such as reported in "Analysis of the Common Market Organisation in fruit and vegetables" (2004), page 13, realized by European Commission and in the workshop "Crisi dei prezzi, crisi dei consumi o crisi dell'impresa" (26 May 2005), slide #12, made by Unione Italiana delle Associazioni dei Produttori Ortofrutticoli e Agrumari.

Moreover, the assumptions foreseen in this scenery highlight a huge increase of the flows by road²⁰ that will determine an increase in trade costs and a growth in the time of delivery. The latter will lead to negative consequence for the freshness and quality of fruit and vegetables.

2.7.2 - SCENERY #2

This scenery does not foresee an improvement in the intermodality usage with rail but only an optimisation in road services and intermodality road-sea/sea-road. The evolution hypothesis of this scenery is based on a slightly modernisation of the present situation such as highlighted in the last few years from the greater part of the market analysts as a consequence of the big problems faced by fruit and vegetables system.

This scenery foresees a rationalization of the present role of each typology of TLT involved in the fresh produce trade. In particular, it means more integration between distribution centres and wholesale markets, specially in the Eastern part of the European Union, and development of concentration platform at the production level - able to gather an increasing volume of fresh produce to a small number of point of shipment - to increase full lorries bound to the distribution and consumption areas and improve all the activities of the reverse logistics. Moreover, this scenery foresees also a development of distribution platforms able to concentrate an increasing volume of fruit and vegetables to few point of delivery and so rationalize the redistribution operation. In particular, this scenery foresees a better integration among distribution centres of the same multiples chain to rationalize the numbers of these structures and realize distribution platforms in the same way of concentration platforms of production.

This is a rationalization able to reduce costs, speed up the trade business in terms of time and develop a series of synergies among demand and supply, such as shown in the demonstrators project and analysis reported in Chapter 3 of this publication.

However, as a matter of fact, this rationalization regards in prevalence the operators of the fruit and vegetables system (producers, wholesalers and retailers) and so does not involve the infrastructure system. In particular, the needed investments at the railroads level are not foreseen. For this reason, this scenery supposes an optimisation of the road services among operators within the same Country or neighbourhood Countries and an improvement of the intermodality road-sea/sea-road for the Countries linked by the sea. Development of the intermodal connection between road and sea, in particular, are backed and confirmed by the following trends:

- increasing trade flows of "low price" traditional fresh produce from developing areas (Egypt, Morocco, Turkey, etc.);
- increasing flows of products in counter season from Southern Hemisphere (i.e. during the period of non-production in Europe). It is the case of fresh fruit from Chile, South Africa, New Zealand, etc.;
- general globalisation of the fruit and vegetables trade, with the foreseen increasing role of "new" supplier Countries such as India, China, Pakistan, etc., for traditional and "new exotic" products.

This scenery will lead to a slightly reduction of the traffic by road - in particular thanks to the concentration of the goods at production and redistribution level - and so a slight decrease of the transport cost. Examples of supply chain yet rationalized in this way are coming - with interesting economic results - in Hungary and Italy. In Hungary, within the wholesale market of Budapest operates a distribution centre of the German retailer Metro. Moreover, in the area of Budapest is under construction Agrogate Hungary, the first Central Europe horticultural hub, where research and development, training, state-of-the-art food processing and the distribution of fresh produce are all conducted under one roof, with the aim to rationalize the supply chain, reduce costs and concentrate the greatest possible volume of goods in one site.

At the same time, also within the Italian wholesale market of Bologna there is a trial collaboration among the wholesale market and the supermarket chain Coop Italia, with the aim to rationalize the supply chain of frozen foods.

²⁰ In consideration of the "dramatic" present in term of road congestion and the foreseen increasing road traffic in the main paths for fruit and vegetables trade (i.e. from South Italy to North Italy and from North Italy to Austria) in time horizon 2015 as a consequence of the present scenery.

2.7.3 - SCENERY #3

This scenery foresees an intermodality development in a continuative way for traffic of fruit and vegetables considering that this reflects the “ideal” supply chain for this kind of products. Scenery #3 foresees an in deep rationalization of the supply chain with an important evolution of any kind of TLT under analysis that design a “new” logistics assessment for fresh produce. In particular, a progressive structural integration among distribution centres and wholesale markets in one side and with concentration platforms, in the other side. Integration able to rationalize the whole trade flows from production areas to consumption areas: in one word “from farm to fork”.

This radical rationalization is the result also of a real and strong concentration of goods at production level, thanks to an increasing role of the organised production in the fresh produce system²¹.

With this in deep rationalization, the “new” supply chain backs and supports the introduction of intermodality between rail and road from main production areas to main consumption areas and also a development of the other kind of intermodality: sea-road and sea-rail.

With this kind of logistics/supply chain there will be a concentration of the goods both at production and redistribution level. This scenery supposes:

- an aggregation of the trade in defined paths that connect directly concentration and distribution platforms (for example, concentration platforms of producers in the area A to the cluster of wholesale market and distribution centres in the area B);
- defined means of transport and reduction of lorries on the roads. For example:
 - road from production area to concentration platform;
 - rail from concentration platform to distribution platform;
 - road from distribution platform to consumption area;
- defined flows and scheduled deliveries (for example, a block train from the concentration platform of the area A every 2 days bound to the cluster of wholesale markets and distribution centres in the area B).

In other words, this scenery foresees all the needed variables of the supply chain able to support the intermodality, along with:

- size of volumes per time unit (a block train of 20 wagons 25 MT each one of net weight per week);
- distance from source to destination over 800 km and interim nodes every 400 km or source and destination nodal points linked by the sea.

This scenery highlights a radical decrease of the road traffic, with an optimisation of the delivery times: the ideal solution for handling of fruit and vegetables in consideration of their peculiarities of freshness that need frequent and quickest delivery.

In this context, it is important to underline that assumptions and work hypotheses to apply the intermodality are all satisfied in the main routes of trade in CADSES area, such as highlighted in the following pages.

2.7.4 - SCENERIES SWOT ANALYSIS

Once draw up, these sceneries have been verified and first validated with the panel of experts in the fresh produce system with regard to the evolution expected in each ring of the supply chain.

In this context, the Imonode Consortium realized a survey made by SWOT analysis (strengths, weaknesses, opportunities and threats) to highlight the most probable scenery in time horizon 2015.

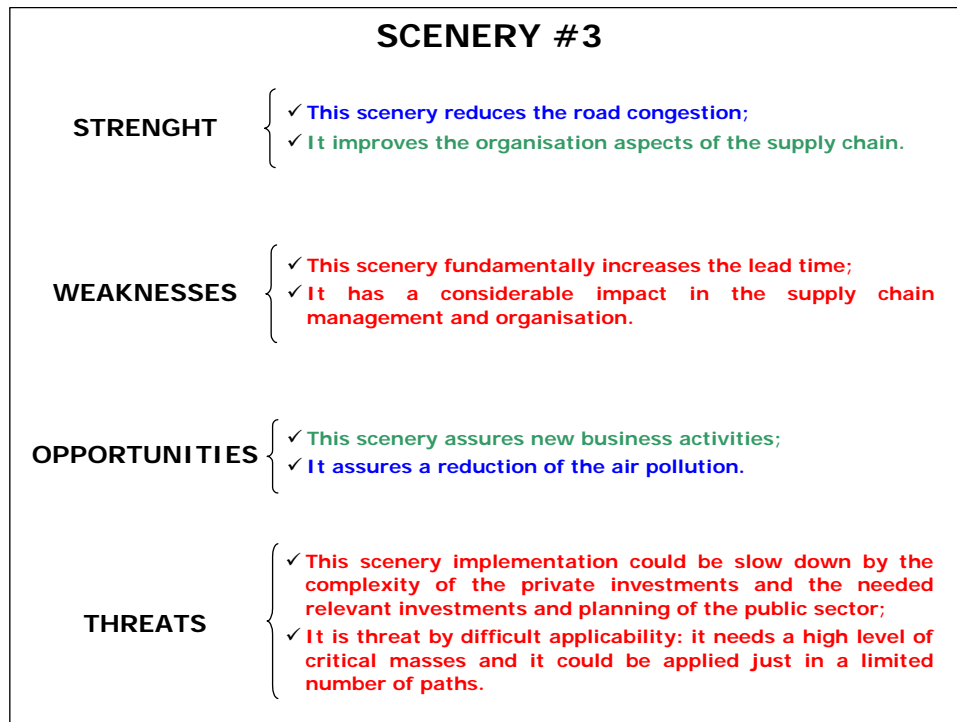
The SWOT analysis has been realized from the point of view of the fresh produce system operators highlighting strengths, weaknesses, opportunities and threats with regard to the importance for the operators activities:

- **remarkable importance - indicated in red colour;**
- **medium importance - indicated in green colour;**
- **low importance - indicated in blue colour.**

²¹ A more organized system is also a goal foreseen by the European Union for the fresh produce sector with the Common Market Organisation (CMO) developed in 1996 and not yet reached both because of lack in the EU regulations and the wariness and resistance of the producers. Anyway, in 2006 EU will simplify the CMO regulations with the aim to make easier and attractive the concentration of the production in producers organisations.

| SCENERY #1 | |
|----------------------|---|
| STRENGTH | <ul style="list-style-type: none"> ✓ This scenery does not foresee any modification of the supply chain. In other words it assures continuity with the past condition of the supply chain; ✓ It reflects the relationships within the supply chain: the most powerful operators (i.e. multiples) will continue to determine the marketing conditions for perishables. |
| WEAKNESSES | <ul style="list-style-type: none"> ✓ This scenery increases cargoes fragmentation that is one of the main weaknesses of the perishable system in CADSES area; ✓ It makes heavy the logistics organisation, i.e. one of the elements that prevent the optimisation of the perishables trade in CADSES area. |
| OPPORTUNITIES | <ul style="list-style-type: none"> ✓ This scenery assures an high value of the services for the logistics providers; ✓ It supports the Information Technology application to better manage and audit the supply chain activities. |
| THREATS | <ul style="list-style-type: none"> ✓ This scenery results in an increase of the transport costs and air pollution; ✓ It is threat by the high level of saturation and the inadequate development of the transport infrastructure. |

| SCENERY #2 | |
|----------------------|---|
| STRENGTH | <ul style="list-style-type: none"> ✓ This scenery is easy to apply, considering also the modular nature of the concentration platform, that allow an implementation of the latter by steps able to assure the full operability of the structure; ✓ It has a moderate impact in the supply chain management and organisation. |
| WEAKNESSES | <ul style="list-style-type: none"> ✓ This scenery implementation could be slow down by fragmentation of the producing system and low inclination of the fresh produce system to the innovation; ✓ It contributes to reduce the role of wholesale markets within the perishables supply chain. |
| OPPORTUNITIES | <ul style="list-style-type: none"> ✓ The rationalisation activities of this scenery are able to reduce the transport costs, air pollution and improve the freshness of the product traded; ✓ It assures an improvement of all activities connected to the reverse logistics (increase saturation of lorries and reduction of empty lorries in the return journeys). |
| THREATS | <ul style="list-style-type: none"> ✓ This scenery implementation could be slow down by the concentration activities in course for the main operators of the production and distribution system; ✓ It is threat by the complexity of the investments to develop the needed structures to rationalize the supply chain. |



From the SWOT analysis comes that each one of the three sceneries could be possible for 2015 in theoretically terms, although "Scenery #2" results the most probable for 2015 in concrete term as emerged from the SWOT analysis reported above and the other two are quite unlikely, for different reasons.

As a matter of fact, "Scenery #2", that the Imonode Consortium called "Likely", is that with the high incidence of the remarkable importance items for the operators activities in the areas of strengths and opportunities and the high incidence of the low/medium importance items for the operators in the areas of weaknesses and threats. In parallel:

- "Scenery #1", called "Pessimistic", subtend a huge increase of the flows by road that will determine an increase in trade costs and a growth in the time of delivery and so negative consequence for the freshness and quality of fruit and vegetables;
- "Scenery #3", called "Dream", request a too radical change of the supply chain, a change that considering the "problems" highlighted within the fresh produce sector in the analysis made in the previous steps of the project is quite hard to achieve in time horizon 2015.

So, nevertheless from the analysis reported above, the only one scenery for fresh produce supply chain in time horizon 2015 that foresees a development in continuative way of the intermodal traffic is the "Dream scenery", the Imonode Consortium of partners suggested "Likely scenery" to realize two FreshLog Pilot demonstrators as territorial concentration platforms in the context area at the feasibility level. As a matter of fact, in Consortium opinion, the rationalization activities foreseen by the "Likely scenery" will lead to a supply chain able to support a fresh produce terminals development and networking.

Anyway, if all conditions and rationalizations foreseen by "Dream scenery" will be realized in the next few years there will be the possibility of the intermodality for transport of fruit and vegetables development in the routes under analysis and for this reason the Imonode Consortium developed a flows estimation through intermodal connection in time horizon 2015.

2.8 - FUTURE LOGISTICS CHAINS IN TIME HORIZON 2015

On the basis of the three sceneries realized for time horizon 2015, the analysis has been completed with a forecasting survey on the future logistics chains for each one of them.

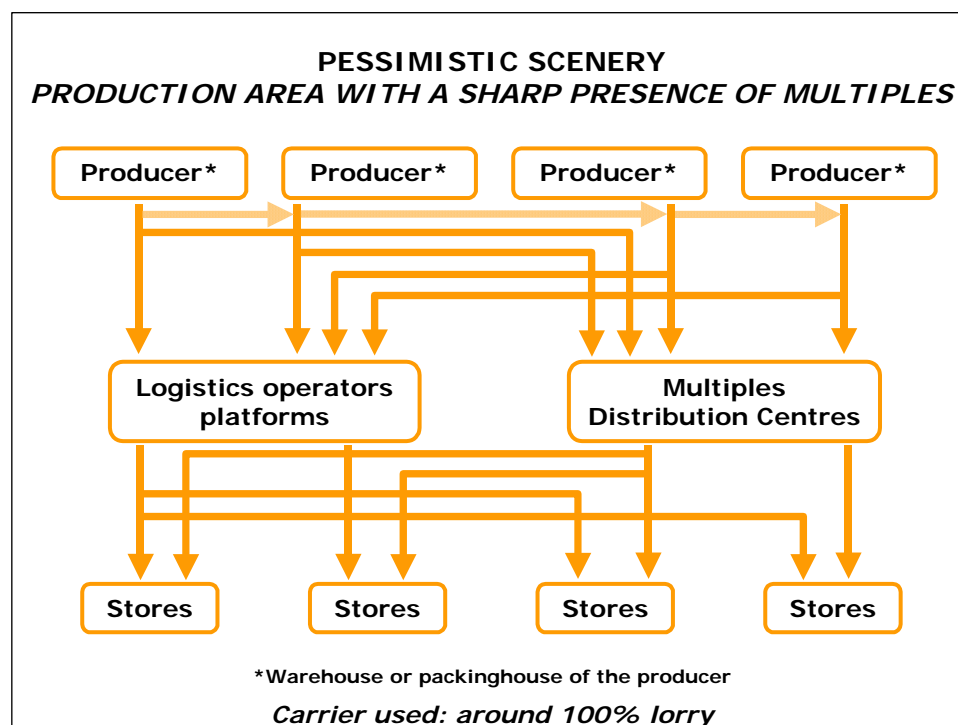
So, the fresh produce basic logistics chains present in CADSES area was identified and presented in the following pages to highlight the single peculiarities of fresh fruit and vegetables supply chain and so verify the possibility to develop an intermodal connection in the trade of fresh produce.

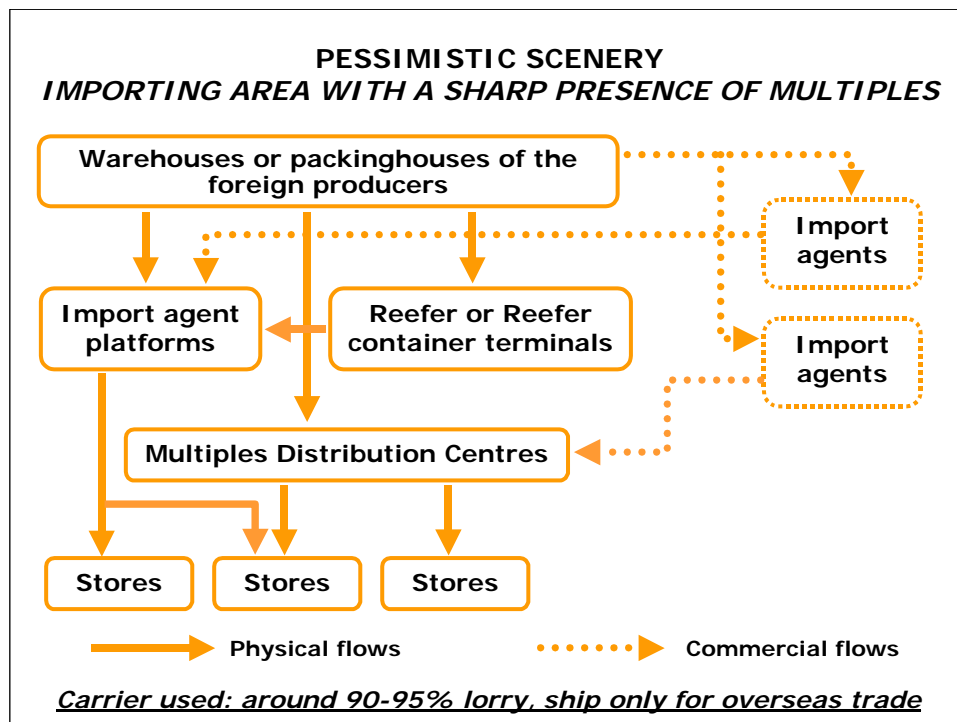
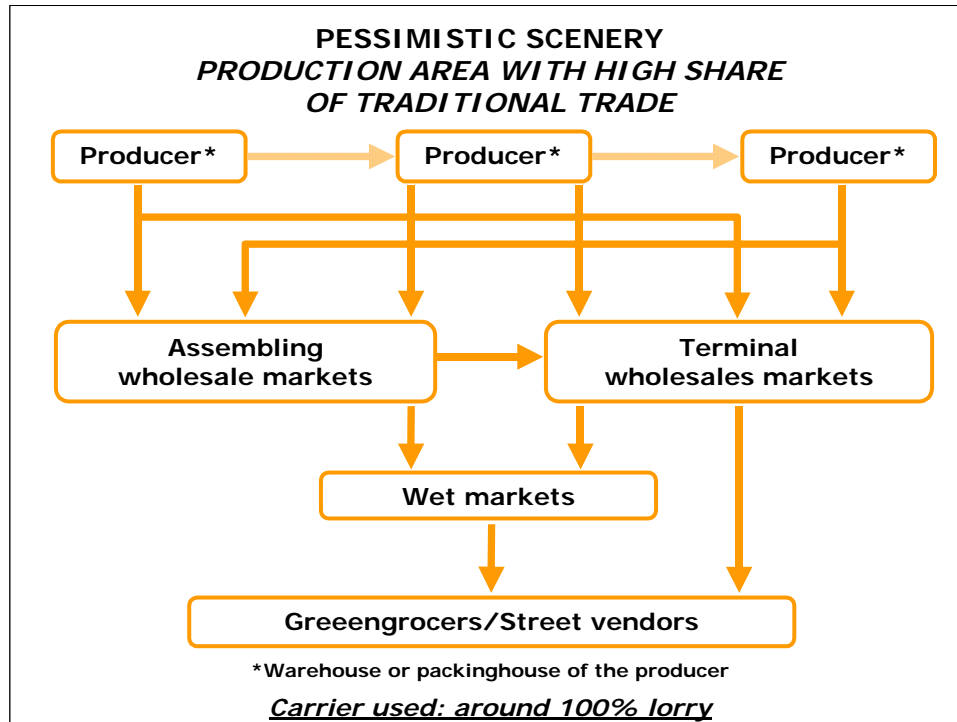
The figures presented are the basic logistics chains while the real logistics chains for fruit and vegetables are frequently integration of the basic ones.

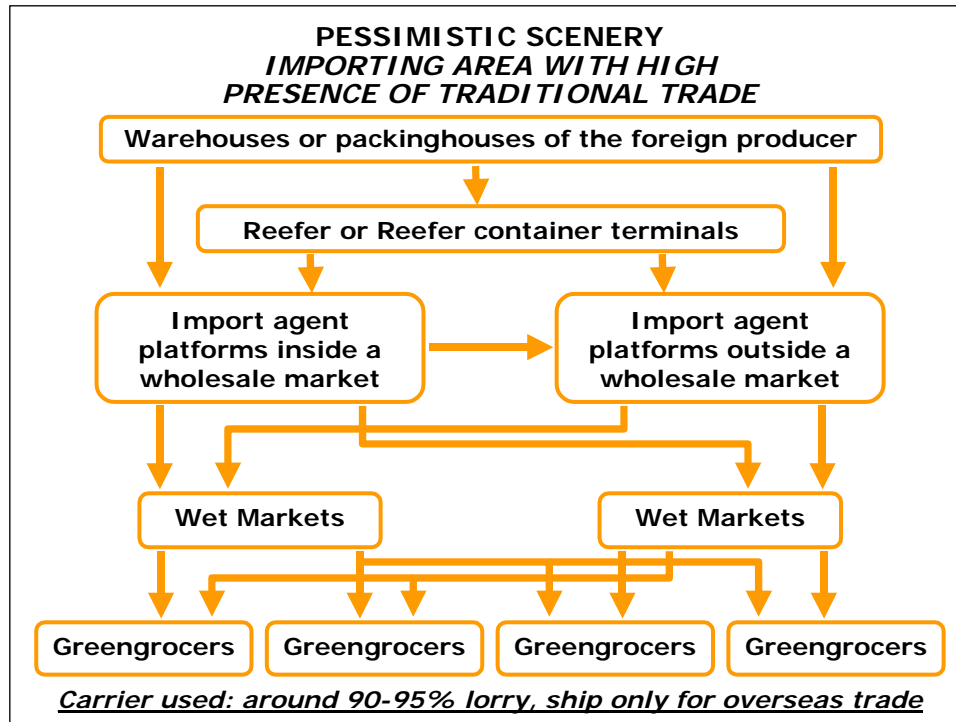
2.8.1 - PESSIMISTIC SCENERY

This scenery will lead to a development of logistics chains devoted to fruit and vegetables characterized by:

- several logistics chains operating in a parallel way;
- low level of cargoes optimisation;
- decreasing level of the lorries saturation;
- decreasing level of deliveries per each transport line;
- increasing level of empty lorries in return journey;
- increasing level of road traffic (in terms of lorries on the road);
- increasing transport cost;
- increasing pollution and other social costs;
- reduction of freshness and quality of fresh produce in transport.





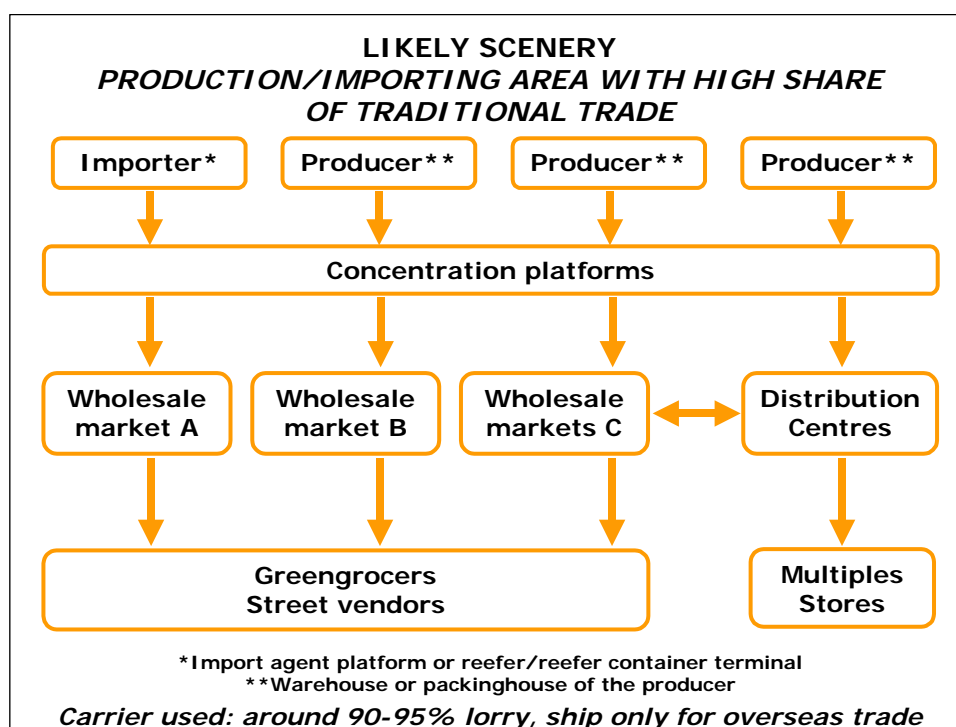
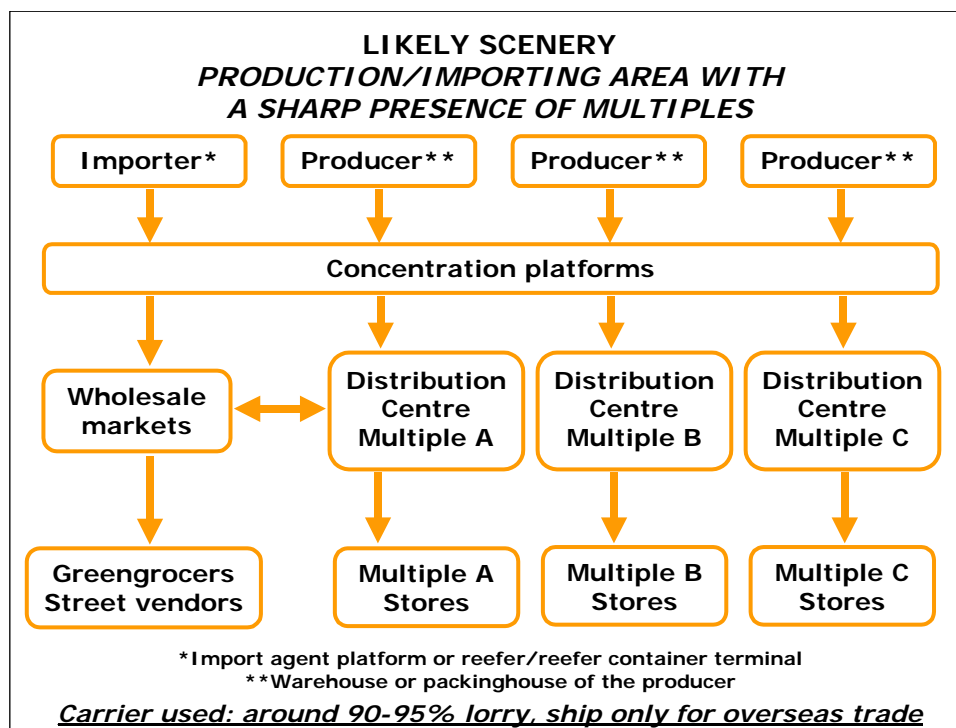


2.8.2 - LIKELY SCENERY

Thanks to the rationalisation foreseen at production and distribution level, this scenery will lead to an increase of the lorries saturation thanks to the concentration platform development. The latter, gathering the production of several producers/importers are in a condition to realize full lorries for each transport line bounded to a distribution centre of a multiples chain or a distribution platform of multiples chains or a wholesale market.

In this way, thanks to the increasing saturation of each transport journey, there will be:

- rationalization of the lorries on the roads (with a slightly reduction of the number of lorries in transit on the roads);
- reduction of transport cost per unit in transport;
- reduction of pollution;
- slightly increase of freshness and quality of fresh produce in transport.



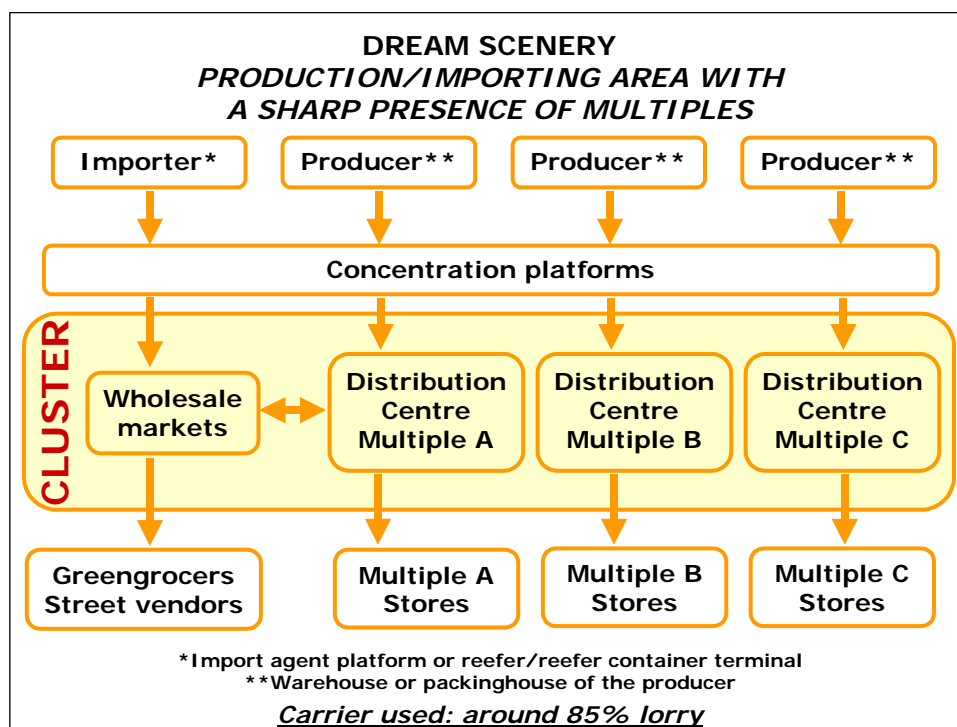
2.8.3 - DREAM SCENERY

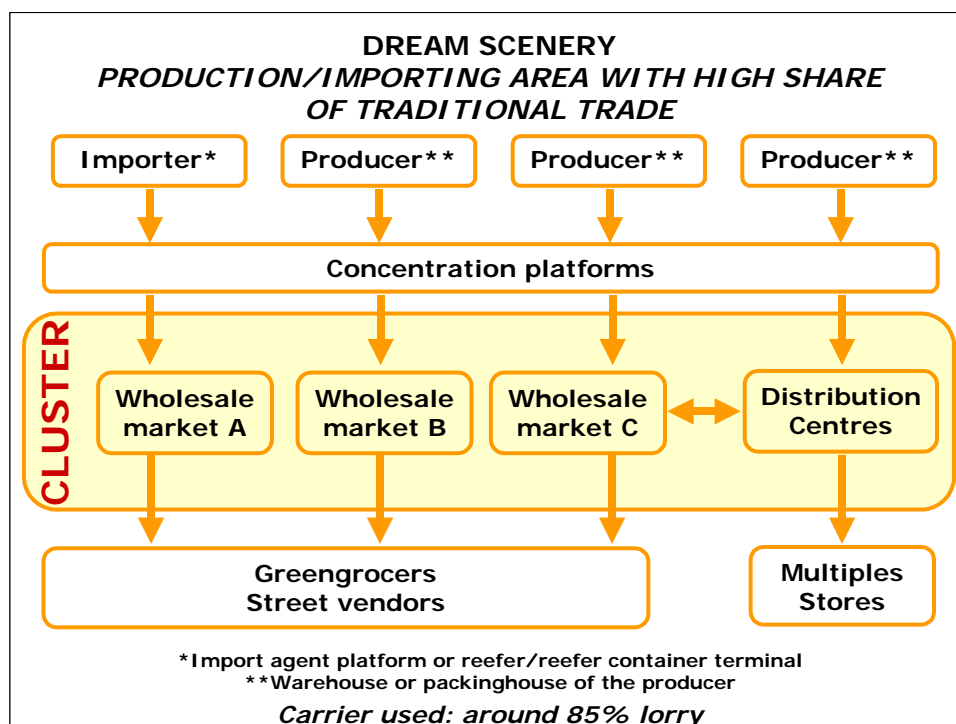
Thanks to the radical rationalisation and integration foreseen at production and distribution level and in particular between distribution centres and wholesale markets, to concentrate in a smaller number of point of delivery fresh produce to the consumption area, this scenery will lead to a development of the intermodal transport.

In this way, thanks to the intermodality development, there will be:

- reduction of the number of lorries in transit on the roads, also thanks to the increasing saturation of the lorries;
- reduction of pollution.

As a matter of fact, these activities of rationalizations are able to create a series of logistics structures (concentration platform in one side and cluster of redistribution platform and wholesale markets on the other side) able to reduce the number of shipping/delivery points for the production/redistribution market and set up a network of fruit and vegetables terminals.





2.9 - INTERMODAL TRANSPORT MODELLING

Considering the final results of the Imonode project, the Consortium decided to verify the potentialities for the intermodal connection in the fresh produce system with regard to the present situation and for the evolution of the supply and logistics chains in time horizon 2015. Such as highlighted in the previous steps of the analysis, during the determination of the transport routes for fresh produce, presently the intermodal connections for fresh produce are almost all limited to the ship-lorry link and just where needed.

In this way, considering that currently the demand for intermodal service is negligible and there are not supply packages, it seemed really arbitrary any kind of hypothesis to enable estimation in the short and middle terms for the intermodal transport demand. For these reasons, within fruit and vegetables, it seemed more right to develop a model to determine if traffics of the products are able to support the development of intermodality in the main Corridors in terms of volumes, frequency and origin/destination balance rather than an estimate of the intermodal trade demand on the basis of logistics nodes utilized, because it seems there is not a concrete demand in this way.

2.9.1 - INTERMODAL TRANSPORT MODELLING: PRESENT SITUATION

To realize the intermodal transport modelling, it was made a preliminary analysis to focus the survey in the main interesting area in 2000-2001 (Corridor X, Corridor V and Adriatic-Ionian route), such as emerging from the origin/destination matrix analysis. In particular, in the following pages it is reported the model regarding Adriatic-Ionian corridor, considering that it is the most important and interesting in terms of fresh produce flows within CADSES area and also because it includes the demonstrators areas of Cesena and Taranto.

The first step of methodological approach was to determine the logistics areas of the modelling in which locate intermodal nodes.

Besides, it was estimated the volumes of the fruit and vegetables from South to North and those of fresh produce and meat²² from North to South in order to calculate the level of balance among the two routes.

With these bases, on the ground of the Imonode Consortium experience and on statistical data, obtained from different sources at industry level, it was build up a series of tables of the commercial seasonality of fruits and vegetables in each NUTS 2 of the reference area and of each NUTS 0/1 outside CADSES area involved in the model. These tables have been verified with the experts panel of the main products categories on the basis of the commercial calendar and the seasonality of the demand.

The result of the analysis is widely satisfactory with reference to the aims, considering that the average commercial seasonalities are the only indicators able to define a potential trade to verify possible development of an intermodal service. As a matter of fact, the real values of seasonality are widely fluctuating in consideration of the climatic trend both for production and consumption.

Once calculated the volumes involved, it was estimated the number of potential full trains per month (20 wagons of 25 MT net weight of product each one) needed to transport products among different Nodes in the case that all products are shipped by intermodality. So, considering the available data, this is an estimation of the maximum potential intermodality movements in the route under analysis, but it is important to underline that the volumes resulting from the modelling are underestimated with regard to the real volumes flows along the route under analysis, considering that they regard just flows among selected NUTS 0/1/2 within CADSES area and do not include flows in transit from other sources and to other destinations.

The reference area of the analysis regards the flows from southern Regions of Italy (Sicilia-ITA, Calabria-IT93, Basilicata-IT92, Puglia-IT91 and Campania-IT8) across Emilia-Romagna-IT4 to Austria-A and Germany-D, while the routes are those connecting the four selected nodes:

- Node 1 - located between ITA (Sicilia, Italy) and IT93 (Calabria, Italy);
- Node 2 - located in IT91 area (Puglia, Italy);
- Node 3 - located in IT4 area (Emilia-Romagna, Italy);
- Node 4 - located in AT21 area (Kaernten, Austria)²³.

Intermodal Transport modelling results in the routes under analysis are reported in the following figures.

In the South-North flows the main path emerging from the modelling is that from Node 2 (IT91) to Node 3 (IT4). This path regards a flow volumes of more than 2,4 millions of MT/year in the reference period (average 2000-2001), a volume double of that from Node 3 (IT4) to Node 4 (AT21).

The main redistribution market in the South-North flows is served by Node 3 (IT4) with more than 1,6 millions of MT.

The seasonality of traffic even if present in the flows is not exasperated.

With regard to the potential full trains (20 wagons of 25 MT net weight each one) the non-stop path that originate from Node 2 and destination to Node 3 remains the most important with at least about 3 full trains per day²⁴ in the lowest traffic month (April). Also the non-stop trains departing from Node 2 directly connected with Node 4 and non-stop trains from Node 1 directly connected with Node 3 register interesting flows, with at least 1 full train per day.

Moreover, also the non-stop traffic from Node 3 directly connected to Node 4 highlights nearly 1 train every 2 days in May.

²² In this case, meat was added considering that represent the greater part of the trade from North to South and the only one category of perishables able to assure any possibilities to have a cargoes balance.

²³ Input, assumptions and conditions of the fresh produce flows used for the modelling are reported in the Appendix A.2.

²⁴ On the basis of 30 days per month.

FIG. 5 - SOUTH/NORTH TRAFFIC OF FRESH PRODUCE IN 2000-2001 (MT)

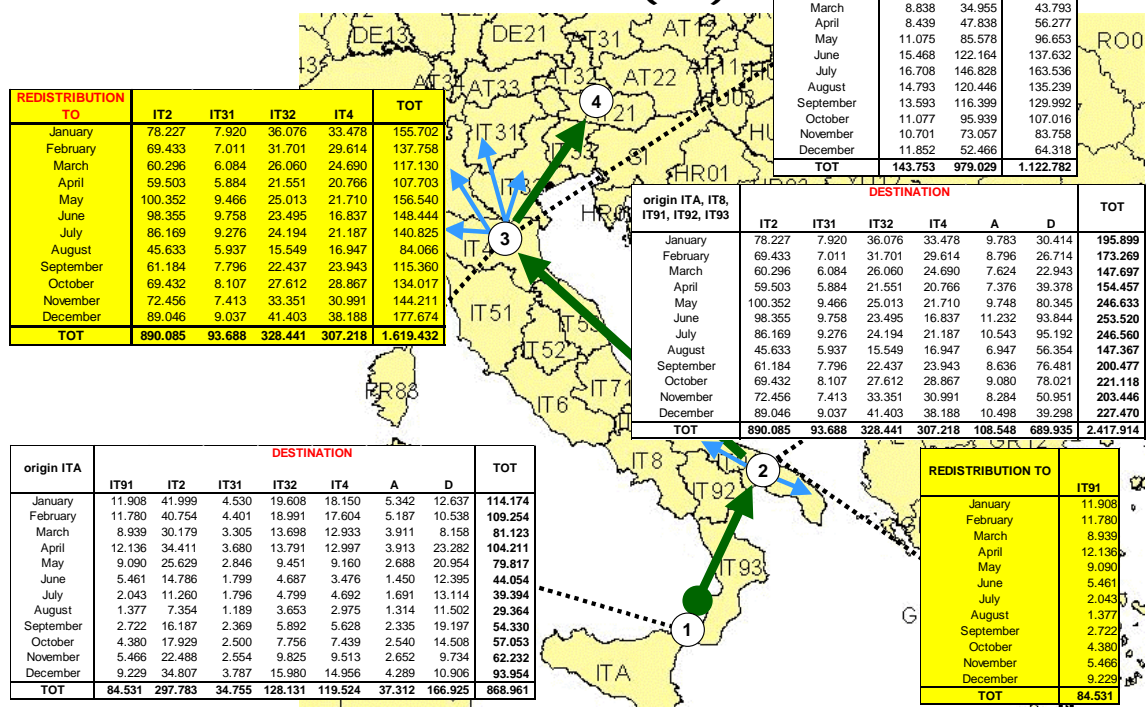
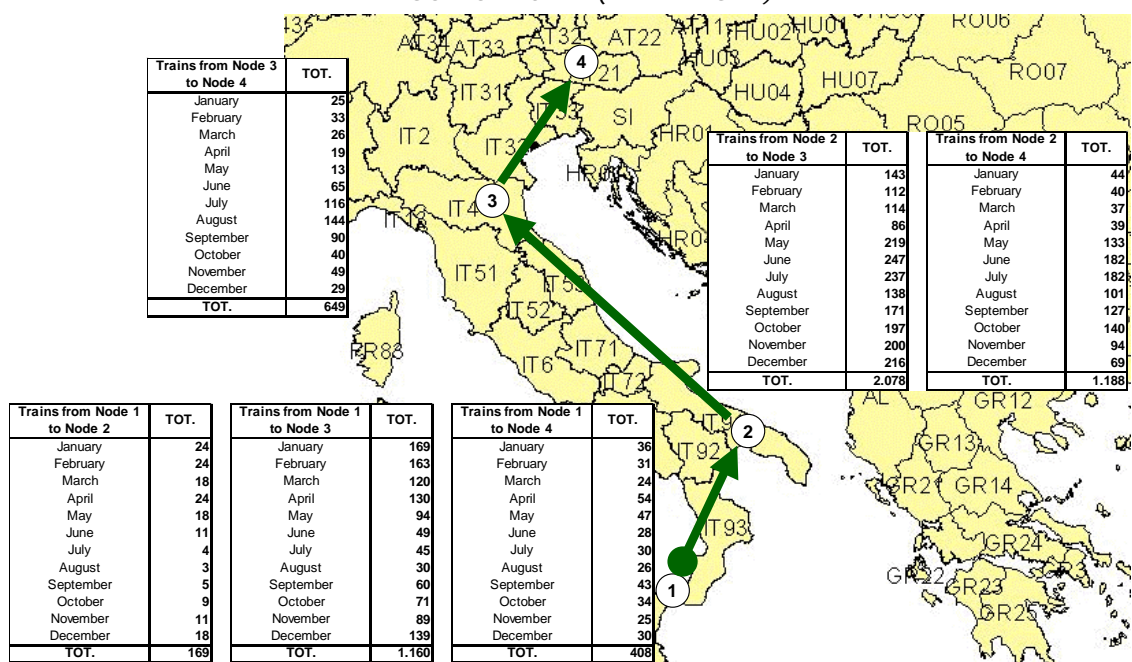


FIG. 6 - SOUTH/NORTH POTENTIAL TRAINS BY ROUTE AND MONTHS IN 2000-2001 (TRAINS OF 20 WAGONS*)

*WAGON OF 25 MT (NET WEIGHT)

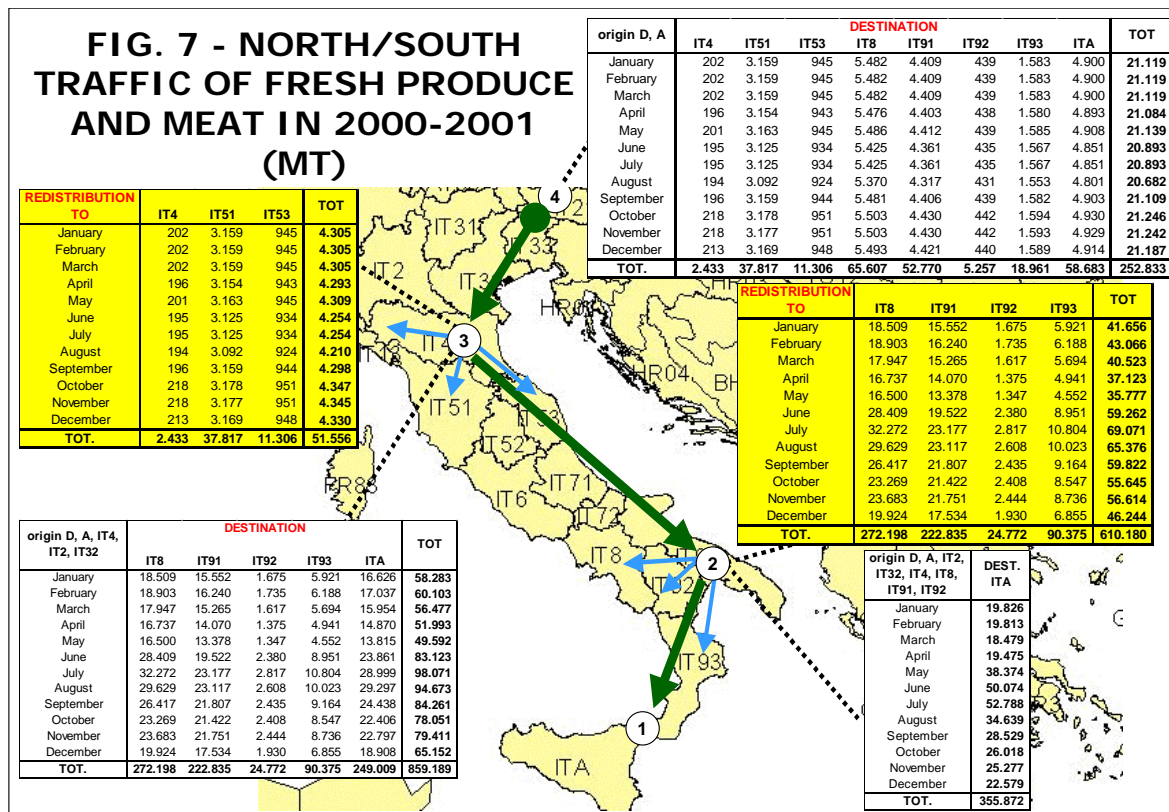


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From the North-South point of view, the route from Node 3 (IT4) to Node 2 (IT91) is still the main in terms of traffic that emerges from the modelling, with about 860.000 MT, that is 36% of the total traffic in the South-North bound (i.e. more than 2,4 millions of MT). The flows from Node 2 (IT91) to Node 1 (ITA) are more than 350.000 MT, while the flows from Node 4 to Node 3 is nearly 260.000 MT.

The traffic is continuous over the year and without any specific seasonality effect.



With regard to the potential full trains, the non-stop path that originate from Node 3 and destination to Node 2 remain the most important with more than 1 full train per day in the lowest traffic month (May).

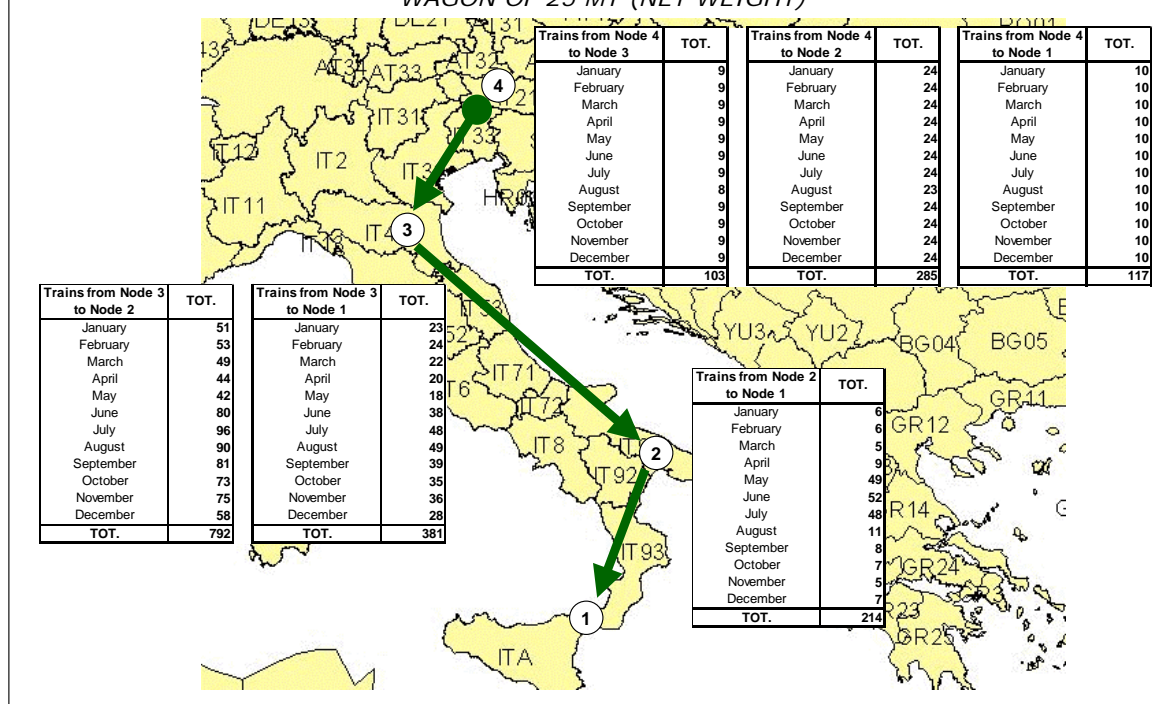
Also the non-stop trains departing from Node 3 directly connected with Node 1 highlight more than 1 train every 2 days in May.

Moreover, the non-stop traffic from Node 4 to Node 2 highlights nearly one per day in each month of the year.

In conclusion of these modelling, anyway, it is important to underline that with regard to the flows and products analysed, the comparison of South-North and North-South flows highlight that there is not a perfect balance of traffic, with the North-South flows that represent respectively 22% (Node 4 to Node 3), 36% (Node 3 to Node 2) and 40% (Node 2 to Node 1) of the volumes in the corresponding South-North flows.

FIG. 8 - SOUTH/NORTH POTENTIAL TRAINS BY ROUTE AND MONTHS IN 2000-2001 (TRAINS OF 20 WAGONS*)

**WAGON OF 25 MT (NET WEIGHT)*



2.9.2 - INTERMODAL TRANSPORT MODELLING: FORECAST ANALYSIS TOWARD 2015

From a forecasting point of view, in consideration of the lack of data regarding transport of perishable goods useful for the Imonode project purposes, the absence of any available forecast data about production, trade and consumption of perishable goods and the lack of forecasting software/tools specific for this category, the Imonode Consortium realized a quanti-qualitative tendency analysis on the main macro-categories (fruit, vegetables and meat²⁵) of perishable goods.

The key elements of this analysis are:

- estimated trend for production of NUTS 2 of origin;
- estimated trend for consumption of NUTS 2 of destination;
- estimated trend for market competition on the NUTS 2 of destination²⁶.

From an operational point of view, the forecast analysis based on the time series tendency has been applied to the same routes and products categories of the intermodal transport modelling presented in the previous Paragraph.

Moreover, this analysis have been completed with a brief survey on the possible effects of the traffic of fruit and vegetables that could be redirect from Southern bound of Mediterranean Sea to the Northern Europe across CADSES area, in consideration of the foreseen increase of the flows from these Countries toward Europe. The Countries analysed are Egypt (ET), Israel (IL), Turkey (TK) and Syria (SYR). And their flows have been considered toward Italy (I), Austria (A) and Germany (D).

These increasing volumes could be redirect from the existing routes across Italy (I) or Greece (GR) to Northern Europe enlarging the traffic flows in the routes in analysis.

With these inputs provided, the intermodal transport modelling results in the routes under analysis reported in the following figures highlighted a decrease - in regard to the average data for 2000-2001 - of nearly 7-12% of fruit flows in each stage of the South-North route from Node 1 to Node

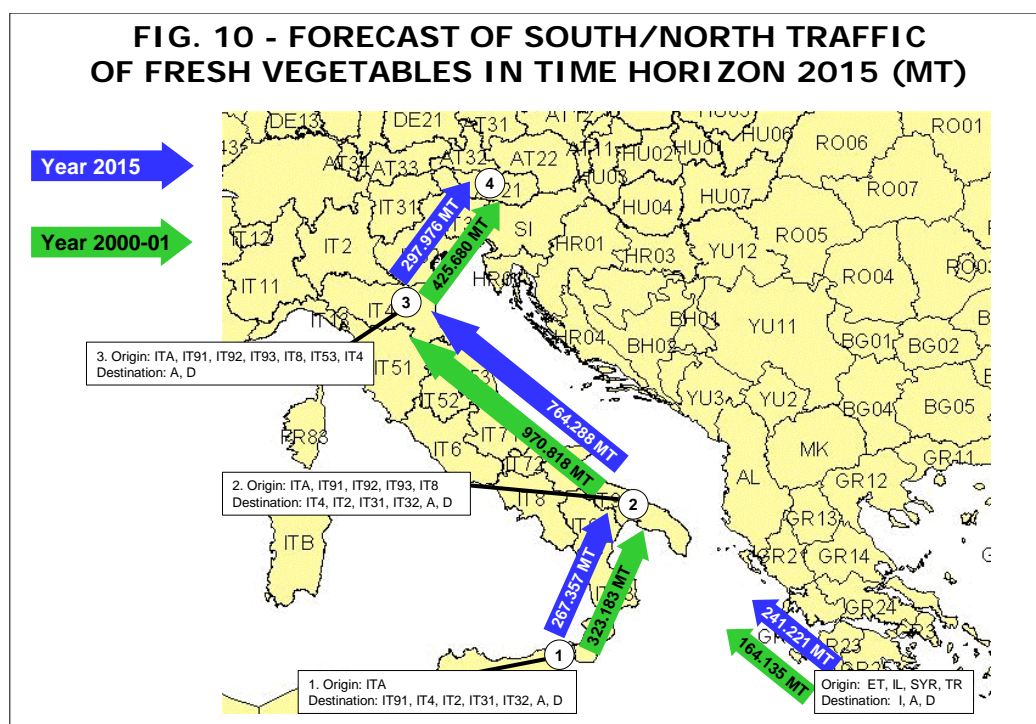
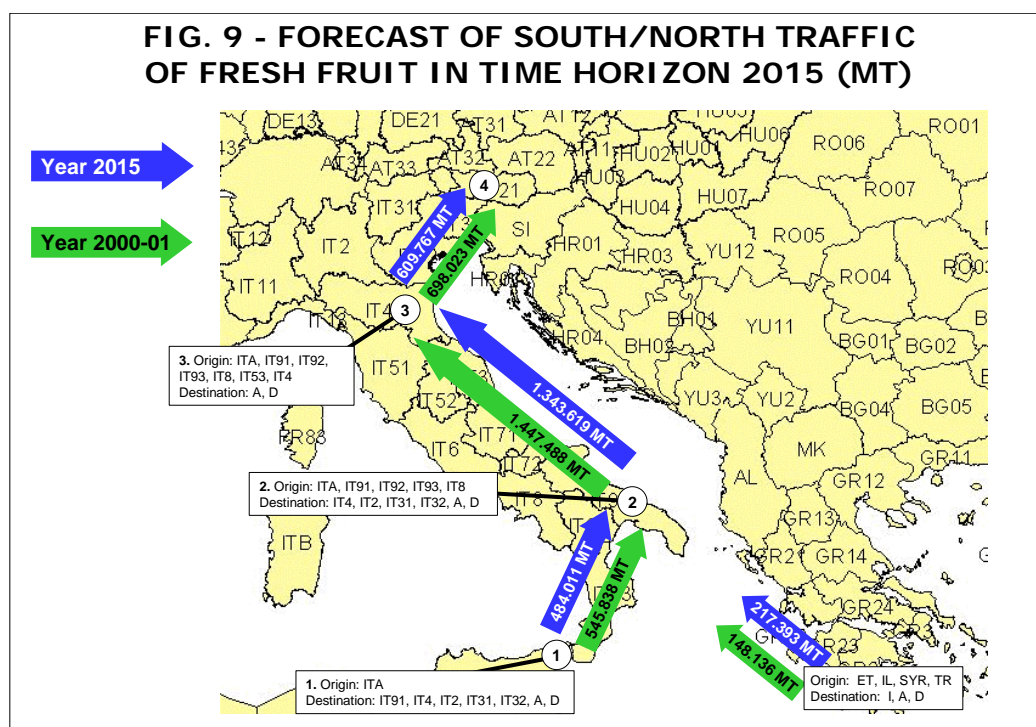
²⁵ For the same reason reported in the previous Paragraph (Ref. note n. 22).

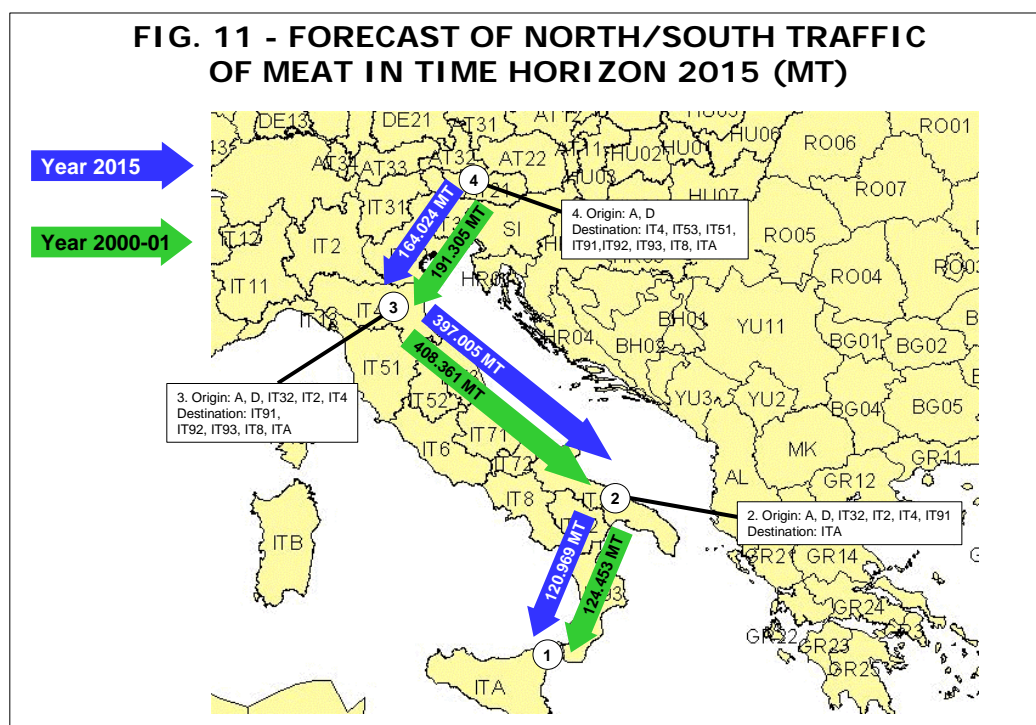
²⁶ The detailed methodology and inputs of this modelling are reported in Appendix A.3.

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4 and nearly 17-30% of vegetables volumes in the same route. In parallel, meat traffics forecast in the North-South bound registered a reduction from more than 14% from Node 4 to Node 3 and less than 3% in the other stages of the path. These trends are related to: reduction of fresh produce and meat output in the main European growing areas, drop of consumption of perishable in the high industrialized NUTS 2 and greater competition from emerging Countries in the destination market.





2.9.3 - INTERMODAL TRANSPORT MODELLING: FORECAST ANALYSIS TOWARD 2015 IN THE LIKELY AND DREAM SCENERIES

From a forecasting point of view, the methodology utilized in the previous Paragraph has been rounded off to deepen the level of investigation from NUTS 2 to NUTS 3.

It means that it was rounded off the flows forecasted in the previous Paragraph considering the traffic among selected NUTS 3 on the basis of the volumes estimated for flows among NUTS 2. Practically, it was deepened the theoretical flows estimated in the previous Paragraph (in term of potential flows in transit in each NUTS 2 under analysis in time horizon 2015) to provide an estimation of the flows passing or could passing (in consideration of the rationalization hypothesis foreseen by "Likely" and "Dream" sceneries) through each NUTS 3 under analysis in time horizon 2015.

Then, in the demonstrators activities it was positioned the flows in a physical site to determine how many volumes could be caught by the territorial logistics structures under project.

On the basis of the analysis made with regards to the TLTs in the previous steps of the analysis and on the basis of the tendency analysis reported in the previous Paragraph, the first selected NUTS 3 along Adriatic-Ionian route for the forecast in time horizon 2015 are those reported in the following table.

TAB. 6 - SELECTED NUTS 3

| | NUTS 2 | NUTS 3 |
|--------|---------------|-------------------------|
| Node 1 | ITA/IT93 | Messina/Reggio Calabria |
| Node 2 | IT91 | Taranto |
| Node 3 | IT4 | Cesena |
| Node 4 | AT21 | Villach |

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Once identified the NUTS 3 in the routes and categories highlighted in Par. 2.9.1 for the 2015 forecast, the survey has been developed analysing how many part of the fresh produce flows as highlighted in the previous pages could pass or could be caught by the NUTS 3 identified in the previous step of the forecasting analysis in the rationalization hypothesis of the supply chain foreseen by both Likely and Dream sceneries.

Considering the lack of the origin/destination statistical data with NUTS 3 details, to realize this forecast it was decided to develop a quanti-qualitative analysis based on the available data (coming from previous steps of the Imonode project and specific in deep analysis for this goal such as reported in Appendix A.4) and on the Imonode Consortium experience in the fresh produce sector, verified with the specific experts panel.

In particular, the goal of this activity has been the estimation of the potential volumes flows that each one of the NUTS 3 in analysis could catch on the basis of its location.

So, following the methodological approach reported in detail in Appendix A.4, it was forecasted 2 sceneries for the flows in time horizon 2015, with the modification of the supply chain foreseen by "Likely scenery" and "Dream scenery":

- **Scenery 2015 only monomodal** - this scenery foresees the 2015 flows crossing the NUTS 3 under analysis in a logistics background based on a situation in which the greater part of the traffic of fresh produce within CADSES area will be realized by lorry and with a slightly rationalization of the supply chain, i.e. in the condition foreseen by the "Likely scenery";
- **Scenery 2015 only intermodal** - this scenery foresees the 2015 flows crossing the NUTS 3 just via intermodal connection, in a logistics background that will register a "realistic" development of the intermodality in the traffic of fresh produce and a huge rationalization of the supply chain, i.e. the organisation and logistics condition foreseen by "Dream scenery".

These two sceneries are different in consideration of:

- the attraction and redistribution basins (i.e. the area from which the reference NUTS 3 could receive the perishable products);
- the share of volumes from the different sources could be caught by the NUTS 3;
- the means of transport and their share, such as stated above.

As a matter of fact, these sceneries are characterised by the following assumptions and conditions:

- **Scenery 2015 only monomodal** - the attraction and redistribution basins are based on the neighbour area of the reference NUTS 3, considering that connection via lorry narrows the areas able to supply the reference NUTS 3. Anyway, the volumes handled by the NUTS 3 per supplying neighbour area are greater than those caught by the scenery of intermodality, considering the non-wide development of the intermodality for perishables in time horizon 2015, in one hand, and also the big minimum size requested for each cargo to use intermodality, in the other hand. Moreover, the volumes to be attracted by the NUTS 3 per supplying overseas area are smaller than those caught by the scenery of intermodality, in consideration of the fact that these flows as a general rule tend to transit to the nearest NUTS 3 to the destination markets. In this scenery the main mean of transport will remain the lorry.
- **Scenery 2015 only intermodal** - the attraction and redistribution basins are based on a greater geographical area than in the previous scenery, because connections via intermodality theoretically widen the areas able to supply the reference NUTS 3 (i.e. flows from overseas and other NUTS 3 flows non-caught in the monomodal scenery due to the distance). Anyway, the volumes handled by the NUTS 3 per supplying neighbour area are smaller than those caught by the scenery of monomodality, for the reasons mentioned above. Moreover, as explained before, the volumes to be attracted by the NUTS 3 per supplying overseas area are greater than those to be attracted by the scenery of monomodality, in consideration of the development of intermodality that contribute to concentrate flows with the same destination markets. Nevertheless, the real volumes of the attraction NUTS 3 depend on the real development of the intermodality and its connections. In this scenery there will be a development of the use of intermodality and a reduction of the share of lorries on the roads.

With these inputs provided, the intermodal transport modelling highlighted that - such as reported in the following figures - the flows of fresh produce traded in the South-North route only with intermodal connections are less than 50% compared with those of the scenery only monomodal.

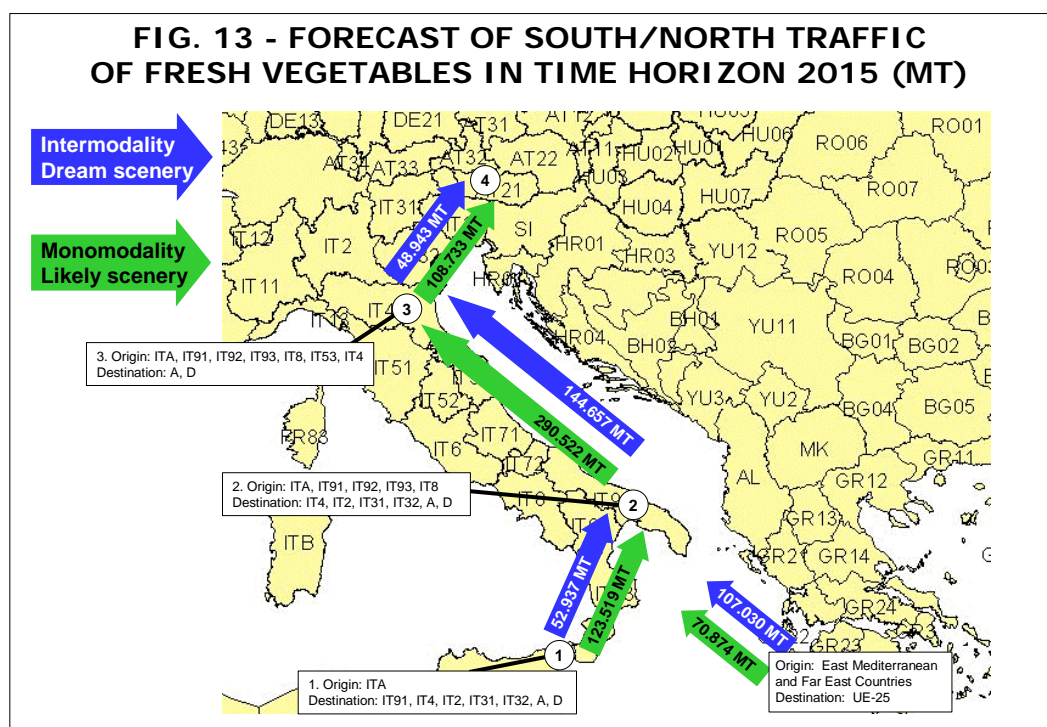
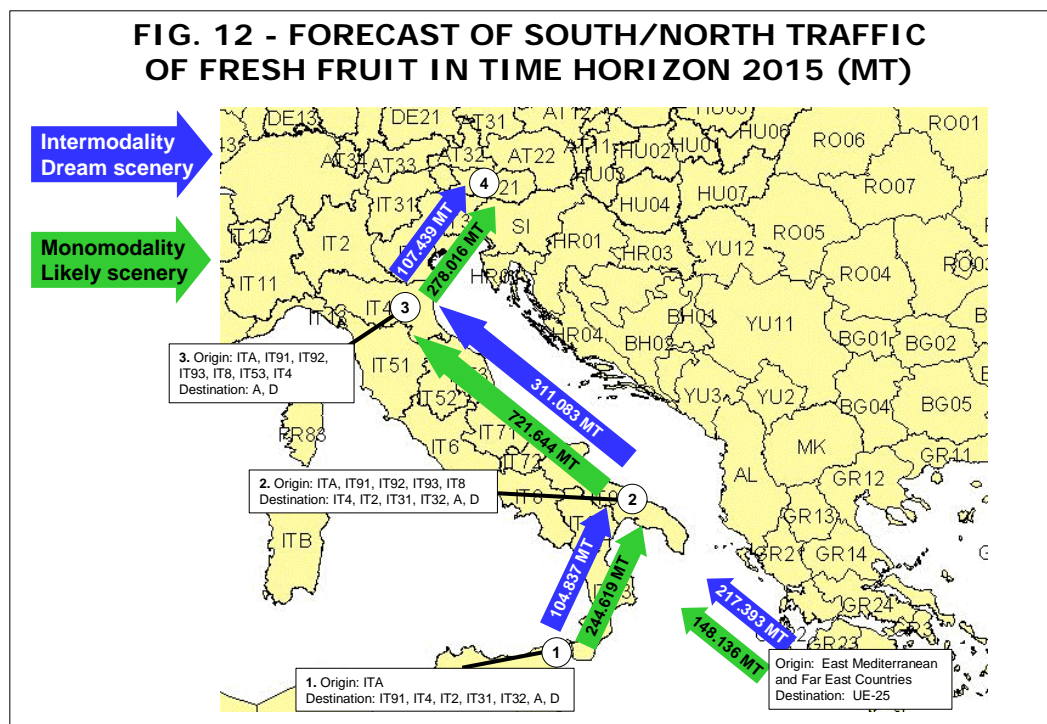
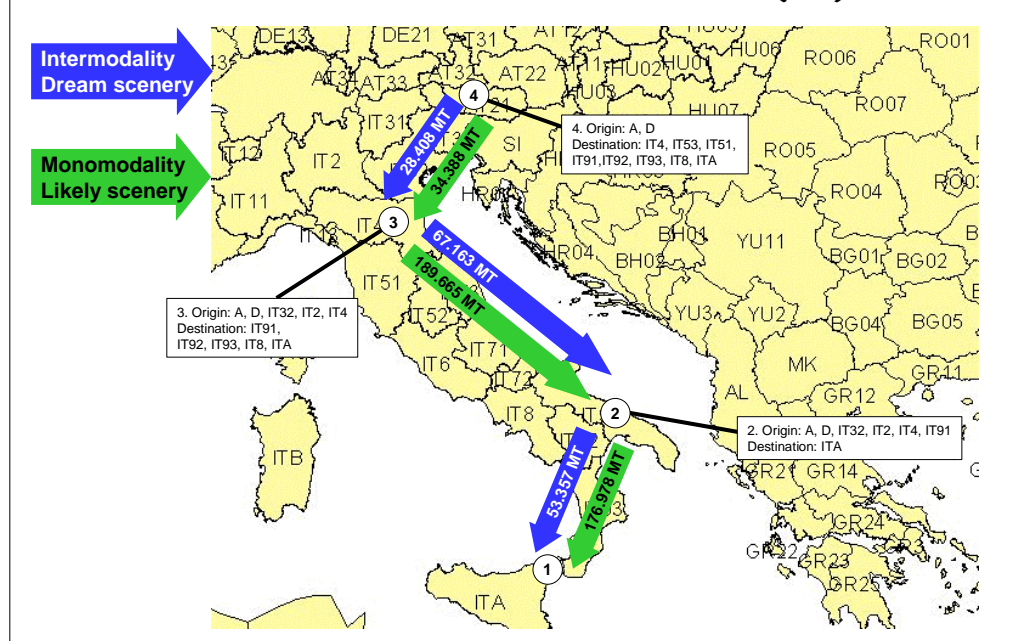


FIG. 14 - FORECAST OF NORTH/SOUTH TRAFFIC OF MEAT IN TIME HORIZON 2015 (MT)



2.10 - SUMMARY

From the preliminary flows analysis of fresh produce in CADSES area realised in this context emerges that Puglia, Emilia-Romagna, Lombardia, Attiki, Trentino-Alto Adige, Veneto, Kentriki Makedonia, Peloponnisos and Niederoesterreich are the main NUTS 2 in this area in terms of handling volumes in the reference period.

Puglia and Emilia-Romagna are the only two NUTS 2 areas able to handle (outgoing and incoming flows) more than 2.000.000 MT of fruit and vegetables each year.

In parallel, from the logistics chains analysis emerges that presently, with regard to fresh produce, the usage of intermodality is almost all limited to the ship-lorry connection, and just where needed. Coming to the path analysis, the main routes of transport for fresh produce in terms of transit volumes are located in Italy, Austria and Greece. In particular, the analysis highlighted 43 road segments with more than 365.000 MT of flows per year, with an average of more than 1.000 MT per day.

To complete the supply chain survey, the Consortium identified within reference area the Transport and Logistics Terminals (TLTs) that handle also fresh produce, analysing in detail 18 main wholesale markets/agro-industrial centres, 9 main reefer terminals and reefer container terminals, one main interport and distribution centres of 32 multiples chains. The Consortium extended also the analysis to select the main areas/nodes for fresh produce trade without specific facilities for fresh produce. In detail, it was identified in total 45 NUTS 2 in CADSES area with an average of outgoing+incoming flows of fresh produce of more than 200.000 MT/year.

Through a multicriteria analysis on the exiting TLTs devoted to fresh produce and a survey on potential sites and/or nodal points on the basis of their location, the Consortium selected a series of sites able to realize a desired first assessment for nodal points devoted to fresh produce in CADSES area. It means a suggested network of 22 TLTs specialised also in fruit and vegetables, 4 demonstrators areas and 8 potential sites to be considered in the planning activities to implement the intermodality in this category of products.

From a number of on-site analysis of the main TLTs devoted to fresh produce and a focus group with experts, it was possible also to highlight a series of bottlenecks and logistics obstacles to the trade and traffic of fruit and vegetables. In particular, "lacks" in the areas of material and immaterial services are the main bottlenecks that prevent the ability to gather the needed critical

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masses and prevent the possibility to manage the shipment in the way of an optimisation of the cargoes and the back logistics.

The analysis of the bottlenecks was focused also to the forecast of short-term probable development of these in the reference area on the basis of the trade and transport possible evolution. The results of these analysis confirmed that the main bottlenecks would be the same detected for the present situation.

With regard to short-term measure for solving bottlenecks, increasing efficiency and prevent new obstacles and bottlenecks for fresh produce, the areas of specific investments for fruit and vegetables are: optimisation of cargoes organisation - by increasing the number of full cargoes and reduce the number of lorries along the roads - and switch from the road transport to the railways to reduce the level of congestion along the road connections.

To these goals, in the redistribution area, it seems necessary an involvement of the public sector to promote an approach among wholesale markets and multiples chains operations. Along with these public interventions, in the private area seems necessary to integrate the current role of wholesale markets such as places of product trading with a role of logistics centres able to provide advanced logistics services.

As a matter of fact, TLTs have to evolve their role and services to develop the fresh produce supply chain in the direction of a greater activities rationalization, to introduce on a regular basis the intermodal connection in the trade of fruit and vegetables and for a perishable terminal development and networking.

Once analysed the TLTs in CADSES area, designed a desired first assessment for nodal points devoted to fresh produce and realized an analysis on what is expected for the future, it was realized also a survey on a series of best models and experiences in different fields and territories outside CADSES area, with the aim to highlight opportunities coming from these best models to be verified in terms of possibilities to be replicated also in CADSES area and in particular for the territorial logistics structures under project in the demonstrators context (Astakos, Cesena, Ravenna and Taranto). In this way, it was analysed a series of TLTs outside CADSES area; from these emerged that the main opportunities and ideas come from port of Zeebrugge (Belgium), Rungis-wholesale market of Paris (France) and Mercabarna-wholesale market of Barcelona (Spain). Coming to the supply chain scenery for fruit and vegetables in CADSES area, the Imonode Consortium detected a non-organised production system - even in the logistics area - without the presence of significant concentration platform of the production to ship fresh produce to the redistribution market (wholesale/retail system). A condition that highlights also a non-organised shipping system with a huge and fragmented number of point of consignment without organisation and management of the flows, as well as fragmented volumes of goods to be shipped.

In the redistribution markets, there are a series of wholesale markets - of public ownership or private-public ownership - in proximity or within the city centres devoted to gather and delivery by road fruit and vegetables to the traditional retail system (greengrocers, street vendors, etc) and a series of distribution centres of multiples or independent wholesalers - of private ownership - located in private area in barycentric position with regard to the point of sales, to better delivery by road fresh produce to the stores or to other logistics centres. These kinds of TLTs are presently hardly linked each other.

With these premises in mind, the forecasting analysis made outlined three sceneries in time horizon 2015 to foresee the evolution of the role of each kind of operator and structure within the supply chain, in terms of production system, trading system, retail system keeping in mind also the emerging and new consumer behaviour that could affect the supply chain.

The evolution hypothesis foreseen in the first scenery does not expect any intermodality development, in consideration of the supposed increasing role of distribution centres and a consequent reduction of wholesale markets importance, a steady role for reefer/reefer container terminals, interports and increasing fragmentation of the cargoes at the production level.

Also the second scenery does not foresee an improvement in the intermodality usage with rail but only an optimisation in road services and intermodality road-sea/sea-road. The evolution hypothesis of this scenery is based on a slightly modernisation of the present situation such as highlighted in the last few years from the greater part of the market analysts as a consequence of the big problems faced by fruit and vegetables system. In particular, it means more integration between distribution centres and wholesale markets, specially in the Eastern part of the European Union, and development of concentration platform at the production level - able to gather an increasing volume of fresh produce to a small number of point of shipment - to increase full lorries bound to the distribution and consumption areas and improve all the activities of the reverse logistics.

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The last scenery foresees an intermodality development in a continuative way for traffic of fruit and vegetables considering that this reflects the “ideal” supply chain for this kind of products.

With these in deep rationalizations, the “new” supply chain backs and supports the introduction of intermodality between rail and road from main production areas to main consumption areas and also a development of the other kind of intermodality: sea-road and sea-rail.

Each one of the three sceneries could be possible for 2015 in theoretically terms, although the second scenery results the most probable for 2015 in concrete term as emerged from the SWOT analysis made with the help of the experts panel and the other two are quite unlikely, for different reasons. So the Imonode Consortium adopted this one, called “Likely scenery”, to realize two FreshLog Pilot demonstrators as territorial concentration platforms in the context area at the feasibility level.

Also on the basis of the three sceneries realized for time horizon 2015, the analysis has been completed with a forecasting survey on the future logistics chains for each one of them.

Moreover, considering the final results of the Imonode project, the Consortium decided to verify the potentialities for the intermodal connection in the fresh produce system with regard to the present situation and for the evolution of the supply and logistics chains in time horizon 2015. Considering that currently the demand for intermodal service is negligible and there are not supply packages, it seemed more right to develop a model to determine if traffics of these products are able to support the development of intermodality in the main Corridors in terms of volumes, frequency and origin/destination balance rather than an estimate of the intermodal trade demand on the basis of logistics nodes utilized, because it seems there is not a concrete demand in this way.

To realize the intermodal transport modelling, the Consortium made a preliminary analysis to focus the survey in the main interesting area in 2000-2001 (Corridor X, Corridor V and Adriatic-Ionian route), such as emerging from the origin/destination matrix analysis. In particular, in this publication is reported the model regarding Adriatic-Ionian corridor, considering that it is the most important and interesting in terms of fresh produce flows within CADSES area and also because it includes the demonstrators areas of Cesena and Taranto. The model confirmed the presence of interesting volumes in both direction of traffic (South-North and North/South) that permit the development of block trains with high frequency, even if it is important to underline that with regard to the flows and products analysed, the comparison of South-North and North-South flows highlight that there is no perfect balance of traffic.

At the end of this part of the publication it is reported also the results of the forecast analysis in time horizon 2015 based on the time series tendency that has been applied to the same routes and products categories of the intermodal transport modelling. Moreover, this analysis have been completed with a brief survey on the possible effects of the traffic of fruit and vegetables that could be redirect from Southern bound of Mediterranean Sea to the Northern Europe across CADSES area, in consideration of the foreseen increase of the flows from these Countries toward Europe. This increasing volume could be redirect from the existing routes across Italy (I) or Greece (GR) to Northern Europe enlarging the traffic flows in the routes in analysis.

Nevertheless, in time horizon 2015, the intermodal transport modelling results in the routes under analysis highlighted a decrease - in regard to the average data for 2000-2001 - of the flows in each stage of the South-North route for fresh produce and in the North-South for meat. These trends are related to: reduction of fresh produce and meat output in the main European growing areas, drop of consumption of perishable in the high industrialized NUTS 2 and greater competition from emerging Countries in the destination market.

Finally, it was deepened the potential flows in transit in each NUTS 2 under analysis in time horizon 2015 to provide an estimation of the flows passing or could passing (in consideration of the rationalization hypothesis foreseen by “Likely” and “Dream” sceneries) through each NUTS 3 under analysis in time horizon 2015. These data highlighted that the flows of fresh produce traded only with intermodal connections are less than 50% compared with those of the scenery only monomodal.

Chapter 3

FEASIBLE EVOLUTION IN THE DEMONSTRATORS AREAS

3.1 - PREMISES

As stated in the Premises of this study, the Imonode Consortium decided to develop a series of demonstrators to better explain and verify the project results. In this Chapter are reported two of these cases implemented in Cesena and Taranto areas as application of the Likely scenery designed in Par. 2.7.2 and a third case related to the consolidation of the first two through an IT solution.

For the demonstrators development, along with the information, data, statistics, forecasts of the logistics scenery analysis coming such as background from the previous Chapter, the Imonode Consortium decided to develop also in depth analyses for particular aspects when in presence of a lack of information.

These activities have been performed with the aim to complete the analysis and obtain the higher level of information on the fresh produce sector to project and realize the territorial logistics structures in the better possible way in consideration of the needs and requests coming from the operative field.

First of all, before any presentation of the in deep analysis it is useful to report in the following pages the result of the origin/destination matrix for the demonstrators areas (coming from the FPID).

From the analysis made in the framework of the Imonode project comes that Italy, handle more than 13 millions of MT of fresh produce annually (avg. 2000-2001)

TAB. 7 - TRAFFIC OF FRESH PRODUCE IN ITALY (in MT)

| REASON OF TRADE | FRUIT | VEGETABLES | TOTAL | % on TOTAL |
|-------------------|------------------|------------------|-------------------|---------------|
| Domestic trade | 4.012.424 | 3.153.140 | 7.165.564 | 53,7% |
| Exports | 2.605.224 | 985.300 | 3.590.524 | 26,9% |
| Imports | 1.222.604 | 884.892 | 2.107.496 | 15,8% |
| Transits | 262.681 | 210.939 | 473.620 | 3,6% |
| TOTAL | 8.102.933 | 5.234.272 | 13.337.204 | 100,0% |
| % on TOTAL | 60,8% | 39,2% | 100,0% | |

As indicated by the figures reported above, the greatest part of the flows for fresh produce is based on domestic trade amongst NUTS 2 areas, while exports accounts for 26,9% of trade and imports for 15,8% of total trade.

Coming to the demonstrators areas, such as highlighted in the table reported in the following pages, Emilia-Romagna-IT4 (i.e. the NUTS 2 in which is located the Cesena demonstrator) ranks:

- 3rd in the chart of the main exporting NUTS 2 of Italy in the domestic trade (with a share of 12,3% on the total);
- 8th in the ranking of the main importing NUTS 2 of Italy in the domestic trade (5,8%);
- 2nd in the chart of the main exporting NUTS 2 of Italy toward foreign Countries (15,9%);
- 10th in the ranking of the main importing NUTS 2 of Italy from foreign Countries (4,5%).

In the same way, Puglia-IT91 (i.e. the NUTS 2 in which is located the Taranto demonstrator) ranks:

- 2nd in the chart of the main exporting NUTS 2 of Italy in the domestic trade (14,7%);
- 7th in the ranking of the main importing NUTS 2 of Italy in the domestic trade (5,9%);
- 1st in the chart of the main exporting NUTS 2 of Italy toward foreign Countries (19,7%);
- 7th in the ranking of the main importing NUTS 2 of Italy from foreign Countries (6,5%).

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TAB. 8.1 - FLOWS OF FRESH PRODUCE AMONG ITALIAN NUTS2 (in MT, IT11-IT53)

| DEST. OR. | TYPE | IT11 | IT12 | IT13 | IT2 | IT31 | IT32 | IT33 | IT4 | IT51 | IT52 | TOT. ITALY |
|--------------|------|---------|--------|---------|-----------|---------|---------|---------|---------|---------|---------|------------|
| IT11 | F | | 117 | 1.868 | 10.305 | 862 | 1.867 | 908 | 1.755 | 3.114 | 876 | 39.186 |
| | V | | 109 | 1.363 | 5.983 | 838 | 724 | 1.024 | 660 | 2.268 | 715 | 28.689 |
| | TOT. | 0 | 227 | 3.231 | 16.289 | 1.700 | 2.591 | 1.933 | 2.415 | 5.382 | 1.591 | 67.875 |
| IT12 | F | | | | | | | | | | | 0 |
| | V | 170 | | 91 | 530 | 29 | 145 | 49 | 55 | 172 | 45 | 2.930 |
| | TOT. | 170 | | 91 | 530 | 29 | 145 | 49 | 55 | 172 | 45 | 2.930 |
| IT2 | F | | | | | | | | | | | 0 |
| | V | 1.285 | 42 | 568 | | 332 | 354 | 411 | 184 | 802 | 117 | 6.422 |
| | TOT. | 1.285 | 42 | 568 | | 332 | 354 | 411 | 184 | 802 | 117 | 6.422 |
| IT31 | F | 176 | 11 | 29.088 | 135.835 | | 18.409 | 4.870 | 30.835 | 57.915 | 12.037 | 699.328 |
| | V | 324 | 10 | 159 | 1.004 | | 314 | 108 | 204 | 310 | 72 | 5.167 |
| | TOT. | 499 | 21 | 29.247 | 136.838 | | 18.722 | 4.978 | 31.038 | 58.225 | 12.110 | 704.495 |
| IT32 | F | 4.214 | 217 | 6.959 | 33.521 | 1.479 | | 2.185 | 7.018 | 13.391 | 3.047 | 161.554 |
| | V | 13.790 | 571 | 6.729 | 37.222 | 3.526 | | 5.338 | 10.638 | 13.608 | 3.596 | 187.180 |
| | TOT. | 18.004 | 789 | 13.688 | 70.743 | 5.004 | 0 | 7.523 | 17.656 | 26.999 | 6.642 | 348.735 |
| IT33 | F | 35 | | 459 | 2.137 | 9 | 503 | | 1.049 | 914 | 191 | 11.752 |
| | V | | | | | | | | | | | 0 |
| | TOT. | 35 | | 459 | 2.137 | 9 | 503 | 0 | 1.049 | 914 | 191 | 11.752 |
| IT4 | F | 31.032 | 1.875 | 27.510 | 139.509 | 12.603 | 28.851 | 13.512 | | 48.979 | 12.752 | 606.073 |
| | V | 26.493 | 1.040 | 14.282 | 56.592 | 7.534 | 14.741 | 10.199 | | 25.307 | 6.334 | 322.416 |
| | TOT. | 57.525 | 2.914 | 41.792 | 196.101 | 20.138 | 43.592 | 23.711 | 0 | 74.285 | 19.086 | 928.489 |
| IT52 | F | | | | | | | | | | | 0 |
| | V | 2.507 | 95 | 892 | 5.504 | 730 | 2.006 | 855 | 2.224 | 2.127 | | 26.782 |
| | TOT. | 2.507 | 95 | 892 | 5.504 | 730 | 2.006 | 855 | 2.224 | 2.127 | 0 | 26.782 |
| IT53 | F | 181 | 21 | 249 | 1.434 | 87 | 369 | 164 | 90 | 314 | 121 | 4.780 |
| | V | 8.155 | 295 | 3.103 | 19.644 | 1.564 | 4.147 | 2.721 | 6.643 | 6.855 | 1.574 | 94.266 |
| | TOT. | 8.336 | 315 | 3.352 | 21.078 | 1.651 | 4.516 | 2.885 | 6.733 | 7.168 | 1.695 | 99.046 |
| IT6 | F | 62 | 8 | 96 | 530 | 11 | 164 | 64 | 35 | 104 | 47 | 1.761 |
| | V | 13.163 | 448 | 5.612 | 24.900 | 3.089 | 8.708 | 4.236 | 11.112 | 10.469 | 2.321 | 139.801 |
| | TOT. | 13.226 | 456 | 5.708 | 25.431 | 3.100 | 8.872 | 4.299 | 11.146 | 10.573 | 2.368 | 141.561 |
| IT71 | F | 1.732 | 93 | 1.166 | 6.686 | 680 | 2.064 | 749 | 1.408 | 2.057 | 579 | 26.702 |
| | V | 23.055 | 725 | 9.630 | 56.640 | 4.654 | 16.292 | 7.154 | 15.908 | 20.120 | 4.891 | 295.159 |
| | TOT. | 24.788 | 817 | 10.796 | 63.325 | 5.334 | 18.357 | 7.903 | 17.316 | 22.177 | 5.470 | 321.861 |
| IT72 | F | 153 | 10 | 125 | 716 | 53 | 107 | 77 | 67 | 206 | 64 | 2.817 |
| | V | 7.448 | 265 | 2.293 | 14.860 | 2.041 | 4.310 | 2.420 | 5.654 | 6.178 | 674 | 69.791 |
| | TOT. | 7.601 | 275 | 2.418 | 15.576 | 2.094 | 4.417 | 2.496 | 5.721 | 6.384 | 737 | 72.608 |
| IT8 | F | 7.807 | 671 | 8.516 | 48.978 | 4.532 | 8.312 | 5.168 | 4.609 | 14.236 | 4.210 | 166.624 |
| | V | 39.482 | 1.222 | 17.565 | 103.128 | 8.206 | 24.012 | 12.560 | 22.413 | 36.197 | 8.473 | 462.039 |
| | TOT. | 47.289 | 1.893 | 26.081 | 152.107 | 12.738 | 32.324 | 17.728 | 27.022 | 50.433 | 12.683 | 628.663 |
| IT91 | F | 57.945 | 1.702 | 22.734 | 127.757 | 13.231 | 60.820 | 16.325 | 53.774 | 49.136 | 11.736 | 614.715 |
| | V | 44.878 | 1.560 | 18.763 | 88.317 | 9.391 | 18.539 | 14.800 | 24.060 | 36.576 | 8.601 | 441.659 |
| | TOT. | 102.823 | 3.261 | 41.497 | 216.074 | 22.622 | 79.359 | 31.126 | 77.834 | 85.712 | 20.337 | 1.056.375 |
| IT92 | F | 7.990 | 294 | 3.798 | 21.822 | 2.065 | 8.059 | 2.685 | 6.460 | 7.744 | 1.973 | 102.006 |
| | V | 7.767 | 288 | 2.872 | 14.907 | 1.741 | 4.142 | 2.605 | 5.797 | 6.104 | 1.210 | 77.167 |
| | TOT. | 15.757 | 581 | 6.670 | 36.729 | 3.806 | 12.201 | 5.289 | 12.257 | 13.847 | 3.183 | 179.173 |
| IT93 | F | 55.101 | 1.595 | 21.236 | 120.249 | 12.472 | 58.436 | 15.532 | 51.202 | 46.213 | 11.040 | 594.359 |
| | V | 27.704 | 994 | 10.932 | 67.143 | 7.295 | 17.990 | 9.567 | 19.379 | 25.338 | 4.188 | 312.853 |
| | TOT. | 82.805 | 2.589 | 32.168 | 187.392 | 19.767 | 76.426 | 25.100 | 70.581 | 71.551 | 15.228 | 907.212 |
| ITA | F | 87.255 | 2.507 | 33.339 | 188.850 | 19.521 | 92.257 | 24.360 | 81.317 | 73.020 | 17.384 | 956.162 |
| | V | 58.842 | 1.999 | 23.091 | 108.933 | 15.234 | 35.875 | 19.128 | 38.207 | 47.863 | 7.618 | 546.620 |
| | TOT. | 146.097 | 4.506 | 56.429 | 297.783 | 34.755 | 128.131 | 43.488 | 119.524 | 120.883 | 25.003 | 1.502.782 |
| ITB | F | 2.138 | 61 | 815 | 4.607 | 471 | 2.276 | 599 | 1.993 | 1.776 | 424 | 24.604 |
| | V | 13.997 | 485 | 4.791 | 27.344 | 3.572 | 7.707 | 4.507 | 9.661 | 11.502 | 1.683 | 134.200 |
| | TOT. | 16.135 | 546 | 5.606 | 31.951 | 4.043 | 9.982 | 5.106 | 11.655 | 13.278 | 2.107 | 158.804 |
| TOT. ITALY | F | 255.824 | 9.180 | 157.957 | 842.936 | 68.076 | 282.492 | 87.198 | 241.611 | 319.117 | 76.481 | 4.012.424 |
| | V | 289.059 | 10.146 | 122.736 | 632.651 | 69.775 | 160.006 | 97.682 | 172.799 | 251.794 | 52.112 | 3.153.140 |
| | TOT. | 544.883 | 19.326 | 280.693 | 1.475.587 | 137.851 | 442.498 | 184.881 | 414.410 | 570.911 | 128.593 | 7.165.564 |

Chapter 3

FEASIBLE EVOLUTION IN THE DEMONSTRATORS AREAS

TAB. 8.2 - FLOWS OF FRESH PRODUCE AMONG ITALIAN NUTS2 (in MT, IT6-ITB)

| DEST. OR. | TYPE | IT6 | IT71 | IT72 | IT8 | IT91 | IT92 | IT93 | ITA | ITB | TOT. ITALY |
|--------------|------|---------|---------|--------|---------|---------|--------|---------|---------|---------|------------|
| IT11 | F | 3.578 | 660 | 184 | 3.658 | 2.341 | 310 | 1.125 | 3.887 | 974 | 39.186 |
| | V | 3.914 | 345 | 92 | 3.225 | 2.115 | 517 | 1.332 | 1.984 | 855 | 28.689 |
| | TOT. | 7.492 | 1.005 | 276 | 6.882 | 4.456 | 827 | 2.457 | 5.871 | 1.829 | 67.875 |
| IT12 | F | | | | | | | | | | 0 |
| | V | 229 | 53 | 18 | 399 | 286 | 44 | 141 | 315 | 95 | 2.930 |
| | TOT. | 229 | 53 | 18 | 399 | 286 | 44 | 141 | 315 | 95 | 2.930 |
| IT2 | F | | | | | | | | | | 0 |
| | V | 210 | 245 | 109 | 895 | 163 | 20 | 258 | 114 | 29 | 6.422 |
| | TOT. | 210 | 245 | 109 | 895 | 163 | 20 | 258 | 114 | 29 | 6.422 |
| IT31 | F | 83.801 | 16.354 | 5.408 | 53.087 | 73.739 | 9.534 | 34.555 | 84.582 | 27.392 | 699.328 |
| | V | 453 | 102 | 29 | 575 | 425 | 65 | 218 | 523 | 156 | 5.167 |
| | TOT. | 84.253 | 16.456 | 5.438 | 53.662 | 74.164 | 9.598 | 34.773 | 85.105 | 27.548 | 704.495 |
| IT32 | F | 18.492 | 3.762 | 1.151 | 13.867 | 15.442 | 1.965 | 7.119 | 17.327 | 5.661 | 161.554 |
| | V | 18.176 | 4.308 | 1.148 | 20.923 | 14.092 | 2.084 | 6.798 | 15.961 | 4.584 | 187.180 |
| | TOT. | 36.668 | 8.070 | 2.299 | 34.790 | 29.534 | 4.049 | 13.917 | 33.289 | 10.245 | 348.735 |
| IT33 | F | 1.326 | 260 | 85 | 845 | 1.157 | 149 | 541 | 1.322 | 429 | 11.752 |
| | V | | | | | | | | | | 0 |
| | TOT. | 1.326 | 260 | 85 | 845 | 1.157 | 149 | 541 | 1.322 | 429 | 11.752 |
| IT4 | F | 64.802 | 12.854 | 3.621 | 47.412 | 47.030 | 5.740 | 22.068 | 54.518 | 16.423 | 606.073 |
| | V | 26.172 | 7.913 | 2.344 | 40.033 | 23.353 | 4.150 | 14.124 | 25.258 | 7.940 | 322.416 |
| | TOT. | 90.974 | 20.767 | 5.965 | 87.446 | 70.383 | 9.890 | 36.191 | 79.776 | 24.363 | 928.489 |
| IT52 | F | | | | | | | | | | 0 |
| | V | 1.974 | 461 | 144 | 2.656 | 1.121 | 155 | 685 | 1.376 | 785 | 26.782 |
| | TOT. | 1.974 | 461 | 144 | 2.656 | 1.121 | 155 | 685 | 1.376 | 785 | 26.782 |
| IT53 | F | 212 | 59 | 14 | 269 | 315 | 25 | 218 | 582 | 57 | 4.780 |
| | V | 6.979 | 2.420 | 590 | 9.473 | 6.844 | 831 | 3.035 | 7.071 | 2.323 | 94.266 |
| | TOT. | 7.192 | 2.479 | 604 | 9.742 | 7.159 | 855 | 3.253 | 7.653 | 2.379 | 99.046 |
| IT6 | F | | 19 | | 42 | 155 | 9 | 111 | 257 | 24 | 1.761 |
| | V | | 3.732 | 1.063 | 15.987 | 8.150 | 1.318 | 4.878 | 13.819 | 2.950 | 139.801 |
| | TOT. | 0 | 3.751 | 1.063 | 16.029 | 8.305 | 1.327 | 4.988 | 14.076 | 2.974 | 141.561 |
| IT71 | F | 2.174 | | 101 | 2.866 | 897 | 90 | 828 | 1.397 | 523 | 26.702 |
| | V | 21.616 | | 1.827 | 34.460 | 22.290 | 3.450 | 11.926 | 25.584 | 7.904 | 295.159 |
| | TOT. | 23.789 | 0 | 1.928 | 37.325 | 23.187 | 3.540 | 12.754 | 26.981 | 8.427 | 321.861 |
| IT72 | F | 172 | 67 | | 295 | 215 | 25 | 78 | 245 | 77 | 2.817 |
| | V | 4.152 | 989 | | 4.890 | 3.480 | 521 | 2.376 | 3.457 | 2.641 | 69.791 |
| | TOT. | 4.324 | 1.056 | 0 | 5.186 | 3.695 | 545 | 2.454 | 3.702 | 2.718 | 72.608 |
| IT8 | F | 15.075 | 3.006 | 756 | | 10.792 | 1.218 | 4.965 | 15.868 | 4.239 | 166.624 |
| | V | 40.214 | 10.113 | 3.348 | | 39.900 | 6.265 | 19.386 | 43.593 | 14.994 | 462.039 |
| | TOT. | 55.289 | 13.120 | 4.104 | 0 | 50.692 | 7.482 | 24.350 | 59.462 | 19.233 | 628.663 |
| IT91 | F | 54.977 | 5.277 | 2.870 | 75.293 | | 1.283 | 22.259 | 3.730 | 13.718 | 614.715 |
| | V | 34.348 | 11.647 | 3.625 | 48.114 | | 4.459 | 16.860 | 35.707 | 10.480 | 441.659 |
| | TOT. | 89.326 | 16.924 | 6.495 | 123.407 | 0 | 5.742 | 39.119 | 39.438 | 24.199 | 1.056.375 |
| IT92 | F | 9.839 | 2.508 | 612 | 9.556 | 5.759 | | 2.354 | 3.538 | 2.040 | 102.006 |
| | V | 5.151 | 2.093 | 531 | 7.337 | 4.349 | | 2.303 | 4.426 | 1.694 | 77.167 |
| | TOT. | 14.990 | 4.602 | 1.143 | 16.893 | 10.108 | 0 | 4.657 | 7.964 | 3.734 | 179.173 |
| IT93 | F | 64.676 | 16.457 | 4.202 | 52.533 | 23.968 | 3.550 | | 8.599 | 8.426 | 594.359 |
| | V | 23.524 | 4.998 | 1.515 | 30.459 | 20.170 | 3.346 | | 22.660 | 9.395 | 312.853 |
| | TOT. | 88.201 | 21.456 | 5.717 | 82.992 | 44.137 | 6.896 | 0 | 31.259 | 17.821 | 907.212 |
| ITA | F | 100.127 | 23.465 | 6.319 | 82.093 | 54.205 | 7.794 | 13.558 | | 18.803 | 956.162 |
| | V | 37.163 | 11.269 | 3.700 | 56.696 | 30.356 | 5.043 | 18.047 | | 14.278 | 546.620 |
| | TOT. | 137.289 | 34.734 | 10.019 | 138.789 | 84.561 | 12.837 | 31.604 | 0 | 33.081 | 1.502.782 |
| ITB | F | 2.422 | 639 | 163 | 2.046 | 2.183 | 283 | 571 | 402 | | 24.604 |
| | V | 9.158 | 2.528 | 691 | 11.519 | 8.046 | 1.183 | 4.853 | 8.364 | | 134.200 |
| | TOT. | 11.580 | 3.167 | 855 | 13.564 | 10.229 | 1.466 | 5.424 | 8.767 | 0 | 158.804 |
| TOT. ITALY | F | 421.674 | 85.386 | 25.487 | 343.863 | 238.199 | 31.974 | 110.350 | 196.255 | 98.788 | 4.012.424 |
| | V | 233.434 | 63.219 | 20.774 | 287.639 | 185.140 | 33.451 | 107.218 | 210.213 | 81.103 | 3.153.140 |
| | TOT. | 655.107 | 148.605 | 46.260 | 631.503 | 423.339 | 65.425 | 217.568 | 406.469 | 179.890 | 7.165.564 |

Chapter 3

FEASIBLE EVOLUTION IN THE DEMONSTRATORS AREAS

TAB. 9.1 - ITALIAN NUTS2 EXPORT OF FRESH PRODUCE (in MT, IT11-IT53)

| OR. DEST. | TYPE | IT11 | IT12 | IT13 | IT2 | IT31 | IT32 | IT33 | IT4 | IT52 | IT53 | TOT. ITALY |
|--------------|------|---------|------|---------|-------|---------|---------|--------|---------|-------|--------|------------|
| Albania | F | 190 | | 19 | | 9.767 | 1.432 | 159 | 1.778 | | | 19.004 |
| | V | 435 | 36 | | | 42 | 865 | | 2.046 | 18 | 222 | 13.840 |
| | TOT. | 625 | 36 | 19 | 0 | 9.809 | 2.297 | 159 | 3.824 | 18 | 222 | 32.844 |
| Austria | F | 3.860 | | 900 | | 34.330 | 7.849 | 722 | 25.115 | | 226 | 146.719 |
| | V | 855 | 6 | | 273 | 72 | 4.881 | | 7.833 | 466 | 2.562 | 69.556 |
| | TOT. | 4.715 | 6 | 900 | 273 | 34.402 | 12.730 | 722 | 32.948 | 466 | 2.788 | 216.275 |
| Bosnia Herz. | F | 522 | | 114 | | 3.772 | 905 | 100 | 2.446 | | 17 | 24.922 |
| | V | | 5 | | 28 | 12 | 269 | | 660 | 137 | 157 | 10.205 |
| | TOT. | 522 | 5 | 114 | 28 | 3.784 | 1.173 | 100 | 3.106 | 137 | 174 | 35.127 |
| Croatia | F | 828 | | 149 | | 2.637 | 1.147 | 91 | 6.057 | | 43 | 28.014 |
| | V | 54 | | | 33 | | 516 | | 1.188 | 91 | 236 | 10.158 |
| | TOT. | 881 | 0 | 149 | 33 | 2.637 | 1.663 | 91 | 7.245 | 91 | 279 | 38.172 |
| Czeck Rep. | F | 2.669 | | | | 19.292 | 4.181 | 475 | 9.935 | | 115 | 81.239 |
| | V | 71 | 24 | | 214 | 55 | 962 | | 2.857 | 55 | 672 | 22.744 |
| | TOT. | 2.740 | 24 | 0 | 214 | 19.347 | 5.143 | 475 | 12.792 | 55 | 787 | 103.983 |
| Greece | F | 363 | | 58.031 | | 9.601 | 1.594 | 168 | 2.500 | | 9 | 75.023 |
| | V | 111 | 9 | | | 20 | 662 | | 785 | 41 | 463 | 9.506 |
| | TOT. | 473 | 9 | 58.031 | 0 | 9.621 | 2.256 | 168 | 3.285 | 41 | 472 | 84.529 |
| Hungary | F | 1.069 | | 121 | | 2.634 | 1.072 | 154 | 2.086 | | | 20.135 |
| | V | | | | | | 166 | | 158 | 26 | 192 | 3.641 |
| | TOT. | 1.069 | 0 | 121 | 0 | 2.634 | 1.238 | 154 | 2.244 | 26 | 192 | 23.775 |
| France | F | 3.072 | | 61.826 | | 11.140 | 5.868 | 488 | 27.980 | | 112 | 248.407 |
| | V | 2.037 | 26 | | 310 | 40 | 5.183 | | 10.973 | 321 | 1.495 | 63.871 |
| | TOT. | 5.109 | 26 | 61.826 | 310 | 11.180 | 11.051 | 488 | 38.953 | 321 | 1.607 | 312.278 |
| Germany | F | 33.776 | 8 | 39.149 | | 208.935 | 57.138 | 5.258 | 207.361 | | 2.556 | 984.323 |
| | V | 4.698 | 573 | | 1.392 | 1.140 | 29.274 | | 62.336 | 2.076 | 16.840 | 524.068 |
| | TOT. | 38.475 | 582 | 39.149 | 1.392 | 210.074 | 86.413 | 5.258 | 269.697 | 2.076 | 19.396 | 1.508.390 |
| Poland | F | 5.224 | | | | 3.305 | 3.783 | 510 | 12.574 | | 183 | 137.122 |
| | V | 5 | 30 | | 127 | 38 | 386 | | 1.793 | 60 | 278 | 15.884 |
| | TOT. | 5.229 | 30 | 0 | 127 | 3.343 | 4.170 | 510 | 14.367 | 60 | 462 | 153.005 |
| Slovakia | F | 1.031 | | 38 | | 9.262 | 1.846 | 228 | 3.030 | | 30 | 30.002 |
| | V | 7 | 7 | | 53 | 13 | 190 | | 657 | 12 | 149 | 5.352 |
| | TOT. | 1.039 | 7 | 38 | 53 | 9.275 | 2.036 | 228 | 3.687 | 12 | 179 | 35.354 |
| Slovenia | F | 745 | | 551 | | 2.637 | 904 | 91 | 3.604 | | 37 | 27.131 |
| | V | 217 | 6 | | 173 | 17 | 1.567 | | 3.195 | 166 | 730 | 25.106 |
| | TOT. | 962 | 6 | 551 | 173 | 2.655 | 2.471 | 91 | 6.798 | 166 | 768 | 52.237 |
| Switzerland | F | 2.868 | | 31 | | 2.385 | 2.716 | 169 | 17.254 | | 233 | 95.489 |
| | V | 154 | | | 260 | 68 | 2.898 | | 4.501 | 177 | 2.086 | 42.572 |
| | TOT. | 3.022 | 0 | 31 | 260 | 2.454 | 5.614 | 169 | 21.754 | 177 | 2.319 | 138.062 |
| Other Europe | F | 29.712 | | 13.753 | | 79.866 | 32.003 | 3.709 | 106.161 | | 1.681 | 511.683 |
| | V | 2.246 | 240 | | 371 | 410 | 9.974 | | 19.433 | 329 | 5.308 | 158.341 |
| | TOT. | 31.957 | 240 | 13.753 | 371 | 80.276 | 41.977 | 3.709 | 125.594 | 329 | 6.989 | 670.024 |
| Other World | F | 10.352 | | 5.395 | | 36.645 | 11.604 | 1.628 | 21.367 | | 329 | 167.711 |
| | V | 51 | 7 | | 60 | 13 | 460 | | 1.354 | 11 | 216 | 8.442 |
| | TOT. | 10.403 | 7 | 5.395 | 60 | 36.657 | 12.064 | 1.628 | 22.720 | 11 | 545 | 176.153 |
| Other Cadses | F | 143 | | 357 | | 4.147 | 615 | 51 | 636 | | | 8.300 |
| | V | 23 | | | | | 105 | | 217 | 5 | 29 | 2.017 |
| | TOT. | 166 | 0 | 357 | 0 | 4.147 | 720 | 51 | 852 | 5 | 29 | 10.317 |
| Total | F | 96.423 | 8 | 180.431 | 0 | 440.357 | 134.657 | 14.002 | 449.881 | 0 | 5.571 | 2.605.224 |
| | V | 10.965 | 970 | 0 | 3.294 | 1.940 | 58.359 | 0 | 119.985 | 3.992 | 31.635 | 985.300 |
| | TOT. | 107.388 | 978 | 180.431 | 3.294 | 442.297 | 193.016 | 14.002 | 569.866 | 3.992 | 37.206 | 3.590.524 |

Chapter 3

FEASIBLE EVOLUTION IN THE DEMONSTRATORS AREAS

TAB. 9.2 - ITALIAN NUTS2 EXPORT OF FRESH PRODUCE (in MT, IT6-ITB)

| OR. DEST. | TYPE | IT6 | IT71 | IT72 | IT8 | IT91 | IT92 | IT93 | ITA | ITB | TOT. ITALY |
|--------------|------|---------|---------|--------|---------|---------|--------|---------|---------|--------|------------|
| Albania | F | 11 | 24 | | 212 | 646 | 247 | 2.262 | 2.185 | 74 | 19.004 |
| | V | 128 | 1.151 | 176 | 3.195 | 1.534 | 19 | 1.793 | 1.757 | 423 | 13.840 |
| | TOT. | 139 | 1.176 | 176 | 3.407 | 2.180 | 266 | 4.055 | 3.941 | 496 | 32.844 |
| Austria | F | 1.913 | 1.364 | 182 | 10.581 | 15.189 | 3.864 | 13.867 | 26.127 | 630 | 146.719 |
| | V | 3.217 | 5.431 | 1.494 | 7.570 | 12.306 | 2.327 | 5.893 | 11.215 | 3.155 | 69.556 |
| | TOT. | 5.130 | 6.796 | 1.676 | 18.151 | 27.495 | 6.191 | 19.760 | 37.342 | 3.785 | 216.275 |
| Bosnia Herz. | F | 444 | 146 | | 737 | 2.768 | 545 | 5.436 | 6.890 | 79 | 24.922 |
| | V | 353 | 564 | 544 | 1.205 | 840 | 193 | 1.623 | 2.734 | 879 | 10.205 |
| | TOT. | 798 | 710 | 544 | 1.941 | 3.608 | 738 | 7.059 | 9.625 | 959 | 35.127 |
| Croatia | F | 532 | 329 | 18 | 1.991 | 4.421 | 698 | 3.219 | 5.725 | 128 | 28.014 |
| | V | 591 | 1.000 | 309 | 944 | 1.249 | 249 | 998 | 2.142 | 558 | 10.158 |
| | TOT. | 1.123 | 1.329 | 327 | 2.936 | 5.670 | 947 | 4.217 | 7.868 | 687 | 38.172 |
| Czeck Rep. | F | 1.930 | 961 | 36 | 4.173 | 17.746 | 1.138 | 8.223 | 10.216 | 148 | 81.239 |
| | V | 1.289 | 1.502 | 222 | 2.740 | 4.360 | 651 | 1.703 | 4.505 | 861 | 22.744 |
| | TOT. | 3.219 | 2.463 | 259 | 6.913 | 22.106 | 1.789 | 9.926 | 14.720 | 1.009 | 103.983 |
| Greece | F | 281 | 34 | | 225 | 838 | 29 | 242 | 1.106 | | 75.023 |
| | V | 249 | 846 | 111 | 1.779 | 1.699 | 291 | 1.045 | 1.123 | 270 | 9.506 |
| | TOT. | 531 | 880 | 111 | 2.004 | 2.538 | 320 | 1.287 | 2.229 | 270 | 84.529 |
| Hungary | F | 1.303 | 147 | | 578 | 2.507 | 417 | 4.953 | 3.087 | 6 | 20.135 |
| | V | 120 | 293 | 120 | 463 | 601 | 149 | 490 | 658 | 205 | 3.641 |
| | TOT. | 1.423 | 440 | 120 | 1.041 | 3.108 | 567 | 5.443 | 3.746 | 211 | 23.775 |
| France | F | 3.232 | 2.447 | 29 | 3.028 | 91.869 | 1.371 | 6.670 | 29.107 | 170 | 248.407 |
| | V | 2.755 | 4.632 | 950 | 6.709 | 10.114 | 1.508 | 4.915 | 9.683 | 2.218 | 63.871 |
| | TOT. | 5.988 | 7.079 | 979 | 9.737 | 101.983 | 2.878 | 11.585 | 38.789 | 2.388 | 312.278 |
| Germany | F | 21.769 | 12.905 | 1.044 | 72.427 | 186.675 | 14.679 | 35.797 | 83.560 | 1.286 | 984.323 |
| | V | 23.364 | 56.717 | 9.235 | 73.573 | 77.567 | 12.321 | 49.972 | 83.364 | 19.624 | 524.068 |
| | TOT. | 45.133 | 69.622 | 10.278 | 145.999 | 264.242 | 27.001 | 85.769 | 166.925 | 20.910 | 1.508.390 |
| Poland | F | 5.371 | 2.039 | 51 | 5.801 | 53.236 | 2.267 | 20.362 | 22.244 | 172 | 137.122 |
| | V | 515 | 1.130 | 307 | 2.790 | 2.354 | 252 | 1.689 | 3.457 | 671 | 15.884 |
| | TOT. | 5.886 | 3.169 | 358 | 8.591 | 55.590 | 2.520 | 22.051 | 25.701 | 843 | 153.005 |
| Slovakia | F | 925 | 233 | 8 | 1.041 | 4.085 | 429 | 4.001 | 3.753 | 61 | 30.002 |
| | V | 273 | 352 | 61 | 696 | 1.005 | 145 | 430 | 1.100 | 203 | 5.352 |
| | TOT. | 1.198 | 585 | 69 | 1.738 | 5.091 | 574 | 4.431 | 4.853 | 264 | 35.354 |
| Slovenia | F | 564 | 263 | 15 | 1.497 | 4.119 | 718 | 5.728 | 5.570 | 87 | 27.131 |
| | V | 1.399 | 1.799 | 489 | 2.398 | 4.517 | 795 | 1.776 | 4.719 | 1.144 | 25.106 |
| | TOT. | 1.962 | 2.063 | 504 | 3.895 | 8.636 | 1.512 | 7.505 | 10.289 | 1.231 | 52.237 |
| Switzerland | F | 1.553 | 1.495 | 177 | 9.537 | 25.705 | 3.522 | 9.551 | 17.762 | 532 | 95.489 |
| | V | 2.355 | 3.716 | 540 | 4.105 | 9.428 | 1.861 | 2.584 | 6.339 | 1.502 | 42.572 |
| | TOT. | 3.908 | 5.211 | 717 | 13.641 | 35.132 | 5.383 | 12.135 | 24.101 | 2.034 | 138.062 |
| Other Europe | F | 28.522 | 7.906 | 418 | 38.461 | 108.004 | 6.179 | 16.132 | 38.758 | 419 | 511.683 |
| | V | 5.389 | 15.532 | 1.760 | 27.439 | 25.720 | 3.360 | 15.008 | 20.997 | 4.824 | 158.341 |
| | TOT. | 33.911 | 23.438 | 2.178 | 65.900 | 133.724 | 9.539 | 31.140 | 59.755 | 5.243 | 670.024 |
| Other World | F | 12.210 | 1.796 | 56 | 6.465 | 34.501 | 1.781 | 9.507 | 13.895 | 181 | 167.711 |
| | V | 551 | 990 | 57 | 915 | 1.435 | 200 | 455 | 1.441 | 226 | 8.442 |
| | TOT. | 12.761 | 2.787 | 113 | 7.381 | 35.937 | 1.981 | 9.962 | 15.336 | 407 | 176.153 |
| Other Cadses | F | 85 | | | 84 | 587 | 24 | 511 | 1.055 | 5 | 8.300 |
| | V | 49 | 141 | 37 | 394 | 254 | 5 | 285 | 388 | 84 | 2.017 |
| | TOT. | 134 | 141 | 37 | 478 | 842 | 29 | 796 | 1.443 | 90 | 10.317 |
| Total | F | 80.646 | 32.091 | 2.034 | 156.838 | 552.896 | 37.908 | 146.460 | 271.041 | 3.978 | 2.605.224 |
| | V | 42.597 | 95.798 | 16.411 | 136.915 | 154.985 | 24.328 | 90.659 | 155.622 | 36.846 | 985.300 |
| | TOT. | 123.244 | 127.889 | 18.445 | 293.753 | 707.881 | 62.235 | 237.119 | 426.663 | 40.825 | 3.590.524 |

Chapter 3

FEASIBLE EVOLUTION IN THE DEMONSTRATORS AREAS

TAB. 10.1 - ITALIAN NUTS2 IMPORT OF FRESH PRODUCE (in MT, IT11-IT53)

| DEST. ORIGIN | TYPE | IT11 | IT12 | IT13 | IT2 | IT31 | IT32 | IT33 | IT4 | IT51 | IT52 | IT53 | TOT. ITALY |
|-----------------|------|---------|-------|---------|---------|--------|---------|--------|--------|---------|--------|--------|------------|
| Austria | F | 24 | | 99 | 317 | | 71 | 12 | 122 | 125 | 20 | 36 | 1.640 |
| | V | 510 | 22 | 403 | 2.052 | 192 | 448 | 261 | 253 | 722 | 202 | 231 | 11.098 |
| | TOT. | 533 | 22 | 502 | 2.369 | 192 | 519 | 273 | 375 | 847 | 222 | 267 | 12.739 |
| Greece | F | 598 | 26 | 398 | 2.194 | 205 | 681 | 223 | 501 | 719 | 195 | 209 | 9.601 |
| | V | 16.341 | 530 | 7.215 | 6.573 | 4.216 | 4.519 | 5.231 | 2.378 | 10.211 | 1.488 | 3.604 | 88.493 |
| | TOT. | 16.938 | 556 | 7.613 | 8.767 | 4.421 | 5.201 | 5.453 | 2.879 | 10.930 | 1.683 | 3.813 | 98.094 |
| Hungary | F | | | | 10 | | | | | | | | 10 |
| | V | 20 | | 66 | 281 | 41 | 21 | 50 | 20 | 109 | 35 | 29 | 1.405 |
| | TOT. | 20 | 0 | 66 | 291 | 41 | 21 | 50 | 20 | 109 | 35 | 29 | 1.415 |
| Denmark | F | | | | 5 | | | | | | | | 5 |
| | V | 190 | | 98 | 579 | 34 | 178 | 58 | 91 | 186 | 47 | 71 | 3.179 |
| | TOT. | 190 | 0 | 98 | 584 | 34 | 178 | 58 | 91 | 186 | 47 | 71 | 3.184 |
| France | F | 5.539 | 228 | 11.677 | 17.656 | 1.613 | 6.341 | 2.074 | 5.002 | 6.242 | 1.584 | 2.208 | 97.329 |
| | V | 16.417 | 468 | 8.907 | 47.548 | 3.468 | 12.422 | 5.396 | 6.464 | 16.598 | 4.217 | 5.931 | 264.552 |
| | TOT. | 21.956 | 696 | 20.585 | 65.204 | 5.081 | 18.763 | 7.469 | 11.466 | 22.840 | 5.801 | 8.139 | 361.881 |
| Germany | F | 939 | 31 | 2.172 | 2.628 | 217 | 1.041 | 299 | 984 | 990 | 242 | 385 | 15.682 |
| | V | 8.074 | 255 | 4.646 | 25.418 | 1.880 | 6.608 | 2.877 | 3.578 | 8.699 | 2.254 | 3.052 | 139.393 |
| | TOT. | 9.013 | 286 | 6.818 | 28.046 | 2.097 | 7.649 | 3.176 | 4.563 | 9.688 | 2.496 | 3.437 | 155.075 |
| Great Britain | F | 128 | 9 | 266 | 610 | 68 | 148 | 65 | 88 | 177 | 52 | 45 | 2.574 |
| | V | 327 | 16 | 233 | 1.227 | 111 | 253 | 163 | 202 | 433 | 122 | 142 | 6.576 |
| | TOT. | 454 | 25 | 499 | 1.838 | 179 | 401 | 228 | 290 | 610 | 174 | 187 | 9.150 |
| Holland | F | 2.431 | 82 | 1.772 | 6.101 | 554 | 2.528 | 707 | 2.316 | 2.358 | 580 | 911 | 32.877 |
| | V | 10.411 | 336 | 5.450 | 29.364 | 2.483 | 7.660 | 3.630 | 5.081 | 10.541 | 2.543 | 3.514 | 160.659 |
| | TOT. | 12.842 | 418 | 7.222 | 35.466 | 3.037 | 10.189 | 4.337 | 7.397 | 12.900 | 3.123 | 4.426 | 193.536 |
| Ireland | F | | | | | | | | | | | | 0 |
| | V | 82 | | 26 | 144 | 14 | | 24 | 58 | 62 | 18 | 18 | 808 |
| | TOT. | 82 | 0 | 26 | 144 | 14 | 0 | 24 | 58 | 62 | 18 | 18 | 808 |
| Poland | F | 17 | | 8 | 43 | | 17 | | 15 | 16 | | 6 | 174 |
| | V | 91 | | 31 | 169 | 17 | | 28 | 65 | 73 | 21 | 21 | 943 |
| | TOT. | 107 | 0 | 39 | 212 | 17 | 17 | 28 | 80 | 88 | 21 | 27 | 1.118 |
| Portugal | F | 2.178 | 61 | 12.392 | 4.647 | 480 | 2.302 | 604 | 2.036 | 1.810 | 429 | 748 | 40.969 |
| | V | 6 | | | 8 | | | | | | | | 22 |
| | TOT. | 2.184 | 61 | 12.392 | 4.655 | 480 | 2.302 | 604 | 2.036 | 1.810 | 429 | 748 | 40.991 |
| Spain | F | 22.177 | 839 | 27.635 | 61.143 | 6.077 | 23.173 | 7.332 | 18.788 | 21.978 | 5.561 | 8.026 | 317.559 |
| | V | 9.542 | 372 | 4.194 | 18.152 | 2.758 | 5.916 | 3.432 | 6.382 | 8.063 | 1.641 | 2.440 | 102.737 |
| | TOT. | 31.718 | 1.211 | 31.828 | 79.296 | 8.835 | 29.089 | 10.764 | 25.169 | 30.040 | 7.201 | 10.466 | 420.295 |
| Egypt | F | 12 | | 5 | 30 | | 10 | | 9 | 11 | | | 121 |
| | V | 3.559 | 88 | 2.024 | 11.462 | 684 | 3.023 | 1.115 | 1.174 | 3.765 | 989 | 1.387 | 63.271 |
| | TOT. | 3.570 | 88 | 2.029 | 11.492 | 684 | 3.034 | 1.115 | 1.184 | 3.776 | 989 | 1.387 | 63.392 |
| Israel | F | 961 | 27 | 361 | 2.043 | 211 | 1.017 | 266 | 898 | 795 | 188 | 329 | 9.773 |
| | V | 84 | | 41 | 218 | 18 | 85 | 26 | 49 | 78 | 19 | 28 | 1.289 |
| | TOT. | 1.045 | 27 | 402 | 2.261 | 229 | 1.102 | 292 | 947 | 872 | 207 | 358 | 11.063 |
| Other Countries | F | 39.511 | 1.231 | 158.469 | 92.625 | 8.886 | 41.541 | 11.094 | 37.960 | 36.371 | 8.761 | 14.364 | 694.290 |
| | V | 3.006 | 117 | 1.795 | 6.721 | 943 | 1.633 | 1.259 | 1.131 | 3.089 | 732 | 991 | 40.467 |
| | TOT. | 42.518 | 1.348 | 160.263 | 99.346 | 9.828 | 43.174 | 12.354 | 39.091 | 39.460 | 9.493 | 15.356 | 734.757 |
| Total | F | 74.513 | 2.535 | 215.252 | 190.052 | 18.310 | 78.872 | 22.676 | 68.720 | 71.591 | 17.612 | 27.269 | 1.222.604 |
| | V | 68.659 | 2.203 | 35.129 | 149.917 | 16.857 | 42.768 | 23.548 | 26.927 | 62.628 | 14.326 | 21.460 | 884.892 |
| | TOT. | 143.171 | 4.739 | 250.381 | 339.969 | 35.168 | 121.639 | 46.224 | 95.647 | 134.219 | 31.938 | 48.728 | 2.107.496 |

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TAB. 10.2 - ITALIAN NUTS2 IMPORT OF FRESH PRODUCE (in MT, IT6-ITB)

| DEST. ORIGIN | TYPE | IT6 | IT71 | IT72 | IT8 | IT91 | IT92 | IT93 | ITA | ITB | TOT. ITALY |
|-----------------|------|---------|--------|--------|---------|---------|--------|--------|---------|--------|------------|
| Austria | F | 170 | 27 | 9 | 153 | 154 | 16 | 68 | 172 | 45 | 1.640 |
| | V | 1.114 | 177 | 54 | 1.356 | 1.001 | 169 | 536 | 1.051 | 345 | 11.098 |
| | TOT. | 1.285 | 205 | 63 | 1.509 | 1.155 | 184 | 604 | 1.223 | 390 | 12.739 |
| Greece | F | 877 | 174 | 38 | 802 | 510 | 61 | 201 | 748 | 242 | 9.601 |
| | V | 2.714 | 3.121 | 1.374 | 11.406 | 2.119 | 259 | 3.296 | 1.496 | 403 | 88.493 |
| | TOT. | 3.591 | 3.294 | 1.412 | 12.208 | 2.629 | 320 | 3.497 | 2.244 | 645 | 98.094 |
| Hungary | F | | | | | | | | | | 10 |
| | V | 189 | 10 | | 166 | 122 | 26 | 79 | 98 | 43 | 1.405 |
| | TOT. | 189 | 10 | 0 | 166 | 122 | 26 | 79 | 98 | 43 | 1.415 |
| Denmark | F | | | | | | | | | | 5 |
| | V | 265 | 59 | 19 | 397 | 290 | 44 | 143 | 333 | 99 | 3.179 |
| | TOT. | 265 | 59 | 19 | 397 | 290 | 44 | 143 | 333 | 99 | 3.184 |
| France | F | 8.558 | 1.779 | 488 | 8.201 | 5.852 | 789 | 2.776 | 6.552 | 2.170 | 97.329 |
| | V | 21.447 | 5.019 | 1.653 | 34.401 | 24.031 | 3.781 | 12.240 | 26.027 | 8.117 | 264.552 |
| | TOT. | 30.005 | 6.799 | 2.140 | 42.602 | 29.883 | 4.570 | 15.016 | 32.579 | 10.286 | 361.881 |
| Germany | F | 1.340 | 323 | 85 | 1.288 | 898 | 118 | 419 | 943 | 340 | 15.682 |
| | V | 11.914 | 2.531 | 814 | 17.661 | 12.609 | 2.013 | 6.457 | 13.716 | 4.336 | 139.393 |
| | TOT. | 13.254 | 2.853 | 899 | 18.950 | 13.507 | 2.131 | 6.875 | 14.660 | 4.676 | 155.075 |
| Great Britain | F | 204 | 42 | 10 | 236 | 98 | 15 | 53 | 216 | 45 | 2.574 |
| | V | 656 | 119 | 33 | 777 | 576 | 97 | 305 | 587 | 196 | 6.576 |
| | TOT. | 860 | 160 | 43 | 1.013 | 674 | 113 | 358 | 804 | 242 | 9.150 |
| Holland | F | 3.205 | 773 | 203 | 2.692 | 2.125 | 276 | 814 | 1.682 | 766 | 32.877 |
| | V | 13.186 | 2.995 | 954 | 19.889 | 13.718 | 2.185 | 7.138 | 14.637 | 4.943 | 160.659 |
| | TOT. | 16.391 | 3.768 | 1.156 | 22.581 | 15.843 | 2.460 | 7.952 | 16.319 | 5.708 | 193.536 |
| Ireland | F | | | | | | | | | | 0 |
| | V | 63 | 30 | 6 | 87 | 66 | 9 | 26 | 56 | 20 | 808 |
| | TOT. | 63 | 30 | 6 | 87 | 66 | 9 | 26 | 56 | 20 | 808 |
| Poland | F | 20 | | | 19 | 6 | | | 8 | | 174 |
| | V | 77 | 34 | 7 | 102 | 78 | 11 | 32 | 65 | 23 | 943 |
| | TOT. | 97 | 34 | 7 | 121 | 83 | 11 | 32 | 73 | 23 | 1.118 |
| Portugal | F | 2.704 | 653 | 167 | 2.929 | 2.080 | 307 | 1.036 | 2.570 | 836 | 40.969 |
| | V | | | | 8 | | | | | | 22 |
| | TOT. | 2.704 | 653 | 167 | 2.937 | 2.080 | 307 | 1.036 | 2.570 | 836 | 40.991 |
| Spain | F | 29.864 | 6.905 | 1.780 | 26.343 | 17.654 | 2.368 | 7.176 | 16.574 | 6.167 | 317.559 |
| | V | 8.296 | 2.328 | 708 | 11.117 | 5.293 | 831 | 3.168 | 5.761 | 2.344 | 102.737 |
| | TOT. | 38.160 | 9.233 | 2.488 | 37.461 | 22.947 | 3.199 | 10.344 | 22.335 | 8.510 | 420.295 |
| Egypt | F | 12 | | | 14 | 12 | | | 5 | | 121 |
| | V | 5.105 | 1.123 | 384 | 8.552 | 6.116 | 962 | 3.053 | 6.671 | 2.034 | 63.271 |
| | TOT. | 5.117 | 1.123 | 384 | 8.566 | 6.128 | 962 | 3.053 | 6.676 | 2.034 | 63.392 |
| Israel | F | 1.162 | 287 | 73 | 878 | 69 | 10 | 51 | 94 | 53 | 9.773 |
| | V | 113 | 24 | 8 | 156 | 110 | 16 | 53 | 126 | 37 | 1.289 |
| | TOT. | 1.275 | 311 | 81 | 1.034 | 179 | 26 | 104 | 220 | 90 | 11.063 |
| Other Countries | F | 52.480 | 12.415 | 3.242 | 51.492 | 38.968 | 5.530 | 18.153 | 45.517 | 15.679 | 694.290 |
| | V | 3.472 | 810 | 272 | 4.975 | 3.092 | 519 | 1.840 | 3.021 | 1.048 | 40.467 |
| | TOT. | 55.952 | 13.225 | 3.515 | 56.467 | 42.060 | 6.049 | 19.993 | 48.538 | 16.727 | 734.757 |
| Total | F | 100.598 | 23.378 | 6.094 | 95.047 | 68.426 | 9.490 | 30.747 | 75.081 | 26.342 | 1.222.604 |
| | V | 68.613 | 18.381 | 6.286 | 111.050 | 69.221 | 10.922 | 38.366 | 73.645 | 23.987 | 884.892 |
| | TOT. | 169.210 | 41.758 | 12.380 | 206.097 | 137.647 | 20.412 | 69.112 | 148.726 | 50.329 | 2.107.496 |

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All trade flows regarding Italy have been studied in connection to the most important roads. Moreover, if these flows concern foreign Countries, an entry/exit point to/from the Country were also indicated.

The most significant entry/exit points appear to be those indicated in the following table.

TAB. 11 - FRESH PRODUCE MAIN ENTRY/EXIT POINT OF ITALY (in MT)

| BORDER | CITY | ROUTE | FRUIT | VEGETABLES | TOTAL |
|------------------|----------|---------------------|-----------|------------|-----------|
| Italy - Austria | Brennero | Bolzano- Innsbruck | 1.438.489 | 943.628 | 2.382.116 |
| Italy - Austria | Tarvisio | Tarvisio - Villach | 343.739 | 159.642 | 503.381 |
| Italy - Sea | Ravenna | Adriatic corridor | 149.762 | 60.021 | 209.783 |
| Italy - Sea | Bari | Adriatic corridor | 112.068 | 72.908 | 184.976 |
| Italy - Sea | Venezia | Adriatic corridor | 114.423 | 45.574 | 159.996 |
| Italy - Slovenia | Kozina | Trieste - Rijeka | 86.831 | 31.097 | 117.928 |
| Italy - Slovenia | Sezana | Trieste - Ljubljana | 66.729 | 42.314 | 109.042 |
| Italy - Sea | Ancona | Adriatic corridor | 38.386 | 40.157 | 78.543 |
| Italy - Sea | Trieste | Adriatic corridor | 51.978 | 22.124 | 74.103 |

The routes where traffic of fruit and vegetables is heavier are reported in the following table.

TAB. 12 - FRESH PRODUCE MAIN ROADS OF TRANSIT IN ITALY (in MT)

| ROUTE | ROAD | FRUIT | VEGETABLES | TOTAL |
|-----------------------|----------------|-----------|------------|-----------|
| Modena - Bologna | A1/E35 | 2.924.481 | 1.983.407 | 4.907.888 |
| Modena - Verona | A22/E45 | 1.975.760 | 1.206.306 | 3.182.066 |
| Verona - Trento | A22/E45 | 2.044.877 | 1.025.076 | 3.069.953 |
| Brennero - Bolzano | A22/E45 | 1.438.489 | 943.628 | 2.382.116 |
| Bolzano - Trento | A22/E45 | 1.438.489 | 943.628 | 2.382.116 |
| Bologna - Cesena | A14/E45 | 1.066.254 | 835.785 | 1.902.039 |
| Cesena - Ancona | A14/E55 | 1.046.512 | 822.235 | 1.868.747 |
| Ancona - Giulianova | A14/E55 | 1.090.648 | 831.183 | 1.921.832 |
| Parma - Modena | A1/E35 | 948.721 | 777.101 | 1.725.822 |
| Giulianova - Termoli | A14/E55 | 951.318 | 558.603 | 1.509.921 |
| Termoli - Foggia | A14/E55 | 945.037 | 518.400 | 1.463.438 |
| Foggia - Bari | A14/E55 | 846.607 | 447.151 | 1.293.758 |
| Venezia - Padova | A4/E70 | 680.005 | 358.543 | 1.038.549 |
| Bologna - Firenze | A1/E35 | 406.110 | 248.164 | 654.274 |
| Venezia - Udine | A4/E70+A23/E55 | 414.674 | 248.452 | 663.126 |
| Bari - Potenza | SP96 | 402.162 | 279.106 | 681.268 |
| Padova - Bologna | A13 | 371.408 | 202.642 | 574.050 |
| Tarvisio - Udine | A23/E55 | 343.739 | 159.642 | 503.381 |
| Verona - Padova | A4/E70 | 314.485 | 158.125 | 472.609 |
| Milano - Verona | A4/E64 | 306.788 | 102.472 | 409.260 |
| L'Aquila - Giulianova | A24+SP150 | 139.795 | 282.769 | 422.565 |

The total amount of fruit and vegetables flows is very considerable and from the data highlighted above, it can be inferred that the most crowded arteries in Italy are:

- A1/E35 + A14/E55 highways between Modena and Taranto. This route, passing through the largest production areas of fresh produce in Italy - and also in the area of Cesena and Taranto - is the most commonly used road to connect Southern part of Italy with the Northern part as well as for the connection to the main roads linking Italy to the main destination markets of Northern and Central Europe;

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- A22/E45 highway, between Modena and the border with Austria (Brennero), is the main route connecting Italy to the Northern Europe (particularly Austria and Germany);
- A4/E70 highway between Verona and Trieste and then with the border points among Italy and Slovenia (Kozina and Sezana) and Austria (Tarvisio).

From these results comes that the roads connections made by A1/E35, A14/E55 and A22/E45 are the main paths used for fresh produce trade within Italy and for the export activities of the main Italian production areas.

Such as mentioned in the Premises of this publication, this connection is one of the main reason for the demonstrators positioning choice in the areas of Cesena and Taranto. The other main reasons of these positioning choice refer to the relevance of Emilia-Romagna and Puglia in the production of fruit and vegetables in the Italian context and their role in the trade of fresh produce both with regard to the other Italian NUTS 2 and to/from foreign Countries.

**TAB. 13 - PRODUCTION OF FRUIT AND VEGETABLES FOR FRESH CONSUMPTION
IN EMILIA-ROMAGNA AND PUGLIA (avg. 2000-2001 in MT)**

| PRODUCTS | EMILIA ROMAGNA (IT4) | PUGLIA (IT91) | ITALY (IT) | IT4 vs. IT | IT91 vs. IT |
|-----------------------------|----------------------|------------------|-------------------|------------|-------------|
| Potatoes | 219.886 | 161.451 | 1.844.685 | 12% | 9% |
| Onions and Garlic | 120.090 | 33.945 | 449.362 | 27% | 8% |
| Cabbage and Cauliflowers | 9.905 | 154.360 | 662.553 | 1% | 23% |
| Salad | 74.953 | 209.057 | 946.982 | 8% | 22% |
| Carrots | 133.157 | 19.575 | 527.644 | 25% | 4% |
| Cucumbers | 7.529 | 6.890 | 47.508 | 16% | 15% |
| Melons and Watermelons | 135.339 | 145.685 | 986.616 | 14% | 15% |
| Peppers | 4.734 | 43.510 | 354.024 | 1% | 12% |
| Tomatoes | 32.900 | 73.180 | 1.434.388 | 2% | 5% |
| VEGETABLES TOTAL | 738.493 | 847.653 | 7.253.762 | 10% | 12% |
| Kiwifruits | 57.910 | 2.640 | 307.071 | 19% | 1% |
| Pineapples | 0 | 0 | 0 | - | - |
| Bananas | 0 | 0 | 0 | - | - |
| Apples | 174.652 | 1.632 | 1.942.951 | 9% | 0% |
| Pears | 450.690 | 6.423 | 697.826 | 65% | 1% |
| Apricots | 38.514 | 4.720 | 112.343 | 34% | 4% |
| Plums | 47.788 | 2.849 | 125.646 | 38% | 2% |
| Cherries and Sour Cherries | 17.430 | 31.756 | 100.673 | 17% | 32% |
| Peaches and nectarines | 417.954 | 50.567 | 1.211.532 | 34% | 4% |
| Lemons | 0 | 2.477 | 380.250 | 0% | 1% |
| Oranges | 0 | 85.732 | 1.331.224 | 0% | 6% |
| Other citrus | 0 | 49.176 | 535.265 | 0% | 9% |
| Strawberries | 31.008 | 1.272 | 175.692 | 18% | 1% |
| Grapes | 134 | 1.122.650 | 1.546.996 | 0% | 73% |
| FRUIT TOTAL | 1.236.080 | 1.361.894 | 8.467.469 | 15% | 16% |
| FRUIT AND VEGETABLES | 1.974.573 | 2.209.547 | 15.721.231 | 13% | 14% |

Source: Imonode consortium processing on ISTAT data

Moreover, circumscribing the analyses to the routes linking the demonstrators areas of Taranto and Cesena emerged that with regard to fruit and vegetables trade in the one way from Taranto to Cesena NUTS 3 (Italy) - i.e. the most important in the fresh produce transport within CADSES area - there are nearly 1.154.000 MT/year²⁷ of flows of fruit and vegetables. This volume - on the basis of an optimised transport made by lorry in a conventional full travel of 33 pallets of 600 kg/each for fresh produce and a saturation of 100% of the lorries - subtend 58.283 theoretical lorries in the one way route from Taranto to Cesena. Anyway, in the present situation - i.e. with an average

²⁷ In the reference period 2000-2001 on the basis of the routes and conditions applied to the modelling reported in Appendix A.2, A.3 and A.4.

lorries saturation of 80%²⁸ for the outward journey - there are 72.854 theoretical lorries from Taranto to Cesena, i.e. 14.500 more than the optimised logistics (+25%).

Considering also that the outward lorries in the route from Taranto to Cesena have to return to Taranto, the analysis highlights the following volumes:

- optimised situation - i.e. with a saturation of 100% - there are 1.154.000 MT from Cesena to Taranto in 58.283 lorries;
- present situation - i.e. with an average 40%²⁹ of empty lorries in return journeys and/or non-saturated return journey defined in equivalent empty lorries - there are 865.500 MT from Cesena to Taranto in 72.854 lorries.

So, in the path Taranto-Cesena-Taranto, the total (outward+return journeys) flows are in the present situation 2.019.500 MT in 145.708 theoretical journeys (outward+return journey) vs. an optimised situation of 2.308.000 MT in 116.566 theoretical journeys.

It means that in the present situation there are an average of 13,86 MT/lorry in the roundtrip Taranto-Cesena-Taranto vs. an optimised situation of 19,80 MT/lorry, with the following main consequence:

- higher traffic on the roads;
- higher cost of transport;
- increasing pollutions and other social costs;
- less freshness of fruit and vegetables, due to multi loading and unloading activities.

From these analyses comes that to realize a fresh produce terminal development and networking is needed a better integration of the TLTs. In particular, with regard to the production system, the goal is a greater organisation of producers at logistics level and a development of concentration platforms of production to increase full lorries bound to the distribution and consumption area and improve all the activities of the reverse logistics. While with regard to the wholesale/distribution area, the main goal is a better integration between distribution centres and wholesale markets to concentrate in a smaller number of points of delivery to the consumer area.

All these activities of rationalizations have been foreseen to create a series of **logistics structures** able to reduce the number of shipping/delivery points for the production areas/redistribution markets and set up a network of fresh produce terminals.

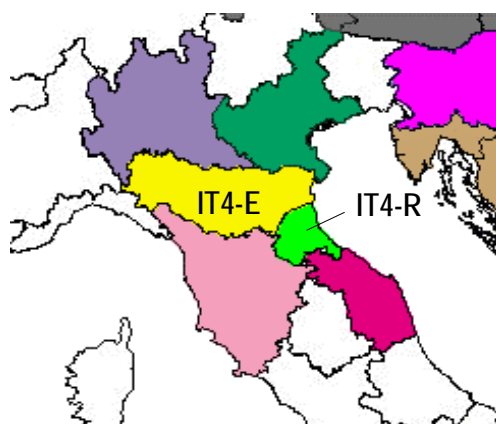
So, such as first step of this process, the Imonode Consortium began a feasibility analysis and project of territorial logistics structures in the areas of Cesena and Taranto, planned with the specific aim to concentrate an increasing volume of fresh produce in one point of shipment.

3.2 - THE FRESH PRODUCE SYSTEM IN CESENA AREA

With refer to Cesena demonstrator, the first in deep analysis regards the fruit and vegetables local production. This analysis started from the results of a study of the agro-industrial cluster of Romagna (IT4-R) for fresh produce realized by the Chamber of Commerce of Forlì-Cesena at the beginning of the new millennium³⁰.

Romagna sub-region is a productive basin specialized on fresh fruit and vegetables production destined mainly for local and North Italy consumption but also exported in considerable quantities mainly in Germany and other European Countries. In the following tables the considerable importance of the Romagna

FIG. 15 - ROMAGNA CLUSTER



²⁸ Such as highlighted in Par. 1.5, pag. 16.

²⁹ Ref. Note n. 28.

³⁰ "I distretti agro-alimentari nel sistema economico romagnolo: il caso ortofrutticolo", CCIAA FC, 2003. This analysis regards in particular the data of the Romagna sub-region, i.e. the eastern part of Emilia-Romagna Region that include the Provinces of Ravenna, Forlì-Cesena and Rimini, such as highlighted in the Fig. 15.

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area on the whole Emilia-Romagna region is clearly shown. Moreover, these data highlight the relevance of the Romagna for the Italian fresh produce system. As a matter of fact, in Romagna there is a relevant production of some fresh fruit and vegetables in respect to Italian production: stone fruits, kiwifruits, and strawberries. In particular, Romagna produces more than 10% or the whole Italian production of fruit.

TAB. 14 - PRODUCTION OF FRUIT AND VEGETABLES IN ROMAGNA CLUSTER (2000, in Quintals)

| | Romagna | Emilia-Romagna | Italy | Romagna vs Emilia Romagna | Romagna vs Italy |
|--|------------------|-------------------|--------------------|---------------------------|------------------|
| TOTAL FRUIT | 6.106.945 | 15.013.723 | 59.739.277 | 40,68% | 10,22% |
| TOTAL VEGETABLES | 2.201.265 | 18.316.411 | 95.674.133 | 12,02% | 2,30% |
| TOTAL VEGETABLES (excl tomatoes for industry) | 1.588.165 | 3.390.219 | 49.929.557 | 46,85% | 3,18% |
| TOTAL FRUIT AND VEGETABLES | 8.308.210 | 33.330.134 | 155.413.410 | 24,93% | 5,35% |
| TOTAL FRUIT AND VEGETABLES (excl tomatoes for industry) | 7.695.110 | 18.403.942 | 109.668.834 | 41,81% | 7,02% |

Source: I distretti agro-alimentari nel sistema economico romagnolo: il caso ortofrutticolo, CCIAA Forlì-Cesena, 2003

In Romagna, currently there are 5 Producers Organisations (PO) devoted to fresh fruit and vegetables vs. 19 POs present in the western part of the Emilia-Romagna region (i.e. Emilia).

In the same way, from the import/export side, in Romagna there are more than 43 companies member of the Italian association of fruit and vegetables importers and exporters (ANEIOA), a number highlighting a great fragmentation in the trading system of Romagna fresh produce cluster.

In terms of fresh produce marketing, from the Romagna fruit and vegetables agro-industrial cluster analysis emerges the following table.

TAB. 15 - ROMAGNA CLUSTER: MARKETING OF FRESH PRODUCE IN 2000 (in MT)

| | vs. Italy | vs. Foreign Countries | TOTAL |
|---------------------------|----------------|-----------------------|----------------|
| Cooperative system | 505.179 | 241.932 | 747.111 |
| Private companies | 74.374 | 111.560 | 185.934 |
| TOTAL | 579.553 | 353.492 | 933.045 |

Source: I distretti agro-alimentari nel sistema economico romagnolo: il caso ortofrutticolo, CCIAA Forlì-Cesena, 2003

Moreover, the in deep analysis was focused also on the main characteristics that influence the demonstrator project: transport system for fresh produce in the area, possible cargo integration among local production and transits, retail system provisioning, etc.. From these analysis comes that the Romagna scenery is characterized by:

- strong reduction of controlled temperature lorries fleet. The latter are nearly 600 units that represent less than 50% of 1990s fleet;
- connected strong reduction of transport companies;
- integration with productions coming from South-East Mediterranean Countries;
- growing importance of integration of the production coming from South Italy with the local one to increase efficiency for cargoes addressed in North Italy and beyond the Alps;
- absence of an efficient and integrated system to find carriers for small quantities for the same destinations. At the moment cargoes are consolidated in a pragmatic way without any kind of organisation/automation;
- high level of disorganization in logistics activities considering for instance that sometimes super and hypermarkets are fed by 2-3 different lorries coming from the same area or even from the same producers.

With refer to the fresh produce flows analysis results that Emilia-Romagna is a potential export area for 1,5 millions MT of fruit and vegetables, while Romagna provide a potential export flows of

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533.000 MT (475.000 of fresh fruit and 58.000 vegetables). In the same way, Emilia-Romagna is a re-export area (toward North Italy and North Europe) for around 4.000.000 MT coming from South Italy (Abruzzo, Molise, Puglia, Basilicata, Calabria, Campania and Sicilia).

Finally, coming to the input needed to project the demonstrator, the Imonode partners involved in the development of the territorial logistics structure of Cesena realized an on field analysis - made on the 4 main territorial operators of transport - to verify the following information:

- picking activities price per pallet. This is a net price without any consideration for discount and volumes reward. This price is after transport to the logistics structure ("ex platform");
- cross docking activities price per pallet. This price comes from an elaboration made on the basis of the picking activities price rounded off for the cross docking activity (reduced on the basis of the savings realisable with these kind of activities). This is a net price without any consideration for discount and volumes reward. This price is after transport to the logistics structure ("ex platform");
- price of return per lorry. This is a net price without any consideration for discount and volumes reward. This price is after transport to the logistics structure ("ex platform");
- transport average price/km on the basis of the algebraic formula reported in table afterwards. The current conditions highlighted an average price of 1,25 €/km.

TAB. 16 - METHODOLOGY TO CALCULATE THE AVERAGE PRICE/KM ON THE BASIS OF 150.000 KM COVERED IN ONE YEAR

| |
|---|
| Depreciation+Diesel oil expenses+Employee salary+Travel allowance employee+Employee social and financial costs+Full coverage lorry insurance+Road tax+Tires+Average expenditure for lorry service+Lorry washing (outside and inside)+Interest paid+Other expenses (car electrician, coachbuilder, brake maintenance, etc) |
|---|

| |
|-----------------|
| KM covered/year |
|-----------------|

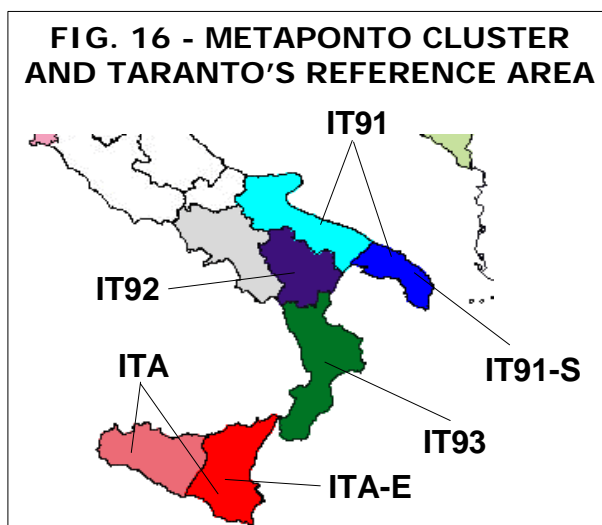
3.3 - THE FRESH PRODUCE SYSTEM IN TARANTO AREA

With refer to fresh produce, the involved partners for the territorial logistics structures realized an analysis on the Puglia and Basilicata output on the basis of the official production data coming from the National Institute of Statistics of Italy (ISTAT).

In this field it is useful to highlight that the southern part of Puglia and Basilicata make up the so-called Metaponto cluster:

- southern Puglia (IT91-S, i.e. Taranto, Brindisi and Lecce Provinces);
- Basilicata (IT92).

FIG. 16 - METAPONTO CLUSTER AND TARANTO'S REFERENCE AREA



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From this analysis comes that Puglia is one of the Italian main fruit and vegetables producing area with around 2,5 millions of MT and represents nearly 12% of the Italian production (12,2% for vegetables in 2004 and 11,2% for fresh fruit). In particular, Puglia is the main Italian producer of table grape.

TAB. 17 - PRODUCTION OF FRUIT AND VEGETABLES IN PUGLIA (in MT)

| | 2000 | 2001 | 2002 | 2003 | 2004 |
|-----------------------------|------------------|------------------|------------------|------------------|------------------|
| TOTAL FRUIT | 1.555.535 | 1.412.889 | 1.303.341 | 1.117.642 | 1.237.127 |
| TOTAL VEGETABLES | 1.555.535 | 1.396.485 | 1.303.341 | 1.292.344 | 1.306.239 |
| FRUIT AND VEGETABLES | 3.111.070 | 2.809.374 | 2.606.682 | 2.409.986 | 2.543.366 |

Source: Imonode consortium processing on ISTAT data

With regard to Basilicata, the analysis realized highlights that this Region with about 500.000 MT of fruit and vegetables production represents around 2,3% of the Italian production (1,5% for vegetables in 2004 and 3,1% for fresh fruit).

TAB. 18 - PRODUCTION OF FRUIT AND VEGETABLES IN BASILICATA (in MT)

| | 2000 | 2001 | 2002 | 2003 | 2004 |
|-----------------------------|----------------|----------------|----------------|----------------|----------------|
| TOTAL FRUIT | 230.738 | 168.702 | 173.132 | 195.027 | 346.348 |
| TOTAL VEGETABLES | 220.453 | 207.132 | 150.262 | 163.468 | 157.372 |
| FRUIT AND VEGETABLES | 451.191 | 375.834 | 323.394 | 358.495 | 503.720 |

Source: Imonode consortium processing on ISTAT data

The Metaponto cluster, such as emerges from the following table is one of the main fruit and vegetables producing area of Italy with nearly 1,6 millions MT and represents around 7,3% of the Italian production (6,0% for vegetables in 2004 and 8,5% for fresh fruit).

TAB. 19 - PRODUCTION OF FRUIT AND VEGETABLES IN METAPONTO CLUSTER (in MT)

| | 2000 | 2001 | 2002 | 2003 | 2004 |
|-----------------------------|------------------|------------------|------------------|------------------|------------------|
| TOTAL FRUIT | 1.071.445 | 1.013.919 | 932.286 | 670.934 | 902.871 |
| TOTAL VEGETABLES | 781.440 | 740.845 | 656.365 | 599.389 | 669.565 |
| FRUIT AND VEGETABLES | 1.852.885 | 1.754.764 | 1.588.651 | 1.270.323 | 1.572.436 |

Source: Imonode consortium processing on ISTAT data

In Puglia, there are 11 Producers Organisations (PO) devoted to fresh fruit and vegetables, while in Basilicata there are 13 POs; numbers that confirm a great fragmentation in the production system of fresh produce in these areas. From the breakdown of the POs on the basis of the location by Provinces comes that in the Metaponto cluster there are 14 POs.

From the import/export side, in Puglia there are 59 companies member of the Italian association of fruit and vegetables importers and exporters (ANEIOA). In Basilicata there is one company associated to ANEIOA. While in the Provinces that make up the Metaponto cluster there are just 2 companies associated to ANEIOA.

Once analysed the production system of Metaponto cluster, the Imonode Consortium realized an in deep analysis of the potential transits across Taranto of fresh produce coming from South Italy and destined to the Northern areas of the Country and Europe and those coming from North (Italy and Europe) bounded to the Southern part of Italy.

To estimate the potential transits passing across Taranto, the Imonode partner realized an in deep analysis applying to the origin/destination matrix a series of conditions and assumptions, such as reported in the Appendix A.5.

In particular, these conditions and assumptions are focused on the following inputs:

- fresh produce import and export of Puglia, Basilicata, Calabria and Sicilia;
- Taranto, Brindisi and Lecce (IT91-S) production/export of fruit and vegetables and share on Puglia region production/export;
- Messina, Catania, Siracusa, Enna and Ragusa (ITA-E) production/export of fruit and vegetables and share on Sicilia region production/export;
- population of Taranto, Brindisi and Lecce (IT91-S) and share on Puglia (IT91) region population;
- share of Puglia, Basilicata, Calabria and Sicilia fresh produce export across Taranto on Puglia, Basilicata, Calabria and Sicilia fresh produce total export.

Moreover, the Imonode Consortium analysed the import of EU-25 and Italy from the main eastern Mediterranean basin Countries (Cyprus, Egypt, Israel, Turkey, Syria, Jordan and Lebanon) and Far East Countries (Australia, China, New Zealand, Philippines, Pakistan, Japan, India and Myanmar) to estimate the potential flows of fresh produce coming from these Countries that could reach the final destination markets in UE-25 crossing Taranto.

In this way, applying these data and assumptions to the statistics coming from the origin/destination matrix with regard to the NUTS 2 trade of fruit and vegetables emerged the data reported in the following table.

TAB. 20 - FLOWS OF FRESH PRODUCE ACROSS TARANTO (in MT)

| SOURCES-DESTINATIONS | MT |
|---|-----------|
| FLows FROM METAPONTO TO NORTH DESTINATIONS | 1.096.269 |
| TRANSITS FROM SOUTH ITALY TO NORTH DESTINATIONS | 1.242.699 |
| FLows FROM EASTERN MEDITERRANEAN AND FAR EAST COUNTRIES | 1.416.902 |
| TRANSITS FROM NORTH ITALY TO SOUTH DESTINATIONS | 723.261 |

Moreover, as made for Cesena, the in deep analysis was focused on the main characteristics that influence the demonstrator project. From these analysis comes that the Puglia scenery is characterized by:

- few modern companies involved in the reefer transport business;
- increasing role of production in South-East Mediterranean Countries to extend the local supply of fruit and vegetables;
- lack of efficient and integrated system to consolidate small production for the same destinations;
- high level of disorganization in the provisioning of multiples.

Finally, such as made for Cesena demonstrator area, the Imonode partner involved in development of the territorial logistics structure of Taranto realized an on field analysis to verify and adapt the same information recognized in Cesena with refer to the needed input to realize the business plan activity. These analysis confirmed the information collected for Cesena with refer to picking activities price per pallet, cross docking activities price per pallet, price of return per lorry and transport average price/km.

3.4 - DEMONSTRATORS PROJECT

Once realized the survey regarding the fresh produce system in the demonstrators areas, the Imonode Consortium began the feasibility analysis of the territorial logistics structures to be project and planned within the areas of Cesena and Taranto.

Main demonstrators objective is to implement - on the basis of the Likely scenery as drawn up in the way stated in the Par. 2.7.2 and 2.8.2 - some possible management solutions and/or pilots, reaching a feasibility level, that aim at producing models to be repeated in other logistics contexts. These demonstrators are foreseen to be developed in different geographical areas (Cesena and Taranto) with the goal to carry out a range of working management prototypes. For these reasons the development modalities of the prototypes are strictly linked to the operational context of the demonstrators. On this ground the methodology for demonstrators implementation will have to be considered as a flexible scheme showing the possible best practices to develop business ideas. This scheme could be also modified and integrated on the basis of the different concrete situations. With

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refer to every single step for the project ideas implementation, a specific methodology has been defined for every analysis that was necessary to reach the objectives.

First of all, in agreement with the goals selected in the preliminary steps of the project, such as reported in the Introduction of this publication, the planning activities of demonstrators have been realized to logistics structures devoted to the fresh produce, nevertheless:

- in the area of Cesena, poultry and frozen foods systems highlight a remarkable role in the perishables division of the demonstrator area and they could be part of a following development of the logistics structure under project;
- in the area of Taranto, fish and fish-cultivation systems register an important role in the perishables supply chains of the area and they could be part of a following development of the logistics structure under planning.

3.4.1 - SCENARIO ANALYSIS

The first step of the methodology has been focused both on the analysis of the current situation in the market and on the promotion and dissemination activities of the demonstrators aims in order to inform, identify and then select operators which could be interested in demonstrators foreseen in the FreshLog Pilot.

In particular, the territorial actors involved in the development of demonstrators - the Chambers of Commerce of Forlì-Cesena and Taranto - are representative bodies of the companies established in the local area and their aim is to start up a demonstrator/pilot involving firstly local operators and then, through dissemination activities, trying to approach “new actors” also at national and international level.

On this ground, using a bottom up approach, the Chambers of Commerce of Forlì-Cesena and Taranto have identified the entrepreneurial associations to be contacted.

The representatives of entrepreneurial associations grouping the operators involved in the supply chain of fresh produce have been invited in some meetings informing them about the project and demonstrators/pilots aims, asking them to report their members that could be interested in pilots and if among their associates some projects were in progress or were planned. In this way, the operators that could be considered as interested have been identified and selected by the entrepreneurial associations located in the demonstrators areas.

Moreover several companies have been contacted directly by the involved parties of the Imonode Consortium or highlighted their interest in the project known through the promotion activities.

These selected operators have been invited in some meetings informing them about the Imonode project aims, about the preliminary project ideas identified during the scenario analysis. As a matter of fact, a scenario analysis including local fruit and vegetables production, handling and flows of fruit and vegetables, logistics chains, paths used, existing facilities and structures, presence of bottlenecks/obstacles in trade of fresh produce, forecasting analysis of the possible evolution of the logistics/supply chains and flows has been carried out in parallel with the operators identification and selection activities.

In both territorial areas of Cesena and Taranto, these meetings highlighted that the key issue for the demonstrators development is to solve the in-deep crisis of the fresh produce system through different actions:

- structures, operators and services development in the direction of the modified needs of the market and logistics;
- links of the local production to the flows in transit;
- adjustment of the activities to the modified logistics needs of the national and international retail system.

3.4.2 - IDENTIFICATION, VERIFICATION, PRIORITISATION AND SELECTION OF BUSINESS IDEAS

On the basis of the companies identified by the entrepreneurial associations and the operators contacted directly by the Imonode Consortium, as described in the previous Paragraph, a series of meetings have been organized with the identified operators, both one-to-one and in joined form, collecting all information provided by operators concerning suggestions of concrete solutions to be developed in the project ideas context, information on the supply chain macro-needs, further business ideas, etc..

Meanwhile, the scenario analysis has been continued, studies on the context have been collected, the seasonality of flows and handling has been studied, and in depth survey on the demonstrators areas have been realized.

In this way, the consulting activity with operators and the scenario analysis provided the needed input to design a series of project ideas for each one of the demonstrators areas.

3.4.2.1 - Cesena

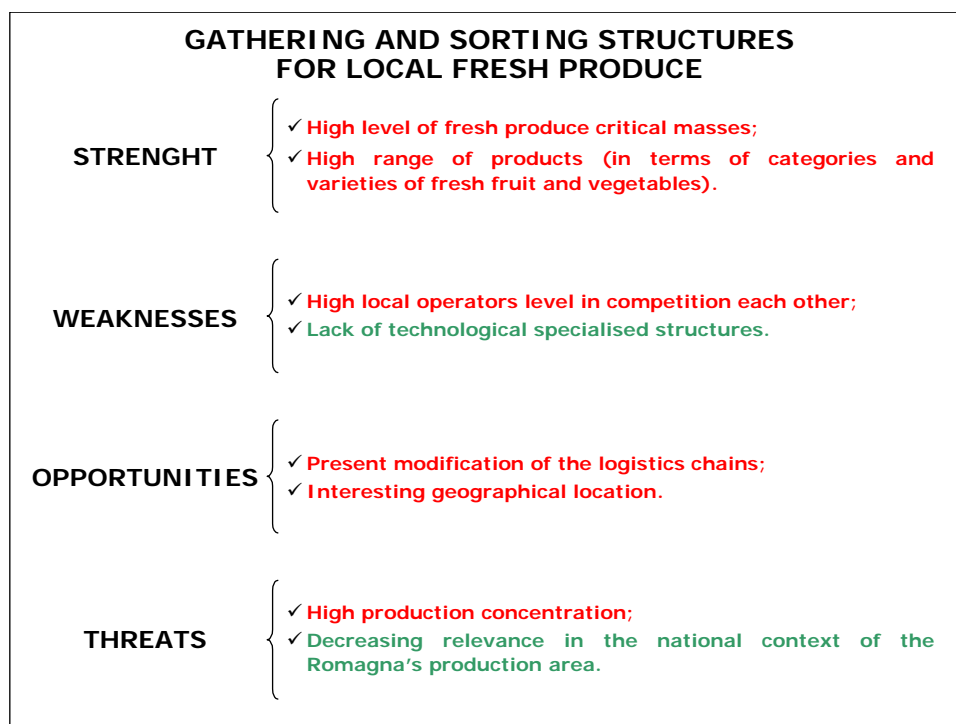
With regard to the Cesena territorial logistics structure the consulting activity and the scenario analysis highlighted the following possible project ideas:

- gathering and sorting structure for local fresh produce destined in North Italy, Austria, Slovenia and beyond;
- cross-docking structure for fresh produce in transit;
- re-distributing centre and warehouse for frozen agro-food products vegetables based;
- re-distributing centre for fresh-cut fruits and vegetables (in general products with high added value);
- feeder platform for food service (hotels, restaurants and catering) with refer to fresh and frozen products fruit and vegetables based.

Once identified these project ideas, the Consortium decided to realize a SWOT analysis to select the first ideas to be developed.

The analysis has been realized considering strengths, weaknesses, opportunities and threat of each one of the project ideas from the point of view of the fresh produce system operators and highlighting them with regard to the importance for the actors activities:

- **remarkable importance - indicated in red colour;**
- **medium importance - indicated in green colour;**
- **low importance - indicated in blue colour.**



| CROSS-DOCKING STRUCTURE FOR FRESH PRODUCE IN TRANSIT | |
|---|---|
| STRENGTH | <ul style="list-style-type: none"> ✓ Interesting geographical location; ✓ High presence of companies devoted to the fresh produce logistics activities and transport. |
| WEAKNESSES | <ul style="list-style-type: none"> ✓ High fragmentation of the operators and logistics chains; ✓ Lack of management system able to match the cross docking needs. |
| OPPORTUNITIES | <ul style="list-style-type: none"> ✓ High number of companies devoted to the transport of fresh produce; ✓ Present modification of the logistics chains. |
| THREATS | <ul style="list-style-type: none"> ✓ Increasing relevance of the foreign transport companies; ✓ Lack of technological specialised structures. |

| RE-DISTRIBUTING CENTRE AND WAREHOUSE FOR FROZEN AGRO-FOOD PRODUCTS VEGETABLES BASED | |
|--|--|
| STRENGTH | <ul style="list-style-type: none"> ✓ High level of critical masses of products; ✓ Lack of specialised structures. |
| WEAKNESSES | <ul style="list-style-type: none"> ✓ High concentration of the operators; ✓ Logistics chains evolution. |
| OPPORTUNITIES | <ul style="list-style-type: none"> ✓ Presence in the local area of one of the main Italian companies in the frozen vegetables sector; ✓ Possibility to use in the transport of the frozen vegetables the same means of transport (reefer lorries) used for the fresh produce system. |
| THREATS | <ul style="list-style-type: none"> ✓ Discrepancy between potential demand and actual demand; ✓ High cost of the service. |

| A RE-DISTRIBUTING CENTRE FOR FRESH-CUT FRUITS AND VEGETABLES | |
|---|---|
| STRENGTH | <ul style="list-style-type: none"> ✓ Increasing size of the fresh-cut market; ✓ Excellent connection with the main consumption markets. |
| WEAKNESSES | <ul style="list-style-type: none"> ✓ Level of critical masses; ✓ Discrepancy between potential demand and actual demand. |
| OPPORTUNITIES | <ul style="list-style-type: none"> ✓ Necessity to reduce the logistics chain economic costs; ✓ Wide potential consumption market for fresh-cut fruit. |
| THREATS | <ul style="list-style-type: none"> ✓ Lack of important fresh-cut operators in the local area; ✓ High cost of the service. |

| FEEDER PLATFORM FOR FOOD SERVICE | |
|----------------------------------|---|
| STRENGTH | <ul style="list-style-type: none"> ✓ Interesting size of the local market; ✓ Wide availability of raw materials in the local area. |
| WEAKNESSES | <ul style="list-style-type: none"> ✓ Limited professionalism, know how and experience in the specific sector of the local operators; ✓ High fragmentation and personalization of the service. |
| OPPORTUNITIES | <ul style="list-style-type: none"> ✓ Necessity to rationalize and optimise the logistics chain; ✓ Full range of fresh or frozen produce coming either from the local area or in transit. |
| THREATS | <ul style="list-style-type: none"> ✓ Huge impact/results in the economic costs; ✓ Development of direct connection between producer and user. |

From the SWOT analysis reported above comes the selection of the project ideas to be developed in the first step of the territorial logistics structure of Cesena.

The project ideas with the higher incidence of the remarkable importance items for the operators activities in the areas of strengths and opportunities and the high incidence of the low/medium importance items and/or less incidence of remarkable importance items for the operators activities in the areas of weaknesses and threats are:

- a gathering and sorting structures for local fresh produce destined in North Italy, Austria, Slovenia and beyond;
- a cross-docking structure for fresh produce in transit

3.4.2.2 - Taranto

With regard to the Taranto territorial logistics structure the analysis highlighted the following possible project ideas:

- terminal of nodes network in the Imonode context receiving fruit and vegetables able to gather in picking and cross docking fresh produce coming from other southern Italian regions and from local area and forwarding them along the Adriatic-Ionian route to Emilia-Romagna area and then to Northern Italy and North-Eastern Europe destination markets;
- centre for storage, logistics assembling and handling of the local fresh produce;
- centre for handling of reefer containers or Ro-Ro for fresh and frozen produce arriving at the Taranto Container Terminal or Ro-Ro Terminal from abroad and forward to final destination markets by road or by railway;
- re-distributing centre platform for produce to the multiples for the local production and the production coming from North.

Once identified these project ideas, the Consortium also in this case decided to realize a SWOT analysis to select the first ideas to be developed.

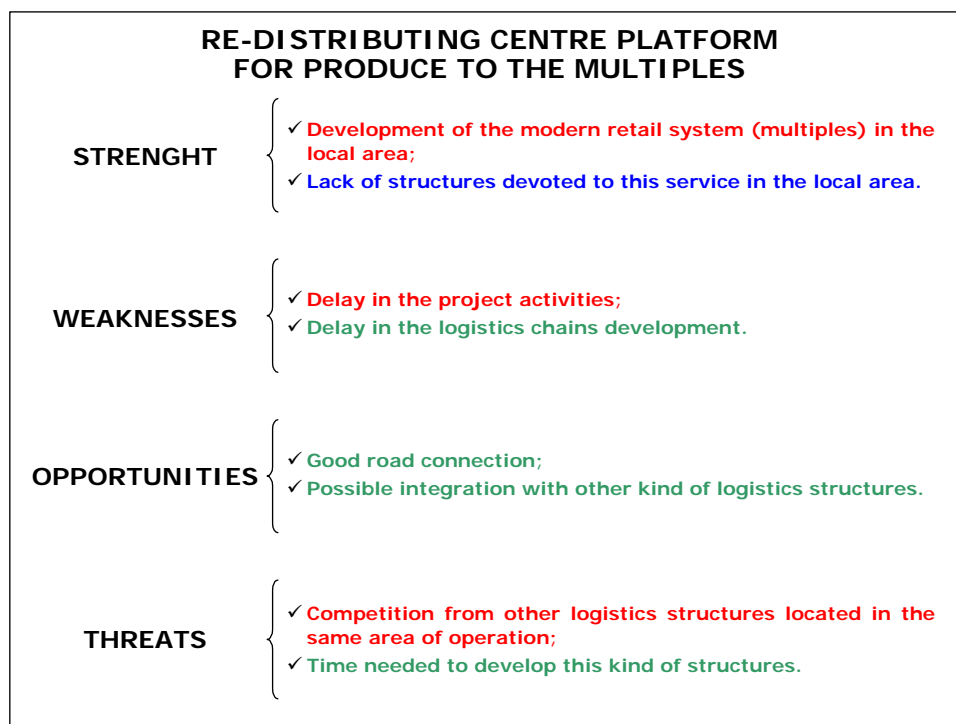
The analysis has been realized considering strengths, weaknesses, opportunities and threat of each one of the project ideas from the point of view of the fresh produce system actors and highlighting them with regard to the importance for the operators activities:

- **remarkable importance - indicated in red colour;**
- **medium importance - indicated in green colour;**
- **low importance - indicated in blue colour.**

| TERMINAL OF NODES NETWORK | |
|---------------------------|--|
| STRENGTH | <ul style="list-style-type: none"> ✓ High level of fresh produce critical masses; ✓ Interesting geographical location. |
| WEAKNESSES | <ul style="list-style-type: none"> ✓ High fragmentation of the operators and logistics chains; ✓ Lack of management system able to match picking and cross docking needs. |
| OPPORTUNITIES | <ul style="list-style-type: none"> ✓ Present modification of the logistics chains; ✓ Necessity to optimise the transport to the final destination market located in the Northern Italy and Europe. |
| THREATS | <ul style="list-style-type: none"> ✓ Decreasing relevance of the local production area; ✓ Increasing relevance of the foreign transport companies. |

| CENTRE FOR STORAGE, LOGISTIC ASSEMBLING AND HANDLING OF THE LOCAL FRESH PRODUCE | |
|---|---|
| STRENGTH | <ul style="list-style-type: none"> ✓ High level of critical masses of fresh produce; ✓ High production specialization. |
| WEAKNESSES | <ul style="list-style-type: none"> ✓ Seasonality of the production; ✓ Horizontal competition among small companies in the local area. |
| OPPORTUNITIES | <ul style="list-style-type: none"> ✓ Modification of the demand; ✓ Present modification of the logistics chains. |
| THREATS | <ul style="list-style-type: none"> ✓ High fragmentation of the local producing system; ✓ High cost for this kind of service. |

| CENTRE FOR HANDLING OF REEFER CONTAINERS OR RO-RO FOR FRESH AND FROZEN PRODUCE | |
|--|---|
| STRENGTH | <ul style="list-style-type: none"> ✓ Presence of technological specialised structure; ✓ Interesting geographical location. |
| WEAKNESSES | <ul style="list-style-type: none"> ✓ Lack of professionalism, know how and services in these kind of services; ✓ High distance from the consumption markets. |
| OPPORTUNITIES | <ul style="list-style-type: none"> ✓ Good connections available in the routes to Taranto for the reefer containers vessels; ✓ Increasing trade of fresh produce via reefer containers in the Mediterranean Sea. |
| THREATS | <ul style="list-style-type: none"> ✓ Competition from other structures located in the Mediterranean Sea; ✓ Concentration of the shipping lines. |



From the SWOT analysis reported above comes the selection of the project ideas to be developed in the first step of the territorial logistics structure of Taranto.

The project ideas with the high incidence of the remarkable importance items for the operators activities in the areas of strengths and opportunities and the high incidence of the low/medium importance items and/or less incidence of remarkable importance items for the operators activities in the areas of weaknesses and threats are:

- terminal of nodes network in the Imonode context receiving fruit and vegetables able to gather in picking and cross docking fresh produce coming from other southern Italian regions and from local area and forwarding them along the Adriatic-Ionian route to Emilia-Romagna area and then to Northern Italy and North-Eastern Europe destination markets;
- centre for storage, logistics assembling and handling of the local fresh produce.

3.5 - ACTION PLANS FOR CESENA AND TARANTO LOGISTICS STRUCTURES

On the basis of the result of the project idea selection, the function profile of Cesena demonstrator is a territorial logistics structure - called **FreshLog Pievesestina** - devoted to fresh produce with the aim to group an important and representative share of fresh produce grown in the reference area of Cesena, marketed both at national and international level, and products in transit in the area of Cesena for North and South destinations, with the aim to provide advanced logistics services.

The operations provided by the new logistics structure of Cesena are picking, cross docking and groupage. While the management organisation of the logistics structure will be a general contractor of logistics services that ideally do not provide own means of transport but entrust the transport to third party operators on the basis of transport tariff.

In particular, the selected operators for the structure development would provide a groupage service within the logistics structure for CADSES area destinations, considering that presently - alone and without the structure - they are not able to develop this kind of service and so they are not able to provide full cargoes from the origin as a result of the demand fragmentation in the greater part of the markets. Also in destination areas, such as Germany, where it is possible to

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realize full cargoes, the retailers of these areas prefer to receive mixed cargoes to have a fresher product and the possibility to realize an “on time” management of the fresh produce.

Coming to the operators to be involved in the demonstrators activities development, their selections has been made on the basis of the interest shown by them during the previous steps of the identification and prioritisation of project ideas and in particular during the direct meetings realized. On these bases, the Imonode Consortium selected 4 operators for the new territorial logistics structure of Cesena.

In the same way, the function profile of Taranto demonstrator is a territorial logistics structure - called **Agromed** - devoted to fresh produce with the aim to group an important and representative share of fresh produce grown in the reference area of Taranto, marketed both at national and international level, and products in transit in the area of Taranto from other Southern regions of Italy with destination in the Northern Italy and in the North-Eastern Countries of Europe, also in this case with the aim to provide advanced logistics services.

The operations provided by the new logistics structure of Taranto are picking, cross docking, groupage and short storage. While the management organisation of the logistics structure, such as for Cesena, will be a general contractor of logistics services that ideally do not provide own means of transport but entrust the transport to third party operators.

In particular, the selected operators for the structure development would provide a groupage service within the logistics structure for CADSES area destinations, in consideration of the same reasons reported above for Cesena.

The local promoter of the Taranto territorial logistics structure in October 2005 constituted the Agromed Consortium among public subjects. This Consortium is open to private company join beginning from 2006.

3.6 - FEASIBILITY ANALYSIS

3.6.1 - CESENA

3.6.1.1 - Technical analysis

The technical analysis start from the origin/destination of flows.

Origins of flows are:

- agro-industrial cluster of Romagna;
- outside agro-industrial cluster of Romagna.

The volumes handled analysis has been realized on the basis of the data coming from the previous surveys made in the Imonode project and from the specific in deep analysis made for the FreshLog case such as reported in the Par. 3.2.

In particular, from the background analysis (origin/destination matrix) comes a volume of 1.900.000 MT of fresh produce that is in transit in the area of Cesena³¹. From the estimation on the basis of the in deep analysis of FreshLog case - and in particular from the agro-industrial cluster analysis realized by the Chamber of Commerce of Forli-Cesena - comes a volume of 1.200.000 MT of fresh produce marketed in the cluster.

The relevance of the flows among Italian NUTS 2 on the total flows with origin or destination in Italy highlights the necessity to extend to the national paths the demonstrator analysis and planning, nevertheless originally this project was based on an international level. As a matter of

³¹ This volume does not consider the production that from Bologna goes to the North destinations in consideration of the hypothesis realized during the origin/destination matrix building in the first step of the Imonode project analyses that foresee such as starting point of these volume the city of Bologna that is located North of the Cesena area. So the previous volumes are obviously underestimated.

fact, from the analysis realized in origin/destination matrix emerges that the flows of fresh produce among Italian NUTS 2 represents 54% of the total flows with origin or destination in Italy, while in the case of Emilia-Romagna Region this share reaches 66%.

On the basis of the conventional pallet of 600 kg for fresh produce comes a number of 3,2 million of pallets for fruit and vegetables in transit in the area of Cesena and a number of 2 million of pallets for fresh produce marketed in the cluster.

During the planning of FreshLog Pievesestina - to meet the market potential and match the needs of the involved operators - the Imonode Consortium considered a target to catch 25% of the pallets of fresh produce in transit in the area of Cesena and 40% of the pallets of fresh produce marketed in the cluster. With these goals the volumes target of the new territorial logistics structure are 1.600.000 of pallets (i.e. 960.000 MT).

Main simplified destination areas for these flows have been identified as follows:

National

- North-West of Italy
- North-East of Italy
- Centre of Italy
- South of Italy
- Major island of Italy

International

CADSES area Countries

- Austria
- Croatia
- Slovenia
- Hungary

Other main or emerging export market for Italian fresh produce

- Germany
- France
- United Kingdom
- The Netherlands
- Czech Republic
- Slovak Republic

Origins of flows have been located in the Cesena logistics structure - FreshLog Pievesestina - while each one of the destination markets have been identified in a conventional area of the reference region/Country:

National

- North-West of Italy - PADOVA
- North-East of Italy - PESCHIERA BORROMEO (MILAN)
- Centre of Italy - ROME NOMENTANA
- South of Italy - TARANTO
- Major island of Italy - PALERMO

International

CADSES area Countries

- Austria - SALZBURG
- Croatia - ZAGREB
- Slovenia - LJUBLJANA
- Hungary - BUDAPEST

Other main or emerging export market for Italian fresh produce

- Germany - FRANKFURT
- France - PARIS
- United Kingdom - LONDON
- The Netherlands - AMSTERDAM
- Czech Republic - PRAHA
- Slovak Republic - BRATISLAVA

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On these bases, the new Cesena territorial logistics structure has been project at technical and economical level for a 2 steps of development:

- the first step is the realization of 2 blocks of the logistics structure for an handling of 800.000 pallets/year.
- the second step is the realization of further 2 blocks of the territorial logistics structure for an handling of more 800.000 pallets/year.

Once realized the 2 steps of the project the new Cesena logistics structure will provide an handling capacity of 1,6 millions pallets/year.

In terms of planning, the first step of the new territorial logistics structure should be completed in the second half of 2006. The first block should be operative in November 2006 and the second block in 2009:

- estimated start for building activities: January 2006;
- estimated start for logistics activities in the first block: November 2006;
- estimated start for building activities second block: March 2008;
- estimated start for logistics activities in the second block: January 2009.

With these volumes and schedule in mind along with the information of the volumes handled in the past years by the 4 operators involved in the project³² began the real project of the logistics structure.

On the basis of the technical information collected from the operators, the Imonode Consortium began to realize the volumes analysis, considering the conventional full travel of 33 pallets.

TAB. 21 - FRESHLOG PIEVESESTINA: TECHNICAL INFORMATION

| | 2006 | 2007 | 2008 | 2009 |
|---|------------------------|------------------------|------------------------|------------------------|
| Picking | 100% | 90% | 82% | 75% |
| Cross-docking | 0 | 10% | 18% | 25% |
| Full lorries export | 70% | 60% | 55% | 50% |
| Cross-docking price | - | -5 € | -5 € | -5 € |
| Saturation Italy | 70% | 70% | 78% | 85% |
| Saturation export cross-docking and picking | 95% | 95% | 95% | 95% |
| Return Italy | 45% | 45% | 52% | 65% |
| Return from abroad | 95% | 95% | 95% | 95% |
| Price of return Italy | 30% of outward journey | 30% of outward journey | 35% of outward journey | 40% of outward journey |
| Price for return from abroad | 80% of outward journey | 80% of outward journey | 80% of outward journey | 80% of outward journey |

On the basis of the technical analysis reported in the previous pages, it has been realized the transport analysis to highlight the volumes evolution handled by the logistics structure in terms of:

- total pallets;
- picking pallets;
- cross docking pallets;
- returns (in term of tractor+trailer).

³² In 2005 the 4 operators foresee a volumes of 300.000 pallets realized in 4 inadequate logistic areas.

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TAB. 22 - FRESHLOG PIEVESESTINA: TRANSPORT ANALYSIS 2006

| DESTINATION MARKETS | TOTAL PALLETES | FULL LORRIES | PICKING PALLETES | CROSS- DOCKING PALLETES | RETURN UNITS |
|-------------------------------|-------------------|-----------------|---------------------|-------------------------------|-----------------|
| n. | n. | n. | n. | n. | n. |
| ITALY: | 300.000 | | 300.000 | | 5.844 |
| - North East | 50.000 | | 50.000 | | 974 |
| - North West | 200.000 | | 200.000 | | 3.896 |
| - Centre | 35.000 | | 35.000 | | 682 |
| - South | 10.000 | | 10.000 | | 195 |
| - Islands | 5.000 | | 5.000 | | 97 |
| FOREIGN COUNTRIES: | 200.000 | 4.242 | 60.000 | | 5.848 |
| - Austria | 40.000 | 848 | 12.000 | | 1.170 |
| - Croatia | 4.000 | 85 | 1.200 | | 117 |
| - Czech Republic | 4.000 | 85 | 1.200 | | 117 |
| - Slovak Republic | 6.000 | 127 | 1.800 | | 175 |
| - Slovenia | 6.000 | 127 | 1.800 | | 175 |
| - Hungary | 12.000 | 255 | 3.600 | | 351 |
| - France | 30.000 | 636 | 9.000 | | 877 |
| - United Kingdom | 26.000 | 552 | 7.800 | | 760 |
| - Germany | 34.000 | 721 | 10.200 | | 994 |
| - The Netherlands | 38.000 | 806 | 11.400 | | 1.111 |
| TOTAL | 500.000 | 4.242 | 360.000 | | 11.693 |

TAB. 23 - FRESHLOG PIEVESESTINA: TRANSPORT ANALYSIS 2007

| DESTINATION MARKETS | TOTAL PALLETES | FULL LORRIES | PICKING PALLETES | CROSS- DOCKING PALLETES | RETURN UNITS |
|-------------------------------|-------------------|-----------------|---------------------|-------------------------------|-----------------|
| n. | n. | n. | n. | n. | n. |
| ITALY: | 340.000 | | 306.000 | 34.000 | 6.623 |
| - North East | 54.000 | | 48.600 | 5.400 | 1.052 |
| - North West | 216.000 | | 194.400 | 21.600 | 4.208 |
| - Centre | 49.000 | | 44.100 | 4.900 | 955 |
| - South | 14.000 | | 12.600 | 1.400 | 273 |
| - Islands | 7.000 | | 6.300 | 700 | 136 |
| FOREIGN COUNTRIES: | 250.000 | 4.545 | 90.000 | 10.000 | 7.045 |
| - Austria | 50.000 | 909 | 18.000 | 2.000 | 1.409 |
| - Croatia | 5.000 | 91 | 1.800 | 200 | 141 |
| - Czech Republic | 5.000 | 91 | 1.800 | 200 | 141 |
| - Slovak Republic | 7.500 | 136 | 2.700 | 300 | 211 |
| - Slovenia | 7.500 | 136 | 2.700 | 300 | 211 |
| - Hungary | 15.000 | 273 | 5.400 | 600 | 423 |
| - France | 37.500 | 682 | 13.500 | 1.500 | 1.057 |
| - United Kingdom | 32.500 | 591 | 11.700 | 1.300 | 916 |
| - Germany | 42.500 | 773 | 15.300 | 1.700 | 1.198 |
| - The Netherlands | 47.500 | 864 | 17.100 | 1.900 | 1.339 |
| TOTAL | 590.000 | 4.545 | 396.000 | 44.000 | 13.669 |

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TAB. 24 - FRESHLOG PIEVESESTINA: TRANSPORT ANALYSIS 2008

| DESTINATION MARKETS | TOTAL PALLETES | FULL LORRIES | PICKING PALLETES | CROSS- DOCKING PALLETES | RETURN UNITS |
|-------------------------------|-------------------|-----------------|---------------------|-------------------------------|-----------------|
| n. | n. | n. | n. | n. | n. |
| ITALY: | 390.000 | | 319.800 | 70.200 | 7.879 |
| - North East | 62.000 | | 50.840 | 11.160 | 1.253 |
| - North West | 248.000 | | 203.360 | 44.640 | 5.010 |
| - Centre | 56.000 | | 45.920 | 10.080 | 1.131 |
| - South | 16.000 | | 13.120 | 2.880 | 323 |
| - Islands | 8.000 | | 6.560 | 1.440 | 162 |
| FOREIGN COUNTRIES: | 300.000 | 5.000 | 110.700 | 24.300 | 9.091 |
| - Austria | 60.000 | 1.000 | 22.140 | 4.860 | 1.818 |
| - Croatia | 6.000 | 100 | 2.214 | 486 | 182 |
| - Czech Republic | 6.000 | 100 | 2.214 | 486 | 182 |
| - Slovak Republic | 9.000 | 150 | 3.321 | 729 | 273 |
| - Slovenia | 9.000 | 150 | 3.321 | 729 | 273 |
| - Hungary | 18.000 | 300 | 6.642 | 1.458 | 545 |
| - France | 45.000 | 750 | 16.605 | 3.645 | 1.364 |
| - United Kingdom | 39.000 | 650 | 14.391 | 3.159 | 1.182 |
| - Germany | 51.000 | 850 | 18.819 | 4.131 | 1.545 |
| - The Netherlands | 57.000 | 950 | 21.033 | 4.617 | 1.727 |
| TOTAL | 690.000 | 5.000 | 430.500 | 94.500 | 16.970 |

TAB. 25 - FRESHLOG PIEVESESTINA: TRANSPORT ANALYSIS 2009

| DESTINATION MARKETS | TOTAL PALLETES | FULL LORRIES | PICKING PALLETES | CROSS- DOCKING PALLETES | RETURN UNITS |
|-------------------------------|-------------------|-----------------|---------------------|-------------------------------|-----------------|
| n. | n. | n. | n. | n. | n. |
| ITALY: | 450.000 | | 337.500 | 112.500 | 10.428 |
| - North East | 70.000 | | 52.500 | 17.500 | 1.622 |
| - North West | 280.000 | | 210.000 | 70.000 | 6.488 |
| - Centre | 70.000 | | 52.500 | 17.500 | 1.622 |
| - South | 20.000 | | 15.000 | 5.000 | 463 |
| - Islands | 10.000 | | 7.500 | 2.500 | 232 |
| FOREIGN COUNTRIES: | 350.000 | 5.833 | 118.125 | 39.375 | 10.606 |
| - Austria | 70.000 | 1.167 | 23.625 | 7.875 | 2.121 |
| - Croatia | 7.000 | 117 | 2.363 | 788 | 212 |
| - Czech Republic | 7.000 | 117 | 2.363 | 788 | 212 |
| - Slovak Republic | 10.500 | 175 | 3.544 | 1.181 | 318 |
| - Slovenia | 10.500 | 175 | 3.544 | 1.181 | 318 |
| - Hungary | 21.000 | 350 | 7.088 | 2.363 | 636 |
| - France | 52.500 | 875 | 17.719 | 5.906 | 1.591 |
| - United Kingdom | 45.500 | 758 | 15.356 | 5.119 | 1.379 |
| - Germany | 59.500 | 992 | 20.081 | 6.694 | 1.803 |
| - The Netherlands | 66.500 | 1.108 | 22.444 | 7.481 | 2.015 |
| TOTAL | 800.000 | 5.833 | 455.625 | 151.875 | 21.034 |

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From an equipment point of view the analysis realized with the selected local operators and the help of the specific experts panel highlighted that a block of FreshLog Pievesestina needs:

- a plot of 160 x 130 mt (20.800 sq.m);
- a one floor factory shed of 30x200x8,5 mt (6.000 sq.m);
- a large square of approx 15.000 sq.m;
- 400 sq.m of offices;
- 700 sq.m of cold rooms;
- n. 2 space cars;
- n. 12 transpallets;
- 25 working stations (equipped with CPU + basic software + monitor + printer + telephone) linked to 2 servers;
- a package of specific software devoted to the logistics management.

From a personnel point of view, the analysis with the selected local operators and with the experts panel highlighted that for the handling of goods the new territorial logistics structure needs:

- staff of "square workers", i.e. person devoted to the:
 - handling of pallets within the logistics structure (included loading and unloading operations);
 - handling of vehicles within the large square (included the loading doors approach, refuelling and small maintenance activities);
 - collection of pallets from customers vs. logistics structure.
- staff of "logistics workers", i.e. person devoted to the:
 - orders receiving from customers;
 - organization of travel and means of transport search;
 - arrangement of travel documentation;
 - travel monitoring.
- staff of "administrative and sales management", i.e. person devoted to the:
 - general bookkeeping management;
 - invoicing.
- a "managing director", i.e. person devoted to the whole management of the logistics structure.

TAB. 26 - FRESHLOG PIEVESESTINA: N. OF EMPLOYEES PER CATEGORY

| QUALIFICATION | FUNCTION | 2006 | 2007 | 2008 | 2009 |
|--|--|-----------|-----------|-----------|-----------|
| Square workers | - handling of pallets within the logistics structure (included loading and unloading operations); - handling of vehicles within the large square (included the loading doors approach, refuelling and small maintenance activities); - collection of pallets from customers vs. logistics structure. | 16 | 31 | 34 | 36 |
| Logistics workers | - orders receiving from customers; - organization of travel and means of transport search; - arrangement of travel documentation; - travel monitoring. | 9 | 17 | 18 | 19 |
| Administrative and sales management | - general bookkeeping management - invoicing | 12 | 16 | 17 | 18 |
| Managin director | - management of the logistics structure | 1 | 1 | 1 | 1 |
| TOTAL | | 38 | 65 | 70 | 74 |

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3.6.1.2 - Economical and financial analysis

On the basis of the technical analysis made in the previous Paragraph, the Imonode Consortium realized the profit and loss statement for FreshLog Pievesestina in the period 2006-2009³³.

With regard to the turnover, for each destination and in total, the economic analysis has been made on the basis of:

- n. of total pallets;
- n. of picking pallets;
- n. of cross docking pallets;
- picking activities price per pallet;
- cross docking activities price per pallet;
- n. of return;
- price of return per lorry.

Thanks to these indicators the Imonode Consortium has been able to calculate the turnover for each one of the year of the statement.

TAB. 27 - FRESHLOG PIEVESESTINA: TURNOVER 2006

| DESTINATION MARKETS | TOTAL PALLETS | FULL LORRIES | PICKING PALLETS | CROSS-DOCKING PALLETS | PRICE TOTAL | PICKING PRICE | CROSS-DOCKING PRICE | RETURN UNITS | RETURN PRICE | TURNOVER | PICKING TURNOVER | CROSS-DOCKING TURNOVER | RETURN TURNOVER | PATH TURNOVER |
|---------------------------|----------------|--------------|-----------------|-----------------------|-------------|---------------|---------------------|---------------|--------------|------------------|-------------------|------------------------|-------------------|-------------------|
| | n. | n. | n. | n. | € | € | € | n. | € | € | € | € | € | € |
| ITALY: | 300.000 | | 300.000 | | | | | 5.844 | | | | | | 10.228.750 |
| - North East | 50.000 | | 50.000 | | | 24,00 | | 974 | 237,60 | | 1.200.000 | 0 | 231.429 | 1.431.429 |
| - North West | 200.000 | | 200.000 | | | 28,00 | | 3.896 | 277,20 | | 5.600.000 | 0 | 1.080.000 | 6.680.000 |
| - Centre | 35.000 | | 35.000 | | | 25,00 | | 682 | 247,50 | | 875.000 | 0 | 168.750 | 1.043.750 |
| - South | 10.000 | | 10.000 | | | 55,00 | | 195 | 544,50 | | 550.000 | 0 | 106.071 | 656.071 |
| - Islands | 5.000 | | 5.000 | | | 70,00 | | 97 | 693,00 | | 350.000 | 0 | 67.500 | 417.500 |
| FOREIGN COUNTRIES: | 200.000 | 4.242 | 60.000 | | | | | 5.848 | | | | | | 19.923.977 |
| - Austria | 40.000 | 848 | 12.000 | | 1.200,00 | 45,00 | | 1.170 | 1.188,00 | 1.018.182 | 540.000 | 0 | 1.389.600 | 2.947.782 |
| - Croatia | 4.000 | 85 | 1.200 | | 1.350,00 | 65,00 | | 117 | 1.716,00 | 114.545 | 78.000 | 0 | 200.720 | 393.265 |
| - Czech Republic | 4.000 | 85 | 1.200 | | 1.550,00 | 75,00 | | 117 | 1.980,00 | 131.515 | 90.000 | 0 | 231.600 | 453.115 |
| - Slovak Republic | 6.000 | 127 | 1.800 | | 1.450,00 | 85,00 | | 175 | 2.244,00 | 184.545 | 153.000 | 0 | 393.720 | 731.265 |
| - Slovenia | 6.000 | 127 | 1.800 | | 1.250,00 | 45,00 | | 175 | 1.188,00 | 159.091 | 81.000 | 0 | 208.440 | 448.531 |
| - Hungary | 12.000 | 255 | 3.600 | | 1.550,00 | 75,00 | | 351 | 1.980,00 | 394.545 | 270.000 | 0 | 694.800 | 1.359.345 |
| - France | 30.000 | 636 | 9.000 | | 1.350,00 | 65,00 | | 877 | 1.716,00 | 859.091 | 585.000 | 0 | 1.505.400 | 2.949.491 |
| - United Kingdom | 26.000 | 552 | 7.800 | | 1.950,00 | 102,00 | | 760 | 2.692,80 | 1.075.455 | 795.600 | 0 | 2.047.344 | 3.918.399 |
| - Germany | 34.000 | 721 | 10.200 | | 1.250,00 | 55,00 | | 994 | 1.452,00 | 901.515 | 561.000 | 0 | 1.443.640 | 2.906.155 |
| - The Netherlands | 38.000 | 806 | 11.400 | | 1.450,00 | 65,00 | | 1.111 | 1.716,00 | 1.168.788 | 741.000 | 0 | 1.906.840 | 3.816.628 |
| TOTAL | 500.000 | 4.242 | 360.000 | | | | | 11.693 | | 6.007.273 | 12.469.600 | 0 | 11.675.854 | 30.152.727 |

TAB. 28 - FRESHLOG PIEVESESTINA: TURNOVER 2007

| DESTINATION MARKETS | TOTAL PALLETS | FULL LORRIES | PICKING PALLETS | CROSS-DOCKING PALLETS | PRICE TOTAL | PICKING PRICE | CROSS-DOCKING PRICE | RETURN UNITS | RETURN PRICE | TURNOVER | PICKING TURNOVER | CROSS-DOCKING TURNOVER | RETURN TURNOVER | PATH TURNOVER |
|---------------------------|----------------|--------------|-----------------|-----------------------|-------------|---------------|---------------------|---------------|--------------|------------------|-------------------|------------------------|-------------------|-------------------|
| | n. | n. | n. | n. | € | € | € | n. | € | € | € | € | € | € |
| ITALY: | 340.000 | | 306.000 | 34.000 | | | | 6.623 | | | | | | 11.554.593 |
| - North East | 54.000 | | 48.600 | 5.400 | | 24,00 | 19,00 | 1.052 | 237,60 | | 1.166.400 | 102.600 | 249.943 | 1.518.943 |
| - North West | 216.000 | | 194.400 | 21.600 | | 28,00 | 23,00 | 4.208 | 277,20 | | 5.443.200 | 496.800 | 1.166.400 | 7.106.400 |
| - Centre | 49.000 | | 44.100 | 4.900 | | 25,00 | 20,00 | 955 | 247,50 | | 1.102.500 | 98.000 | 236.250 | 1.436.750 |
| - South | 14.000 | | 12.600 | 1.400 | | 55,00 | 50,00 | 273 | 544,50 | | 693.000 | 70.000 | 148.500 | 911.500 |
| - Islands | 7.000 | | 6.300 | 700 | | 70,00 | 65,00 | 136 | 693,00 | | 441.000 | 45.500 | 94.500 | 581.000 |
| FOREIGN COUNTRIES: | 250.000 | 4.545 | 90.000 | 10.000 | | | | 7.045 | | | | | | 24.950.624 |
| - Austria | 50.000 | 909 | 18.000 | 2.000 | 1.200,00 | 45,00 | 40,00 | 1.409 | 1.188,00 | 1.090.909 | 810.000 | 80.000 | 1.674.000 | 3.654.909 |
| - Croatia | 5.000 | 91 | 1.800 | 200 | 1.350,00 | 65,00 | 60,00 | 141 | 1.716,00 | 122.727 | 117.000 | 12.000 | 241.800 | 493.527 |
| - Czech Republic | 5.000 | 91 | 1.800 | 200 | 1.550,00 | 75,00 | 70,00 | 141 | 1.980,00 | 140.909 | 135.000 | 14.000 | 279.000 | 568.909 |
| - Slovak Republic | 7.500 | 136 | 2.700 | 300 | 1.450,00 | 85,00 | 80,00 | 211 | 2.244,00 | 197.727 | 229.500 | 24.000 | 474.300 | 925.527 |
| - Slovenia | 7.500 | 136 | 2.700 | 300 | 1.250,00 | 45,00 | 40,00 | 211 | 1.188,00 | 170.455 | 121.500 | 12.000 | 251.100 | 555.055 |
| - Hungary | 15.000 | 273 | 5.400 | 600 | 1.550,00 | 75,00 | 70,00 | 423 | 1.980,00 | 422.727 | 405.000 | 42.000 | 837.000 | 1.706.727 |
| - France | 37.500 | 682 | 13.500 | 1.500 | 1.350,00 | 65,00 | 60,00 | 1.057 | 1.716,00 | 920.455 | 877.500 | 90.000 | 1.813.500 | 3.701.455 |
| - United Kingdom | 32.500 | 591 | 11.700 | 1.300 | 1.950,00 | 102,00 | 97,00 | 916 | 2.692,80 | 1.152.273 | 1.193.400 | 126.100 | 2.466.360 | 4.938.133 |
| - Germany | 42.500 | 773 | 15.300 | 1.700 | 1.250,00 | 55,00 | 50,00 | 1.198 | 1.452,00 | 965.909 | 841.500 | 85.000 | 1.739.100 | 3.631.509 |
| - The Netherlands | 47.500 | 864 | 17.100 | 1.900 | 1.450,00 | 65,00 | 60,00 | 1.339 | 1.716,00 | 1.252.273 | 1.111.500 | 114.000 | 2.297.100 | 4.774.873 |
| TOTAL | 590.000 | 4.545 | 396.000 | 44.000 | | | | 13.669 | | 6.436.364 | 14.688.000 | 1.412.000 | 13.968.853 | 36.505.216 |

³³ Each cost analysis has been made with the hypothesis of constant price at 2005 level.

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TAB. 29 - FRESHLOG PIEVESESTINA: TURNOVER 2008

| DESTINATION MARKETS | TOTAL PALLETS | FULL LORRIES | PICKING PALLETS | CROSS-DOCKING PALLETS | PRICE TOTAL | PICKING PRICE | CROSS-DOCKING PRICE | RETURN UNITS | RETURN PRICE | TURNOVER | PICKING TURNOVER | CROSS-DOCKING TURNOVER | RETURN TURNOVER | PATH TURNOVER |
|---------------------------|----------------|--------------|-----------------|-----------------------|-------------|---------------|---------------------|---------------|--------------|------------------|-------------------|------------------------|-------------------|-------------------|
| | n. | n. | n. | n. | € | € | € | n. | € | € | € | € | € | € |
| ITALY: | 390.000 | | 319.800 | 70.200 | | | | 7.879 | | | | | | 13.551.133 |
| - North East | 62.000 | | 50.840 | 11.160 | | 24,00 | 19,00 | 1.253 | 277,20 | | 1.220.160 | 212.040 | 347.200 | 1.779.400 |
| - North West | 248.000 | | 203.360 | 44.640 | | 28,00 | 23,00 | 5.010 | 323,40 | | 5.694.080 | 1.026.720 | 1.620.267 | 8.341.067 |
| - Centre | 56.000 | | 45.920 | 10.080 | | 25,00 | 20,00 | 1.131 | 288,75 | | 1.148.000 | 201.600 | 326.667 | 1.676.267 |
| - South | 16.000 | | 13.120 | 2.880 | | 55,00 | 50,00 | 323 | 635,25 | | 721.600 | 144.000 | 205.333 | 1.070.933 |
| - Islands | 8.000 | | 6.560 | 1.440 | | 70,00 | 65,00 | 162 | 808,50 | | 459.200 | 93.600 | 130.667 | 683.467 |
| FOREIGN COUNTRIES: | 300.000 | 5.000 | 110.700 | 24.300 | | | | 9.091 | | | | | | 31.299.750 |
| - Austria | 60.000 | 1.000 | 22.140 | 4.860 | 1.200,00 | 45,00 | 40,00 | 1.818 | 1.188,00 | 1.200.000 | 996.300 | 194.400 | 2.160.000 | 4.550.700 |
| - Croatia | 6.000 | 100 | 2.214 | 486 | 1.350,00 | 65,00 | 60,00 | 182 | 1.716,00 | 135.000 | 143.910 | 29.160 | 312.000 | 620.070 |
| - Czech Republic | 6.000 | 100 | 2.214 | 486 | 1.550,00 | 75,00 | 70,00 | 182 | 1.980,00 | 155.000 | 166.050 | 34.020 | 360.000 | 715.070 |
| - Slovak Republic | 9.000 | 150 | 3.321 | 729 | 1.450,00 | 85,00 | 80,00 | 273 | 2.244,00 | 217.500 | 282.285 | 58.320 | 612.000 | 1.170.105 |
| - Slovenia | 9.000 | 150 | 3.321 | 729 | 1.250,00 | 45,00 | 40,00 | 273 | 1.188,00 | 187.500 | 149.445 | 29.160 | 324.000 | 690.105 |
| - Hungary | 18.000 | 300 | 6.642 | 1.458 | 1.550,00 | 75,00 | 70,00 | 545 | 1.980,00 | 465.000 | 498.150 | 102.060 | 1.080.000 | 2.145.210 |
| - France | 45.000 | 750 | 16.605 | 3.645 | 1.350,00 | 65,00 | 60,00 | 1.364 | 1.716,00 | 1.012.500 | 1.079.325 | 218.700 | 2.340.000 | 4.650.525 |
| - United Kingdom | 39.000 | 650 | 14.391 | 3.159 | 1.950,00 | 102,00 | 97,00 | 1.182 | 2.692,80 | 1.267.500 | 1.467.882 | 306.423 | 3.182.400 | 6.224.205 |
| - Germany | 51.000 | 850 | 18.819 | 4.131 | 1.250,00 | 55,00 | 50,00 | 1.545 | 1.452,00 | 1.062.500 | 1.035.045 | 206.550 | 2.244.000 | 4.548.095 |
| - The Netherlands | 57.000 | 950 | 21.033 | 4.617 | 1.450,00 | 65,00 | 60,00 | 1.727 | 1.716,00 | 1.377.500 | 1.367.145 | 277.020 | 2.964.000 | 5.985.665 |
| TOTAL | 690.000 | 5.000 | 430.500 | 94.500 | | | | 16.970 | | 7.080.000 | 16.428.577 | 3.133.773 | 18.208.533 | 44.850.883 |

TAB. 30 - FRESHLOG PIEVESESTINA: TURNOVER 2009

| DESTINATION MARKETS | TOTAL PALLETS | FULL LORRIES | PICKING PALLETS | CROSS-DOCKING PALLETS | PRICE TOTAL | PICKING PRICE | CROSS-DOCKING PRICE | RETURN UNITS | RETURN PRICE | TURNOVER | PICKING TURNOVER | CROSS-DOCKING TURNOVER | RETURN TURNOVER | PATH TURNOVER |
|---------------------------|----------------|--------------|-----------------|-----------------------|-------------|---------------|---------------------|---------------|--------------|------------------|-------------------|------------------------|-------------------|-------------------|
| | n. | n. | n. | n. | € | € | € | n. | € | € | € | € | € | € |
| ITALY: | 450.000 | | 337.500 | 112.500 | | | | 10.428 | | | | | | 16.505.382 |
| - North East | 70.000 | | 52.500 | 17.500 | | 24,00 | 19,00 | 1.622 | 316,80 | | 1.260.000 | 332.500 | 513.882 | 2.106.382 |
| - North West | 280.000 | | 210.000 | 70.000 | | 28,00 | 23,00 | 6.488 | 369,60 | | 5.880.000 | 1.610.000 | 2.398.118 | 9.888.118 |
| - Centre | 70.000 | | 52.500 | 17.500 | | 25,00 | 20,00 | 1.622 | 330,00 | | 1.312.500 | 350.000 | 535.294 | 2.197.794 |
| - South | 20.000 | | 15.000 | 5.000 | | 55,00 | 50,00 | 463 | 726,00 | | 825.000 | 250.000 | 336.471 | 1.411.471 |
| - Islands | 10.000 | | 7.500 | 2.500 | | 70,00 | 65,00 | 232 | 924,00 | | 525.000 | 162.500 | 214.118 | 901.618 |
| FOREIGN COUNTRIES: | 350.000 | 5.833 | 118.125 | 39.375 | | | | 10.606 | | | | | | 36.461.250 |
| - Austria | 70.000 | 1.167 | 23.625 | 7.875 | 1.200,00 | 45,00 | 40,00 | 2.121 | 1.188,00 | 1.400.000 | 1.063.125 | 315.000 | 2.520.000 | 5.298.125 |
| - Croatia | 7.000 | 117 | 2.363 | 788 | 1.350,00 | 65,00 | 60,00 | 212 | 1.716,00 | 157.500 | 153.563 | 47.250 | 364.000 | 722.313 |
| - Czech Republic | 7.000 | 117 | 2.363 | 788 | 1.550,00 | 75,00 | 70,00 | 212 | 1.980,00 | 180.833 | 177.188 | 55.125 | 420.000 | 833.146 |
| - Slovak Republic | 10.500 | 175 | 3.544 | 1.181 | 1.450,00 | 85,00 | 80,00 | 318 | 2.244,00 | 253.750 | 301.219 | 94.500 | 714.000 | 1.363.469 |
| - Slovenia | 10.500 | 175 | 3.544 | 1.181 | 1.250,00 | 45,00 | 40,00 | 318 | 1.188,00 | 218.750 | 159.469 | 47.250 | 378.000 | 803.469 |
| - Hungary | 21.000 | 350 | 7.088 | 2.363 | 1.550,00 | 75,00 | 70,00 | 636 | 1.980,00 | 542.500 | 531.563 | 165.375 | 1.260.000 | 2.499.438 |
| - France | 52.500 | 875 | 17.719 | 5.906 | 1.350,00 | 65,00 | 60,00 | 1.591 | 1.716,00 | 1.181.250 | 1.151.719 | 354.375 | 2.730.000 | 5.417.344 |
| - United Kingdom | 45.500 | 758 | 15.356 | 5.119 | 1.950,00 | 102,00 | 97,00 | 1.379 | 2.692,80 | 1.478.750 | 1.566.338 | 496.519 | 3.712.800 | 7.254.406 |
| - Germany | 59.500 | 992 | 20.081 | 6.694 | 1.250,00 | 55,00 | 50,00 | 1.803 | 1.452,00 | 1.239.583 | 1.104.469 | 334.688 | 2.618.000 | 5.296.740 |
| - The Netherlands | 66.500 | 1.108 | 22.444 | 7.481 | 1.450,00 | 65,00 | 60,00 | 2.015 | 1.716,00 | 1.607.083 | 1.458.844 | 448.875 | 3.458.000 | 6.972.802 |
| TOTAL | 800.000 | 5.833 | 455.625 | 151.875 | | | | 21.034 | | 8.260.000 | 17.469.994 | 5.063.956 | 22.172.682 | 52.966.632 |

With regard to the transport costs, these have been calculated on the basis of:

- average distance among destination and origin;
- average price/km (i.e. 1,25 €/km, such as calculated with formula reported in Par. 3.2);
- motorway ticket³⁴;
- n. of pallets;
- n. of outward journeys;
- n. of returns.

Thanks to these indicators the Imonode Consortium has been able to calculate a cost for outward journey and return trip, to have the roundtrip cost of the volumes handled by FreshLog Pievesestina.

³⁴ Motorway ticket has been calculated as an average tariff applied in CADSES area, such as emerges from an on filed analysis on this ground. Just to give an example, the motorway tariff applied in Italy by "Autostrade per l'Italia" (Italian Motorway Company, www.autostrade.it) for the lorries in 2005 are:

Plain tariff:

- Lorries of Class 4 (4 axis)- 0,09829 €/km;
- Lorries of Class 5 (5 or more axis) - 0,11780 €/km;

Mountain tariff:

- Lorries of Class 4 (4 axis)- 0,11704 €/km;
- Lorries of Class 5 (5 or more axis) - 0,14048 €/km.

Chapter 3

FEASIBLE EVOLUTION IN THE DEMONSTRATORS AREAS

TAB. 31 - FRESHLOG PIEVESESTINA: TRANSPORT COST 2006

| DESTINATION AREA | AREA OF REFERENCE | AVG. DISTANCE OUTWARD JOURNEY in km | MOTORWAY OUTWARD JOURNEY in km | AVG. TRANSPORT COST/KM €/km | MOTORWAY TICKET €/path | UNIT COST PER OUTWARD OR RETURN JOURNEY € | PALLETS n. | OUTWARD JOURNEYS n. | TOTAL COST PER OUTWARD JOURNEYS € | RETURN JOURNEYS n. | TOTAL COST PER RETURN JOURNEYS € | TOTAL COST OUTWARD AND RETURN JOURNEYS € |
|---------------------------|--------------------|--|-----------------------------------|--------------------------------|---------------------------|--|---------------|------------------------|--------------------------------------|-----------------------|-------------------------------------|---|
| ITALY: | | | | | | | | | 5.485.963 | | 2.468.683 | 7.954.647 |
| - North East | Padova | 200 | 190 | 1,25 | 19,00 | 269,00 | 50.000 | 2.165 | 582.251 | 974 | 262.013 | 844.264 |
| - North West | Peschiera Borromeo | 300 | 290 | 1,25 | 29,00 | 404,00 | 200.000 | 8.658 | 3.497.835 | 3.896 | 1.574.026 | 5.071.861 |
| - Centre | Roma Nomentana | 320 | 300 | 1,25 | 30,00 | 430,00 | 35.000 | 1.515 | 651.515 | 682 | 293.182 | 944.697 |
| - South | Taranto | 668 | 645 | 1,25 | 83,85 | 918,85 | 10.000 | 433 | 397.771 | 195 | 178.997 | 576.767 |
| - Islands | Palermo | 1.225 | 1.162 | 1,25 | 116,20 | 1.647,45 | 5.000 | 216 | 356.591 | 97 | 160.466 | 517.057 |
| FOREIGN COUNTRIES: | | | | | | | | | 8.655.404 | | 8.479.660 | 17.135.064 |
| - Austria | Salzburg | 660 | 650 | 1,25 | 43,50 | 868,50 | | 1.194 | 1.036.936 | 1.170 | 1.015.882 | 2.052.818 |
| - Croatia | Zagreb | 600 | 550 | 1,25 | 75,00 | 825,00 | | 119 | 98.500 | 117 | 96.500 | 195.000 |
| - Czech Republic | Praha | 1.000 | 830 | 1,25 | 101,00 | 1.351,00 | | 119 | 161.301 | 117 | 158.026 | 319.327 |
| - Slovak Republic | Bratislava | 900 | 850 | 1,25 | 29,00 | 1.154,00 | | 179 | 206.671 | 175 | 202.475 | 409.145 |
| - Slovenia | Ljubljana | 460 | 300 | 1,25 | 42,00 | 617,00 | | 179 | 110.499 | 175 | 108.255 | 218.755 |
| - Hungary | Budapest | 1.100 | 1.050 | 1,25 | 29,00 | 1.404,00 | | 358 | 502.887 | 351 | 492.676 | 995.564 |
| - France | Paris | 1.200 | 1.150 | 1,25 | 348,00 | 1.848,00 | | 895 | 1.654.800 | 877 | 1.621.200 | 3.276.000 |
| - United Kingdom | London | 1.500 | 1.450 | 1,25 | 115,00 | 1.990,00 | | 776 | 1.544.361 | 760 | 1.513.003 | 3.057.364 |
| - Germany | Frankfurt | 1.000 | 950 | 1,25 | 40,00 | 1.290,00 | | 1.015 | 1.309.155 | 994 | 1.282.573 | 2.591.727 |
| - The Netherlands | Amsterdam | 1.400 | 1.400 | 1,25 | 40,00 | 1.790,00 | | 1.134 | 2.030.294 | 1.111 | 1.989.070 | 4.019.364 |
| TOTAL | | | | | | | | | 14.141.367 | | 10.948.343 | 25.089.710 |

TAB. 32 - FRESHLOG PIEVESESTINA: TRANSPORT COST 2007

| DESTINATION AREA | AREA OF REFERENCE | AVG. DISTANCE OUTWARD JOURNEY in km | MOTORWAY OUTWARD JOURNEY in km | AVG. TRANSPORT COST/KM €/km | MOTORWAY TICKET €/path | UNIT COST PER OUTWARD OR RETURN JOURNEY € | PALLETS n. | OUTWARD JOURNEYS n. | TOTAL COST PER OUTWARD JOURNEYS € | RETURN JOURNEYS n. | TOTAL COST PER RETURN JOURNEYS € | TOTAL COST OUTWARD AND RETURN JOURNEYS € |
|---------------------------|--------------------|--|-----------------------------------|--------------------------------|---------------------------|--|---------------|------------------------|--------------------------------------|-----------------------|-------------------------------------|---|
| ITALY: | | | | | | | | | 6.374.721 | | 2.868.624 | 9.243.345 |
| - North East | Padova | 200 | 190 | 1,25 | 19,00 | 269,00 | 54.000 | 2.338 | 628.831 | 1.052 | 282.974 | 911.805 |
| - North West | Peschiera Borromeo | 300 | 290 | 1,25 | 29,00 | 404,00 | 216.000 | 9.351 | 3.777.662 | 4.208 | 1.699.948 | 5.477.610 |
| - Centre | Roma Nomentana | 320 | 300 | 1,25 | 30,00 | 430,00 | 49.000 | 2.121 | 912.121 | 955 | 410.455 | 1.322.576 |
| - South | Taranto | 668 | 645 | 1,25 | 83,85 | 918,85 | 14.000 | 606 | 556.879 | 273 | 250.595 | 807.474 |
| - Islands | Palermo | 1.225 | 1.162 | 1,25 | 116,20 | 1.647,45 | 7.000 | 303 | 499.227 | 136 | 224.652 | 723.880 |
| FOREIGN COUNTRIES: | | | | | | | | | 10.346.942 | | 10.215.134 | 20.562.076 |
| - Austria | Salzburg | 660 | 650 | 1,25 | 43,50 | 868,50 | | 1.427 | 1.239.586 | 1.409 | 1.223.795 | 2.463.382 |
| - Croatia | Zagreb | 600 | 550 | 1,25 | 75,00 | 825,00 | | 143 | 117.750 | 141 | 116.250 | 234.000 |
| - Czech Republic | Praha | 1.000 | 830 | 1,25 | 101,00 | 1.351,00 | | 143 | 192.825 | 141 | 190.368 | 383.193 |
| - Slovak Republic | Bratislava | 900 | 850 | 1,25 | 29,00 | 1.154,00 | | 214 | 247.061 | 211 | 243.914 | 490.975 |
| - Slovenia | Ljubljana | 460 | 300 | 1,25 | 42,00 | 617,00 | | 214 | 132.094 | 211 | 130.411 | 262.505 |
| - Hungary | Budapest | 1.100 | 1.050 | 1,25 | 29,00 | 1.404,00 | | 428 | 601.167 | 423 | 593.509 | 1.194.676 |
| - France | Paris | 1.200 | 1.150 | 1,25 | 348,00 | 1.848,00 | | 1.070 | 1.978.200 | 1.057 | 1.953.000 | 3.931.200 |
| - United Kingdom | London | 1.500 | 1.450 | 1,25 | 115,00 | 1.990,00 | | 928 | 1.846.177 | 916 | 1.822.659 | 3.668.836 |
| - Germany | Frankfurt | 1.000 | 950 | 1,25 | 40,00 | 1.290,00 | | 1.213 | 1.565.005 | 1.198 | 1.545.068 | 3.110.073 |
| - The Netherlands | Amsterdam | 1.400 | 1.400 | 1,25 | 40,00 | 1.790,00 | | 1.356 | 2.427.077 | 1.339 | 2.396.159 | 4.823.236 |
| TOTAL | | | | | | | | | 16.721.663 | | 13.083.758 | 29.805.421 |

TAB. 33 - FRESHLOG PIEVESESTINA: TRANSPORT COST 2008

| DESTINATION AREA | AREA OF REFERENCE | AVG. DISTANCE OUTWARD JOURNEY in km | MOTORWAY OUTWARD JOURNEY in km | AVG. TRANSPORT COST/KM €/km | MOTORWAY TICKET €/path | UNIT COST PER OUTWARD OR RETURN JOURNEY € | PALLETS n. | OUTWARD JOURNEYS n. | TOTAL COST PER OUTWARD JOURNEYS € | RETURN JOURNEYS n. | TOTAL COST PER RETURN JOURNEYS € | TOTAL COST OUTWARD AND RETURN JOURNEYS € |
|---------------------------|--------------------|--|-----------------------------------|--------------------------------|---------------------------|--|---------------|------------------------|--------------------------------------|-----------------------|-------------------------------------|---|
| ITALY: | | | | | | | | | 6.559.099 | | 3.410.731 | 9.969.830 |
| - North East | Padova | 200 | 190 | 1,25 | 19,00 | 269,00 | 62.000 | 2.409 | 647.941 | 1.253 | 336.929 | 984.870 |
| - North West | Peschiera Borromeo | 300 | 290 | 1,25 | 29,00 | 404,00 | 248.000 | 9.635 | 3.892.463 | 5.010 | 2.024.081 | 5.916.544 |
| - Centre | Roma Nomentana | 320 | 300 | 1,25 | 30,00 | 430,00 | 56.000 | 2.176 | 935.509 | 1.131 | 486.465 | 1.421.974 |
| - South | Taranto | 668 | 645 | 1,25 | 83,85 | 918,85 | 16.000 | 622 | 571.158 | 323 | 297.002 | 868.160 |
| - Islands | Palermo | 1.225 | 1.162 | 1,25 | 116,20 | 1.647,45 | 8.000 | 311 | 512.028 | 162 | 266.255 | 778.283 |
| FOREIGN COUNTRIES: | | | | | | | | | 11.869.986 | | 13.180.818 | 25.050.804 |
| - Austria | Salzburg | 660 | 650 | 1,25 | 43,50 | 868,50 | | 1.637 | 1.422.050 | 1.818 | 1.579.091 | 3.001.141 |
| - Croatia | Zagreb | 600 | 550 | 1,25 | 75,00 | 825,00 | | 164 | 135.083 | 182 | 150.000 | 285.083 |
| - Czech Republic | Praha | 1.000 | 830 | 1,25 | 101,00 | 1.351,00 | | 164 | 221.208 | 182 | 245.636 | 466.844 |
| - Slovak Republic | Bratislava | 900 | 850 | 1,25 | 29,00 | 1.154,00 | | 246 | 283.428 | 273 | 314.727 | 598.155 |
| - Slovenia | Ljubljana | 460 | 300 | 1,25 | 42,00 | 617,00 | | 246 | 151.538 | 273 | 168.273 | 319.811 |
| - Hungary | Budapest | 1.100 | 1.050 | 1,25 | 29,00 | 1.404,00 | | 491 | 689.658 | 545 | 765.818 | 1.455.476 |
| - France | Paris | 1.200 | 1.150 | 1,25 | 348,00 | 1.848,00 | | 1.228 | 2.269.386 | 1.364 | 2.520.000 | 4.789.386 |
| - United Kingdom | London | 1.500 | 1.450 | 1,25 | 115,00 | 1.990,00 | | 1.064 | 2.117.930 | 1.182 | 2.351.818 | 4.469.748 |
| - Germany | Frankfurt | 1.000 | 950 | 1,25 | 40,00 | 1.290,00 | | 1.392 | 1.795.369 | 1.545 | 1.993.636 | 3.789.006 |
| - The Netherlands | Amsterdam | 1.400 | 1.400 | 1,25 | 40,00 | 1.790,00 | | 1.555 | 2.784.337 | 1.727 | 3.091.818 | 5.876.155 |
| TOTAL | | | | | | | | | 18.429.084 | | 16.591.549 | 35.020.634 |

Chapter 3

FEASIBLE EVOLUTION IN THE DEMONSTRATORS AREAS

TAB. 34 - FRESHLOG PIEVESESTINA: TRANSPORT COST 2009

| DESTINATION AREA | AREA OF REFERENCE | AVG. DISTANCE OUTWARD JOURNEY in km | MOTORWAY OUTWARD JOURNEY in km | AVG. TRANSPORT COST/KM €/km | MOTORWAY TICKET €/path | UNIT COST PER OUTWARD OR RETURN JOURNEY € | PALLETS n. | OUTWARD JOURNEYS n. | TOTAL COST PER OUTWARD JOURNEYS € | RETURN JOURNEYS n. | TOTAL COST PER RETURN JOURNEYS € | TOTAL COST OUTWARD AND RETURN JOURNEYS € |
|---------------------------|--------------------|--|-----------------------------------|--------------------------------|---------------------------|--|---------------|------------------------|--------------------------------------|-----------------------|-------------------------------------|---|
| ITALY: | | | | | | | | | | | | |
| - North East | Padova | 200 | 190 | 1,25 | 24,70 | 274,70 | 70.000 | 2.496 | 685.526 | 1.622 | 445.592 | 1.131.118 |
| - North West | Peschiera Borromeo | 300 | 290 | 1,25 | 37,70 | 412,70 | 280.000 | 9.982 | 4.119.643 | 6.488 | 2.677.768 | 6.797.412 |
| - Centre | Roma Nomentana | 320 | 300 | 1,25 | 39,00 | 439,00 | 70.000 | 2.496 | 1.095.544 | 1.622 | 712.103 | 1.807.647 |
| - South | Taranto | 668 | 645 | 1,25 | 83,85 | 918,85 | 20.000 | 713 | 655.152 | 463 | 425.848 | 1.081.000 |
| - Islands | Palermo | 1.225 | 1.162 | 1,25 | 151,06 | 1.682,31 | 10.000 | 357 | 599.754 | 232 | 389.840 | 989.594 |
| FOREIGN COUNTRIES: | | | | | | | | | 13.388.141 | | 15.377.621 | 28.765.763 |
| - Austria | Salzburg | 660 | 650 | 1,25 | 43,50 | 868,50 | | 1.847 | 1.603.929 | 2.121 | 1.842.273 | 3.446.201 |
| - Croatia | Zagreb | 600 | 550 | 1,25 | 75,00 | 825,00 | | 185 | 152.359 | 212 | 175.000 | 327.359 |
| - Czech Republic | Praha | 1.000 | 830 | 1,25 | 101,00 | 1.351,00 | | 185 | 249.500 | 212 | 286.576 | 536.076 |
| - Slovak Republic | Bratislava | 900 | 850 | 1,25 | 29,00 | 1.154,00 | | 277 | 319.678 | 318 | 367.182 | 686.859 |
| - Slovenia | Ljubljana | 460 | 300 | 1,25 | 42,00 | 617,00 | | 277 | 170.920 | 318 | 196.318 | 367.238 |
| - Hungary | Budapest | 1.100 | 1.050 | 1,25 | 29,00 | 1.404,00 | | 554 | 777.864 | 636 | 893.455 | 1.671.318 |
| - France | Paris | 1.200 | 1.150 | 1,25 | 348,00 | 1.848,00 | | 1.385 | 2.559.638 | 1.591 | 2.940.000 | 5.499.638 |
| - United Kingdom | London | 1.500 | 1.450 | 1,25 | 115,00 | 1.990,00 | | 1.200 | 2.388.810 | 1.379 | 2.743.788 | 5.132.598 |
| - Germany | Frankfurt | 1.000 | 950 | 1,25 | 40,00 | 1.290,00 | | 1.570 | 2.024.995 | 1.803 | 2.325.909 | 4.350.904 |
| - The Netherlands | Amsterdam | 1.400 | 1.400 | 1,25 | 40,00 | 1.790,00 | | 1.754 | 3.140.450 | 2.015 | 3.607.121 | 6.747.571 |
| TOTAL | | | | | | | | | 20.543.760 | | 20.028.773 | 40.572.533 |

With regard to the equipment costs, these have been calculated on the basis of an analysis realized with the selected local operators and with the experts panel. The costs, in the demonstrator area, have been identified as follows:

- current sq.m cost of the plot in the area of construction of the platform - 110,00 €/sq.m;
- current sq.m cost to build a factory shed in the area of construction of the platform - 455,00 €/sq.m;
- current sq.m cost to realize a large square in the area of construction of the platform - 50,00 €/sq.m;
- current sq.m cost to build offices in the area of construction of the platform - 1.500,00€/sq.m;
- current sq.m cost to build cold rooms in the area of construction of the platform - 400,00 €/sq.m;
- current cost to buy a space car - 25.000,00 €/each one;
- current cost to buy a transpallet - 8.300,00 €/each one;
- current cost to buy hardware and software:
 - 25 working stations (equipped with CPU + basic software + monitor + printer + telephone) linked to 2 servers - 50.000,00 €
 - a package of specific software devoted to the logistics management - 150.000 €.

TAB. 35 - FRESHLOG PIEVESESTINA: AVERAGE COST FOR ONE BLOCK OF THE TERRITORIAL LOGISTICS STRUCTURE

| STRUCTURES | SQ.M | € |
|---------------------------------------|--------|------------------|
| Plot of 160 x 130 sq.m | 20.800 | 2.288.000 |
| One floor factory shed 200x30xH8,5 m | 6.000 | 2.730.000 |
| Large square | 15.000 | 750.000 |
| Offices | 300 | 450.000 |
| Cold rooms | 700 | 280.000 |
| TOTAL STRUCTURES | | 6.498.000 |
| EQUIPMENT | | € |
| 2 space cars | | 50.000 |
| 12 transpallets | | 100.000 |
| Hardware and software | | 200.000 |
| TOTAL EQUIPMENT | | 350.000 |
| TOTAL STRUCTURES AND EQUIPMENT | | 6.848.000 |

Chapter 3

FEASIBLE EVOLUTION IN THE DEMONSTRATORS AREAS

The total cost of the structure has been rounded up to a full data (6,5 millions of €) to have full input data in the cost analysis (depreciation, maintenance, etc.). This decision to round up the cost analysis has been realized also to be prudential.

With regard to the personnel costs, these have been calculated on the basis of an analysis realized with the selected local operators and with the experts panel. These costs, in the demonstrator area, have been identified as follows per year:

- square workers - 31.500,00 €/employee;
- logistics workers - 42.000,00 €/employee;
- administrative and sales management - 25.200,00 €/employee;
- managing director - 73.500,00 €/employee.

TAB. 36 - FRESHLOG PIEVESESTINA: LABOUR COST

| QUALIFICATION | N. OF EMPLOYEE | | | | LABOUR COST (employee/year) in € | TOTAL LABOUR COST (employees/year) in € | | | |
|-------------------------------------|----------------|-----------|-----------|-----------|----------------------------------|---|------------------|------------------|------------------|
| | 2006 | 2007 | 2008 | 2009 | | 2006 | 2007 | 2008 | 2009 |
| Square workers | 16 | 31 | 34 | 36 | 31.500 | 504.000 | 976.500 | 1.071.000 | 1.134.000 |
| Logistics workers | 9 | 17 | 18 | 19 | 42.000 | 378.000 | 714.000 | 756.000 | 798.000 |
| Administrative and sales management | 12 | 16 | 17 | 18 | 25.200 | 302.400 | 403.200 | 428.400 | 453.600 |
| Managing director | 1 | 1 | 1 | 1 | 73.500 | 73.500 | 73.500 | 73.500 | 73.500 |
| TOTAL | 38 | 65 | 70 | 74 | 172.200 | 1.257.900 | 2.167.200 | 2.328.900 | 2.459.100 |

With regard to the general costs, these have been calculated on the basis of an analysis realized with the selected local operators and with the experts panel. These costs, in the demonstrator area, have been identified as reported in the following table³⁵.

TAB. 37 - FRESHLOG PIEVESESTINA: TOTAL COSTS (€)

| COSTS CATEGORIES | 2007 | 2008 | 2009 |
|-------------------------------|-------------------|-------------------|-------------------|
| Depreciation of the structure | 325.000 | 450.000 | 650.000 |
| Maintenance of the structure | 32.500 | 45.000 | 65.000 |
| Insurance of the structure | 3.250 | 4.500 | 6.500 |
| Depreciation of the equipment | 70.000 | 100.000 | 140.000 |
| Maintenance of the equipment | 3.500 | 5.000 | 7.000 |
| Insurance of the equipment | 3.500 | 5.000 | 7.000 |
| Interest allowed | 120.021 | 166.182 | 240.041 |
| Personnel | 2.167.200 | 2.328.900 | 2.459.100 |
| Energy and fuel | 45.000 | 60.000 | 90.000 |
| Insurance of the activity | | | |
| Transport services | 29.805.421 | 35.020.634 | 40.572.533 |
| TOTAL COSTS | 32.575.392 | 38.185.216 | 44.237.174 |

³⁵ In this context, it is to underline that the basis to calculate the cost categories related to the structure have been identified as follows: depreciation of the structure in a period of 20 years; maintenance of the structure is 0,5% of the investment value; insurance of the structure is 0,05% of the investment value; depreciation of the equipment is in a period of 5 years; maintenance of the equipment is 1% of the investment value; insurance of the equipment is 1% of the investment value. Moreover, with refer to financial cost, the Imonode Consortium calculated the interest paid on the basis of an interest rate of Euribor rate+1%. This rate comes from a survey made with banks in the demonstrator area.

So on the basis of the turnover and costs calculated in the way reported up to now, FreshLog Pievesestina provide the following economical situation in terms of marginality of the structure.

TAB. 38 - FRESHLOG PIEVESESTINA: GROSS MARGIN

| | 2007 | 2008 | 2009 |
|-----------------------|------------|------------|------------|
| TOTAL COSTS in € | 32.575.392 | 38.185.216 | 44.237.174 |
| TURNOVER in € | 36.505.216 | 44.850.883 | 52.966.632 |
| GROSS MARGIN in € | 3.929.824 | 6.665.667 | 8.729.458 |
| GROSS MARGIN/TURNOVER | 10,77% | 14,86% | 16,48% |
| Investment value in € | 6.500.000 | 9.000.000 | 13.000.000 |
| Equipment value in € | 350.000 | 500.000 | 700.000 |

3.6.1.3 - Management

With regard to the process of development of the logistics structures in the local context, the Imonode Consortium decided to involve the local Municipality to implement a Public-Private-Partnership (PPP) scheme to facilitate the real development of the structure.

Through a concerted action among Chamber of Commerce, entrepreneurial categories and Municipality made by a series of public meetings, Cesena Municipality has decided to dedicate a space in the own area choosing a site in which it recently changed the land use destination from agricultural activities to industrial/services activities in the Municipality Land Plan. To realize this activity a group of Municipality technicians have been involved in order to make a consistent analysis related to the territorial aspects on one side and to the structure necessities on the other side.

Besides, considering the strategic role of perishables logistics activities in the Municipality economical context, it has been decided to dedicate also to logistics activities the part of the area normally reserved to the Municipality when there is a use destination changing in order to reduce the land cost and so facilitate the implementation of private logistics investments.

Coming to the management of the structure, the Bodies involved in the concerted action decided to leave the activity at the private level only. For this reason, the FreshLog Pievesestina property status would be divided among different companies or integrated in a consortium/stock company among the operators involved.

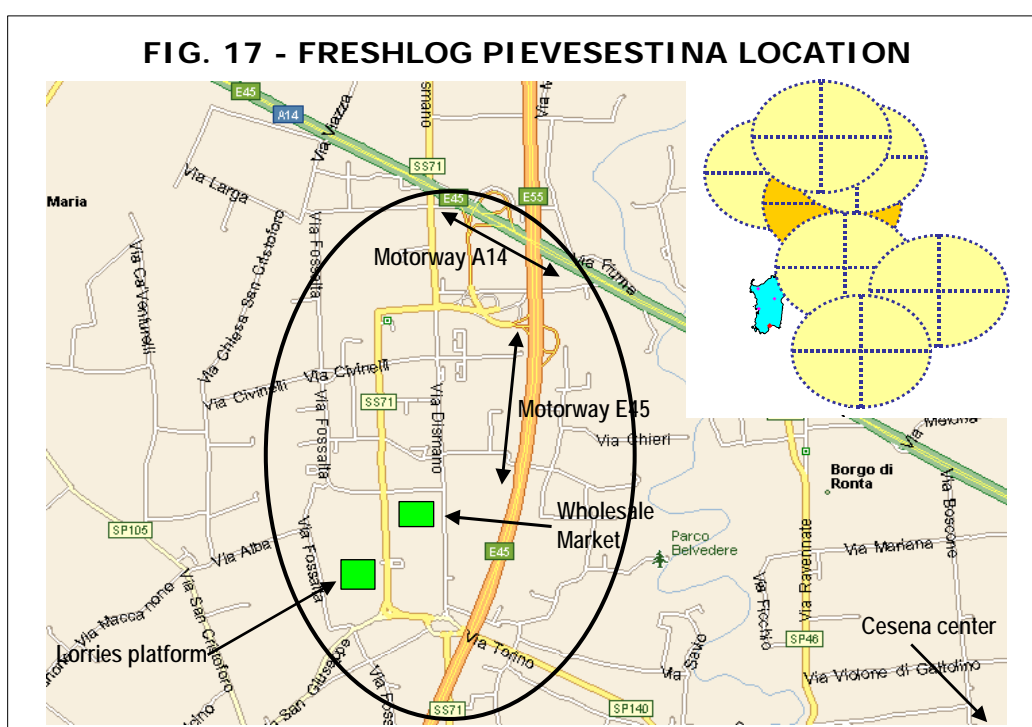


FIG. 18 - FRESHLOG PIEVESESTINA AREA

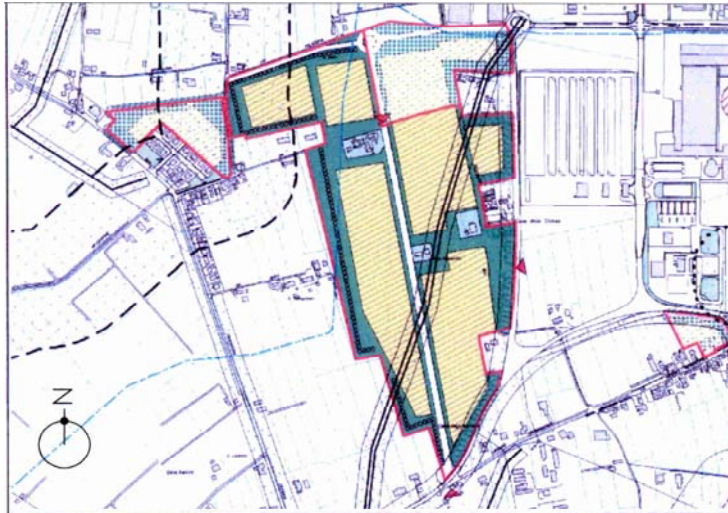
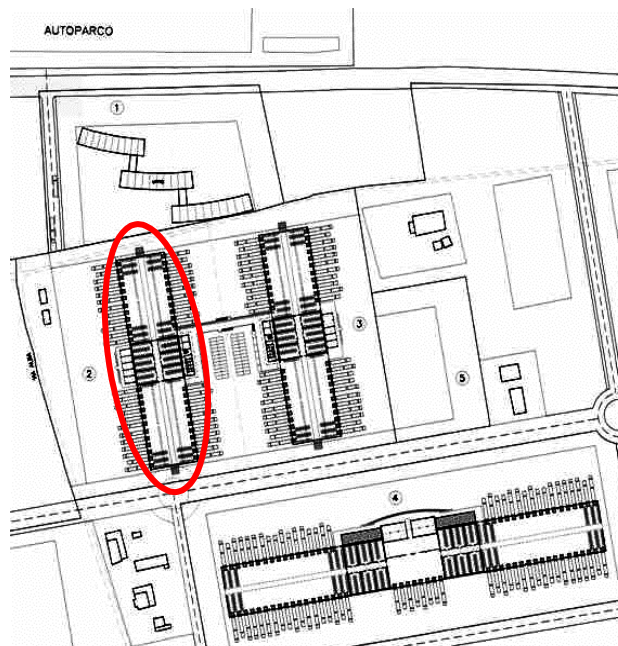
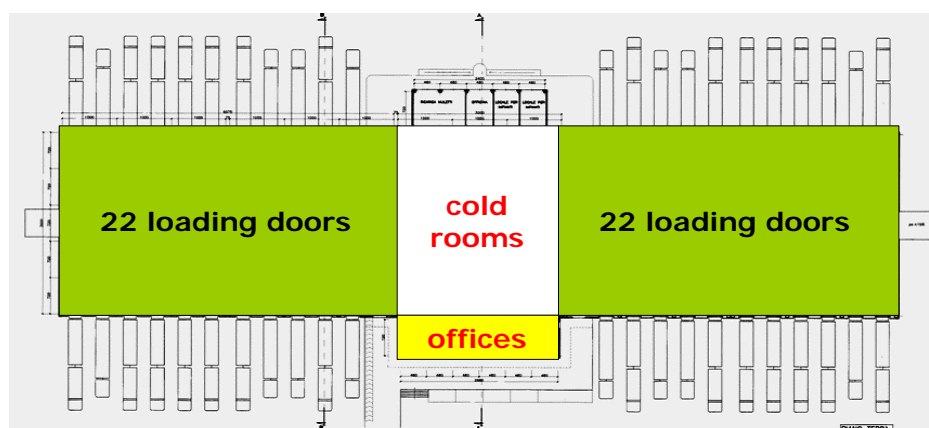


FIG. 19 - FRESHLOG PIEVESESTINA PROJECT



**FIG. 20 - FRESHLOG PIEVESESTINA PROJECT
FIRST BLOCK**



3.6.2 - TARANTO

3.6.2.1 - Technical analysis

The technical analysis start from the origin of flows.

Origins of flows are:

- agro-industrial cluster of Metaponto;
- outside agro-industrial cluster of Metaponto.

The volumes handled analysis have been realized on the basis of the data coming from the previous surveys made in the Imonode project and from the specific in deep analysis made for the FreshLog case, such as reported in Par. 3.3.

In particular, from the in deep analysis of the flows of fruits and vegetables realized with the origin/destination matrix, cross tabulated with the results of the in deep analysis made for demonstrator of Taranto come that:

- the volumes of fresh produce grown in the Metaponto cluster and exported to the destination markets of North Italy and North-East Europe are around 1,1 millions of MT;
- the volumes of fresh produce in transit in the area of Taranto from Calabria and Eastern part of Sicily bound for North (Italy and Europe) are nearly 1,25 millions of MT.

As stated for Cesena demonstrator, the relevance of the flows among Italian NUTS 2 on the total flows with origin or destination in Italy highlights the necessity to extend to the national paths the demonstrator analysis and planning, nevertheless originally this project was based on an international level. As a matter of fact, from the analysis realized in origin/destination matrix emerges that the flows of fresh produce among Italian NUTS 2 represents 54% of the total flows with origin or destination in Italy, while in the case of Puglia Region this incidence reaches 63%.

Main simplified destinations areas for these flows have been identified as follows:

National

- North-West of Italy
- North-East of Italy
- Centre of Italy

International

CADSES area Countries

- Austria
- Croatia
- Slovenia
- Hungary

Other main or emerging export market for Italian fresh produce

- Germany
- France
- United Kingdom
- The Netherlands
- Czech Republic
- Slovak Republic

Origin of flows has been located in the Taranto logistics structure - Agromed - while each one of the destination markets have been identified in a conventional area of the reference region/Country:

National

- North-West of Italy - PADOVA
- North-East of Italy - PESCHIERA BORROMEO (MILAN)
- Centre of Italy - ROME NONENTANA

International

CADSES area Countries

- Austria - SALZBURG
- Croatia - ZAGREB
- Slovenia - LJUBLJANA
- Hungary - BUDAPEST

Other main or emerging export market for Italian fresh produce

- Germany - FRANKFURT
- France - PARIS
- United Kingdom - LONDON
- The Netherlands - AMSTERDAM
- Czech Republic - PRAHA
- Slovak Republic - BRATISLAVA

So, on the basis of the conventional pallet of 600 kg for fresh produce comes a number of 2.070.000 pallets for fresh produce in transit in the area of Taranto and a number of 1.830.000 pallets for fruit and vegetables produced in the cluster.

During the planning of Agromed - to meet the market potential and match the needs of the involved operators - the Imonode Consortium considered a target to catch 5% of the pallets of fresh produce in transit in the area of Taranto from Calabria and Eastern part of Sicily bound for North and 20% of the pallets of fresh produce packed in the cluster with destination North Italy and North-East Europe. With these goals the volume target of the new territorial logistics structure is 465.000 of pallets (i.e. 279.000 MT).

The new Taranto territorial logistics structure - Agromed - has been project at technical and economical level for the first step of development with a block of the logistics structure for an handling of 465.000 pallets/year.

The first step of the new territorial logistics structure should be completed and operative in October 2007.

With these volumes in mind and on the basis of the technical information collected from the operators, the Imonode Consortium began to realize the analysis.

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TAB. 39 - AGROMED: TECHNICAL INFORMATION

| | 2008 |
|---|------------------------|
| Picking | 95% |
| Cross-docking | 5% |
| Full lorries export | 70% |
| Cross-docking price | -5 € |
| Saturation Italy | 70% |
| Saturation export cross-docking and picking | 90% |
| Return Italy | 55% |
| Return from abroad | 95% |
| Price of return Italy | 70% of outward journey |
| Price for return from abroad | 85% |

On the basis of the technical analysis reported in the previous pages, the Imonode Consortium realized the transport analysis to highlight the volumes evolution handled by Agromed in terms of:

- total pallets;
- picking pallets;
- cross docking pallets;
- returns (in term of tractor+trailer).

TAB. 40 - AGROMED: TRANSPORT ANALYSIS 2008

| DESTINATION MARKETS | TOTAL PALLETES n. | FULL LORRIES n. | PICKING PALLETES n. | CROSS- DOCKING PALLETES n. | RETURN UNITS n. |
|---------------------------|-------------------------|-----------------------|---------------------------|-------------------------------------|-----------------------|
| ITALY: | 265.000 | | 251.750 | 13.250 | 6.310 |
| - North East | 85.000 | | 80.750 | 4.250 | 2.024 |
| - North West | 115.000 | | 109.250 | 5.750 | 2.738 |
| - Centre | 65.000 | | 61.750 | 3.250 | 1.548 |
| FOREIGN COUNTRIES: | 200.000 | 4.242 | 57.000 | 3.000 | 5.949 |
| - Austria | 40.000 | 848 | 11.400 | 600 | 1.190 |
| - Croatia | 3.000 | 64 | 855 | 45 | 89 |
| - Czech Republic | 3.000 | 64 | 855 | 45 | 89 |
| - Slovak Republic | 3.000 | 64 | 855 | 45 | 89 |
| - Slovenia | 3.000 | 64 | 855 | 45 | 89 |
| - Hungary | 8.000 | 170 | 2.280 | 120 | 238 |
| - France | 20.000 | 424 | 5.700 | 300 | 595 |
| - United Kingdom | 20.000 | 424 | 5.700 | 300 | 595 |
| - Germany | 80.000 | 1.697 | 22.800 | 1.200 | 2.380 |
| - The Netherlands | 20.000 | 424 | 5.700 | 300 | 595 |
| TOTAL | 465.000 | 4.242 | 308.750 | 16.250 | 12.259 |

From an equipment point of view the analysis made with the specific panel of experts highlighted that a block of Agromed needs:

- a plot of 25.000 sq.m;
- a one floor factory shed of 30x200x8,5 mt (6.000 sq.m);
- a large square of approx 19.000 sq.m;
- 400 sq.m of offices;
- 1.400 sq.m of cold rooms;
- n. 2 space cars;

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- n. 12 transpallets;
- 25 working stations (equipped with CPU + basic software + monitor + printer + telephone) linked to 2 servers;
- a package of specific software devoted to the logistics management.

From a personnel point of view, the analysis made with the panel of experts highlighted that for the handling of goods Agromed needs:

- staff of "square workers", i.e. person devoted to the:
 - handling of pallets within the logistics structure (included loading and unloading operations);
 - handling of vehicles within the large square (included the loading doors approach, refuelling and small maintenance activities);
 - collection of pallets from customers vs. logistics structure.
- staff of "logistics workers", i.e. person devoted to the:
 - orders receiving from customers;
 - organization of travel and means of transport search;
 - arrangement of travel documentation;
 - travel monitoring.
- staff of "administrative and sales management", i.e. person devoted to the:
 - general bookkeeping management;
 - invoicing.
- a "managing director", i.e. person devoted to the whole management of the logistics structure.

TAB. 41 - AGROMED: N. OF EMPLOYEES PER CATEGORY

| QUALIFICATION | FUNCTION | N. |
|--|--|-----------|
| Square workers | - handling of pallets within the logistics structure (included loading and unloading operations); - handling of vehicles within the large square (included the loading doors approach, refuelling and small maintenance activities); - collection of pallets from customers vs. logistics structure. | 24 |
| Logistics workers | - orders receiving from customers; - organization of travel and means of transport search; - arrangement of travel documentation; - travel monitoring. | 14 |
| Administrative and sales management | - general bookkeeping management - invoicing | 16 |
| Managing director | - management of the logistics structure | 1 |
| TOTAL | | 55 |

3.6.2.2 - Economical and financial analysis

On the basis of the technical analysis made in the previous Paragraph, the Imonode Consortium made the profit and loss statement for Agromed in 2008³⁶.

With regard to the turnover, for each destination and in total, the economic analysis has been made on the basis of:

- n. of total pallets;
- n. of picking pallets;
- n. of cross docking pallets;
- picking activities price per pallet;
- cross docking activities price per pallet;

³⁶ Each cost analysis have been made with the hypothesis of constant price at 2005 level.

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- n. of returns;
- price of return.

Thanks to these indicators the Imonode Consortium has been able to calculate the turnover for 2008.

TAB. 42 - AGROMED: TURNOVER 2008

| DESTINATION MARKETS | TOTAL PALLETS | FULL LORRIES | PICKING PALLETS | CROSS-DOCKING PALLETS | PRICE TOTAL | PICKING PRICE | CROSS-DOCKING PRICE | RETURN UNITS | RETURN PRICE | TURNOVER | PICKING TURNOVER | CROSS-DOCKING TURNOVER | RETURN TURNOVER | PATH TURNOVER |
|---------------------------|----------------|--------------|-----------------|-----------------------|-------------|---------------|---------------------|---------------|--------------|------------------|-------------------|------------------------|-------------------|-------------------|
| | n. | n. | n. | n. | € | € | € | n. | € | € | € | € | € | € |
| ITALY: | 265.000 | | 251.750 | 13.250 | | | | 6.310 | | | | | | 29.616.250 |
| - North East | 85.000 | | 80.750 | 4.250 | | 75,00 | 70,00 | 2.024 | 1.732,50 | | 6.056.250 | 297.500 | 3.506.250 | 9.860.000 |
| - North West | 115.000 | | 109.250 | 5.750 | | 80,00 | 75,00 | 2.738 | 1.848,00 | | 8.740.000 | 431.250 | 5.060.000 | 14.231.250 |
| - Centre | 65.000 | | 61.750 | 3.250 | | 55,00 | 50,00 | 1.548 | 1.270,50 | | 3.396.250 | 162.500 | 1.966.250 | 5.525.000 |
| FOREIGN COUNTRIES: | 200.000 | 4.242 | 57.000 | 3.000 | | | | 5.949 | | | | | | 27.307.186 |
| - Austria | 40.000 | 848 | 11.400 | 600 | 2.100,00 | 95,00 | 90,00 | 1.190 | 1.785,00 | 1.781.818 | 1.083.000 | 54.000 | 2.123.970 | 5.042.788 |
| - Croatia | 3.000 | 64 | 855 | 45 | 2.250,00 | 100,00 | 95,00 | 89 | 1.912,50 | 143.182 | 85.500 | 4.275 | 170.676 | 403.633 |
| - Czech Republic | 3.000 | 64 | 855 | 45 | 2.400,00 | 120,00 | 115,00 | 89 | 2.040,00 | 152.727 | 102.600 | 5.175 | 182.055 | 442.557 |
| - Slovak Republic | 3.000 | 64 | 855 | 45 | 2.350,00 | 125,00 | 120,00 | 89 | 1.997,50 | 149.545 | 106.875 | 5.400 | 178.262 | 440.082 |
| - Slovenia | 3.000 | 64 | 855 | 45 | 2.150,00 | 90,00 | 85,00 | 89 | 1.827,50 | 136.818 | 76.950 | 3.825 | 163.091 | 380.684 |
| - Hungary | 8.000 | 170 | 2.280 | 120 | 2.450,00 | 125,00 | 120,00 | 238 | 2.082,50 | 415.758 | 285.000 | 14.400 | 495.593 | 1.210.751 |
| - France | 20.000 | 424 | 5.700 | 300 | 2.250,00 | 95,00 | 90,00 | 595 | 1.912,50 | 954.545 | 541.500 | 27.000 | 1.137.841 | 2.660.886 |
| - United Kingdom | 20.000 | 424 | 5.700 | 300 | 2.800,00 | 148,00 | 143,00 | 595 | 2.380,00 | 1.187.879 | 843.600 | 42.900 | 1.415.980 | 3.490.359 |
| - Germany | 80.000 | 1.697 | 22.800 | 1.200 | 2.150,00 | 100,00 | 95,00 | 2.380 | 1.827,50 | 3.648.485 | 2.280.000 | 114.000 | 4.349.081 | 10.391.566 |
| - The Netherlands | 20.000 | 424 | 5.700 | 300 | 2.350,00 | 110,00 | 105,00 | 595 | 1.997,50 | 996.970 | 627.000 | 31.500 | 1.188.412 | 2.843.881 |
| TOTAL | 465.000 | 4.242 | 308.750 | 16.250 | | | | 12.259 | | 9.567.727 | 24.224.525 | 1.193.725 | 21.937.459 | 56.923.436 |

With regard to the transport costs, these have been calculated on the basis of:

- average distance among destination and origin;
- average price/km (i.e. 1,25 €/km, such as calculated with formula reported in Par. 3.2);
- motorway ticket³⁷;
- n. of pallets;
- n. of outward journeys;
- n. of returns.

Thanks to these indicators the Imonode Consortium has been able to calculate a cost for outward journey and return trip, to have the roundtrip cost of the volumes handled by Agromed.

TAB. 43 - AGROMED: TRANSPORT COST 2008

| DESTINATION AREA | AREA OF REFERENCE | AVG. DISTANCE OUTWARD JOURNEY | MOTORWAY OUTWARD JOURNEY | AVG. TRANSPORT COST/KM | MOTORWAY TICKET | UNIT COST PER OUTWARD OR RETURN JOURNEY | PALLETS | OUTWARD JOURNEYS | TOTAL COST PER OUTWARD JOURNEYS | RETURN JOURNEYS | TOTAL COST PER RETURN JOURNEYS | TOTAL COST OUTWARD AND RETURN JOURNEYS |
|---------------------------|--------------------|-------------------------------|--------------------------|------------------------|-----------------|---|---------|------------------|---------------------------------|-----------------|--------------------------------|--|
| | | in km | in km | €/km | €/path | € | n. | n. | € | n. | € | € |
| ITALY: | | | | | | | | | 12.612.424 | | 6.936.833 | 19.549.258 |
| - North East | Padova | 864 | 841 | 1,25 | 84,1 | 1.164,10 | 85.000 | 3.680 | 4.283.485 | 2.024 | 2.355.917 | 6.639.402 |
| - North West | Peschiera Borromeo | 962 | 937 | 1,25 | 93,7 | 1.296,20 | 115.000 | 4.978 | 6.452.944 | 2.738 | 3.549.119 | 10.002.063 |
| - Centre | Roma Nomentana | 500 | 417 | 1,25 | 41,7 | 666,70 | 65.000 | 2.814 | 1.875.996 | 1.548 | 1.031.798 | 2.907.793 |
| FOREIGN COUNTRIES: | | | | | | | | | 14.343.575 | | 13.626.396 | 27.969.971 |
| - Austria | Salzburg | 1.331 | 1.296 | 1,25 | 129,6 | 1.793,35 | | 1.253 | 2.246.216 | 1.190 | 2.133.905 | 4.380.122 |
| - Croatia | Zagreb | 1.271 | 1.196 | 1,25 | 119,6 | 1.708,35 | | 94 | 160.481 | 89 | 152.457 | 312.939 |
| - Czech Republic | Praha | 1.671 | 1.476 | 1,25 | 147,6 | 2.236,35 | | 94 | 210.081 | 89 | 199.577 | 409.659 |
| - Slovak Republic | Bratislava | 1.571 | 1.496 | 1,25 | 149,6 | 2.113,35 | | 94 | 198.527 | 89 | 188.600 | 387.127 |
| - Slovenia | Ljubljana | 1.131 | 946 | 1,25 | 94,6 | 1.508,35 | | 94 | 141.693 | 89 | 134.609 | 276.302 |
| - Hungary | Budapest | 1.771 | 1.696 | 1,25 | 169,6 | 2.383,35 | | 251 | 597.041 | 238 | 567.189 | 1.164.230 |
| - France | Paris | 1.871 | 1.796 | 1,25 | 179,6 | 2.518,35 | | 626 | 1.577.148 | 595 | 1.498.291 | 3.075.440 |
| - United Kingdom | London | 2.171 | 2.096 | 1,25 | 209,6 | 2.923,35 | | 626 | 1.830.785 | 595 | 1.739.246 | 3.570.030 |
| - Germany | Frankfurt | 1.671 | 1.596 | 1,25 | 159,6 | 2.248,35 | | 2.505 | 5.632.230 | 2.380 | 5.350.619 | 10.982.849 |
| - The Netherlands | Amsterdam | 2.071 | 2.046 | 1,25 | 204,6 | 2.793,35 | | 626 | 1.749.371 | 595 | 1.661.902 | 3.411.273 |
| TOTAL | | | | | | | | | 41.299.574 | | 34.189.625 | 47.519.228 |

³⁷ Ref. note n. 34.

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With regard to the equipment costs, these have been calculated on the basis of an analysis realized with the experts panel. These costs, in the demonstrator area, have been identified as follows:

- current sq.m cost of the plot in the area of construction of the platform - 10,00 €/sq.m;
- current sq.m cost to build a factory shed in the area of construction of the platform - 455,00 €/sq.m;
- current sq.m cost to realize a large square in the area of construction of the platform - 50,00 €/sq.m;
- current sq.m cost to build offices in the area of construction of the platform - 1.500,00€/sq.m;
- current sq.m cost to build cold rooms in the area of construction of the platform - 400,00 €/sq.m;
- current cost to buy space cars - 25.000,00 €/each one;
- current cost to buy transpallets - 8.300,00 €/each one;
- current cost to buy hardware and software:
 - 25 working stations (equipped with CPU + basic software + monitor + printer + telephone) linked to 2 servers - 50.000,00 €;
 - a package of specific software devoted to the logistics management - 150.000 €.

**TAB. 44 - AGROMED: AVERAGE COST FOR ONE BLOCK
OF THE TERRITORIAL LOGISTICS STRUCTURE**

| STRUCTURES | SQ.M | € |
|---------------------------------------|--------|------------------|
| Plot of 160 x 130 sq.m | 25.000 | 250.000 |
| One floor factory shed 200x30xH8,5 m | 6.000 | 2.730.000 |
| Large square | 19.000 | 950.000 |
| Offices | 400 | 600.000 |
| Cold rooms | 1.400 | 560.000 |
| TOTAL STRUCTURES | | 5.090.000 |
| EQUIPMENT | | € |
| 2 space cars | | 50.000 |
| 12 transpallets | | 100.000 |
| Hardware and software | | 200.000 |
| TOTAL EQUIPMENT | | 350.000 |
| TOTAL STRUCTURES AND EQUIPMENT | | 5.440.000 |

The total cost of the structure has been rounded up to a full data (5,1 millions of €) to have full input data in the cost analysis (depreciation, maintenance, etc.). The decision to round up the cost analysis has been realized also to be prudential.

With regard to the personnel costs, these have been calculated on the basis of an analysis realized with the experts panel and with the selected local operators. These costs, in the demonstrator area, have been identified as follows in 2005 horizon:

- square workers - 31.500,00 €/employee;
- logistics workers - 42.000,00 €/employee;
- administrative and sales management - 25.200,00 €/employee;
- managing director - 73.500,00 €/employee.

TAB. 45 - AGROMED: LABOUR COST

| QUALIFICATION | N. OF EMPLOYEE | LABOUR COST (employee/year) in € | TOTAL LABOUR COST (employees/year) in € |
|---|----------------|--|---|
| Square workers | 24 | 31.500 | 756.000 |
| Logistics workers | 14 | 42.000 | 588.000 |
| Administrative and sales management | 16 | 25.200 | 403.200 |
| Managing director | 1 | 73.500 | 73.500 |
| TOTAL | 55 | 172.200 | 1.820.700 |

With regard to the general cost, these have been calculated on the basis of an analysis realized with the experts panel. The costs, in the demonstrator area, have been identified as reported in the following table³⁸.

TAB. 46 - AGROMED: TOTAL COSTS (€)

| COSTS CATEGORIES | 2008 |
|-------------------------------|-------------------|
| Depreciation of the structure | 255.000 |
| Maintenance of the structure | 25.500 |
| Insurance of the structure | 2.550 |
| Depreciation of the equipment | 70.000 |
| Maintenance of the equipment | 3.500 |
| Insurance of the equipment | 3.500 |
| Interest allowed | 94.000 |
| Personnel | 1.820.700 |
| Energy and fuel | 40.000 |
| Insurance of the activity | |
| Transport services | 47.519.228 |
| TOTAL COSTS | 49.833.978 |

So on the basis of the turnover and costs calculated in the way reported up to now, Agromed provide the following economical situation in terms of marginality of the structure:

TAB. 47 - AGROMED: GROSS MARGIN

| | 2008 |
|------------------------------|------------------|
| TOTAL COSTS in € | 49.833.978 |
| TURNOVER in € | 56.923.436 |
| GROSS MARGIN in € | 7.089.458 |
| GROSS MARGIN/TURNOVER | 12,45% |
| INVESTMENT VALUE IN € | 5.100.000 |
| EQUIPMENT VALUE IN € | 350.000 |

³⁸ Ref. note n. 35.

3.6.2.3 - Management

With regard to the development process for the logistics structure in the local context, in this case the Imonode Consortium decided to utilize the partnership made among the Municipality, the Province, the Chamber of Commerce and the Port Authority of Taranto that already signed a local programme to realize investments in the agro-food sector due the public utility of this activities for the local development, in connection with the new Taranto distripark investment.

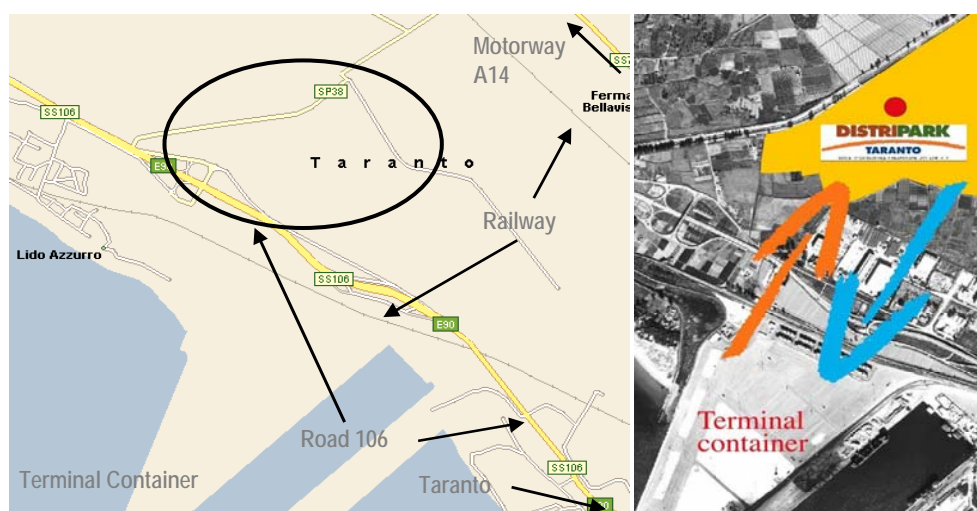
Through the Imonode proposition, considering the strategic role of perishables logistics activities in the Municipality economical context, one of these investments was focused on perishable logistics services and in 2004-2005 the partnership made among these Public Bodies found the right site and opened the activities to expropriate the area from private owners using the public utility reason to realize the expropriation. To do that Municipality technicians have been involved in order to make a consistent analysis related to the territorial aspects on one side and to the structure necessities on the other side and is under evolution the possibility to move Agromed from the original site in the distripark context to a new one in the proximity of the new Taranto wholesale market.

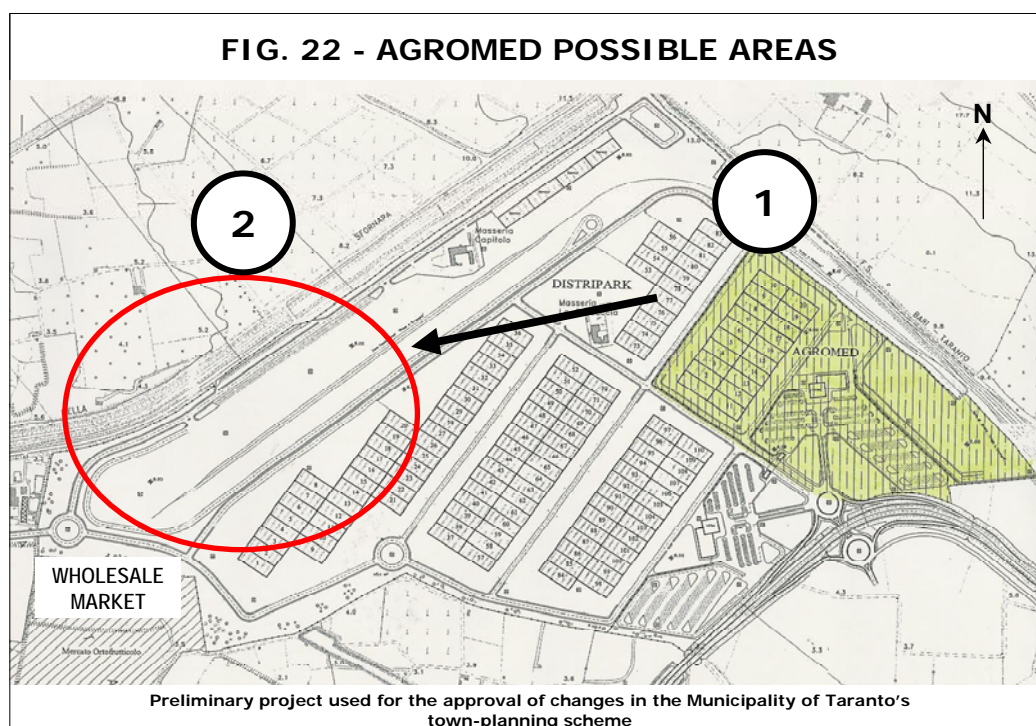
When the process will be concluded the partnership will implement a PPP scheme opening the Consortium property to private investors in order to realize the logistics structure and manage the logistics activities with a separate private company.

The Agromed structure property status is a Public-private Consortium among Chamber of Commerce, Municipality, Province, Port Authority, logistic providers and growers. The Consortium, called Agromed, have been set up in October 2005 among public subjects and will be open to private company join beginning from 2006. Just after the constitution, the Agromed Consortium received a number of request of joining from several operators.

Coming to the management the first option is a PPP consortium that leaves the activity at the private level maintaining just a control of the performed activity. For this reason there is the possibility to implement the Agromed management company as a consortium or a stock company among private operators with the representative presence of PPP Consortium in the Auditor Board.

FIG. 21 - AGROMED LOCATION





3.7 - CONSOLIDATION

The results coming from two demonstrators developed within the Imonode project (Cesena and Taranto) and reported in previous Paragraphs highlight that an aggregation/consolidation of fresh produce critical masses in the areas of production and their integration with products in transits in the logistics nodes are able to guarantee economic revenues to the operators involved.

Furthermore, it is clear the basic role of transits interceptions to realize mixed cargoes in response to the new request coming from multiples. It is also important to underline the progressive exacerbation of the driving law for commercial vehicles. As a matter of fact, the latter foresees a progressive reduction of the driving times that will command a higher number of driving breaks and so the necessity of logistics structures, where drivers could stop and have their rests.

Anyway, fragmented level of demand and supply in terms of volumes make difficult their matching with consequent difficulties in term of flows concentration and so logistics performances improvement. At this level emerged also a trend that is based on the producers organizations behaviour to sign commercial agreement with other organizations located in different areas, to have in their availability more products to complement their seasonality or stock.

For this reason, the Imonode Consortium decided to consolidate the results of Cesena and Taranto demonstrators with an IT tool able to realize an informative and commercial network regarding demand and supply in one side and the territorial logistics structures in the other: the final goal is to implement an IT network able to supply immaterial services linked with a network of physical structures able to provide material advanced logistics services.

As a matter of fact, this activity aims to show the possibilities to co-ordinate critical masses to reduce lead-time and costs, to supply specialised services. In parallel, it will be possible a reduction of the road traffic not just in the first part of the route but also in the following section to the terminal market.

The expected output is to implement a prototype of a Virtual Market Place (VMP) for fresh produce logistics able to match demand and supply of these services and improve performances in the way explained in the following pages.

3.7.1 - THE VIRTUAL MARKET PLACE

3.7.1.1 - Scenario analysis

The analysis made during the Imonode project, as reported in the previous Chapter, highlighted a series of obstacles and bottlenecks in the trade of fresh produce in CADSES area. With particular refer to demand and supply matching, the main obstacles to be solved in order to improve the logistics operations and their performances are as follows:

- fragmentation of supplied volumes as a consequence of the operators size;
- fragmentation of the demand in consideration of the fact that it is linked to distribution centres of multiples and that they are located in barycentric position with regard to the location of their point of sales;
- average lorries saturation (33 pallets capacity) in the Italian destination is 70% vs. 95% for foreign destinations;
- lack of IT equipment with particular refer to administrative-trading systems;
- low level of activities realized through IT tools;
- low level of integration among activities;
- lack of initiative to improve the IT equipment and usage in the short term;

All these obstacles prevent the ability to manage the flows in terms of consolidation, organisation and schedule of the transport journeys. In this way, these obstacles prevent the ability to gather the needed critical masses of fresh produce and to manage the shipment in the way of an optimisation of cargoes and reverse logistics.

With these information in mind, the on field analysis made with the operators involved in the Cesena and Taranto demonstrators highlighted that the critical areas of logistics immaterial services for fresh produce (macro-needs) could be improved with the following initiatives:

- rationalization of products collection;
- optimisation of transit and lead times;
- setting up of full cargoes by destination line;
- improvement of reverse logistics;
- link by critical masses to support intermodality.

These initiatives have been recognized as achievable with a Virtual Market Place development. The VMP is an IT tool that brings companies together who search solutions for technical/products/services requests and who offers new products, services and know-how.

So, the Imonode Consortium decided to develop a VMP called "FreshLog On line". After a preliminary recognition the Imonode Consortium decided to realize a software developed following the well known web-based system to have a wide range of possible improvement margin, easiness of use and low costs of development. The VMP is www.FreshLog.it.

The tools used to design the VMP are "open source" and in particular:

- operative system LINUX RED HAT/FEDORA;
- web server APACHE 1.3.34;
- database MySQL 3.23;
- applicative language PHP 4.4.1,

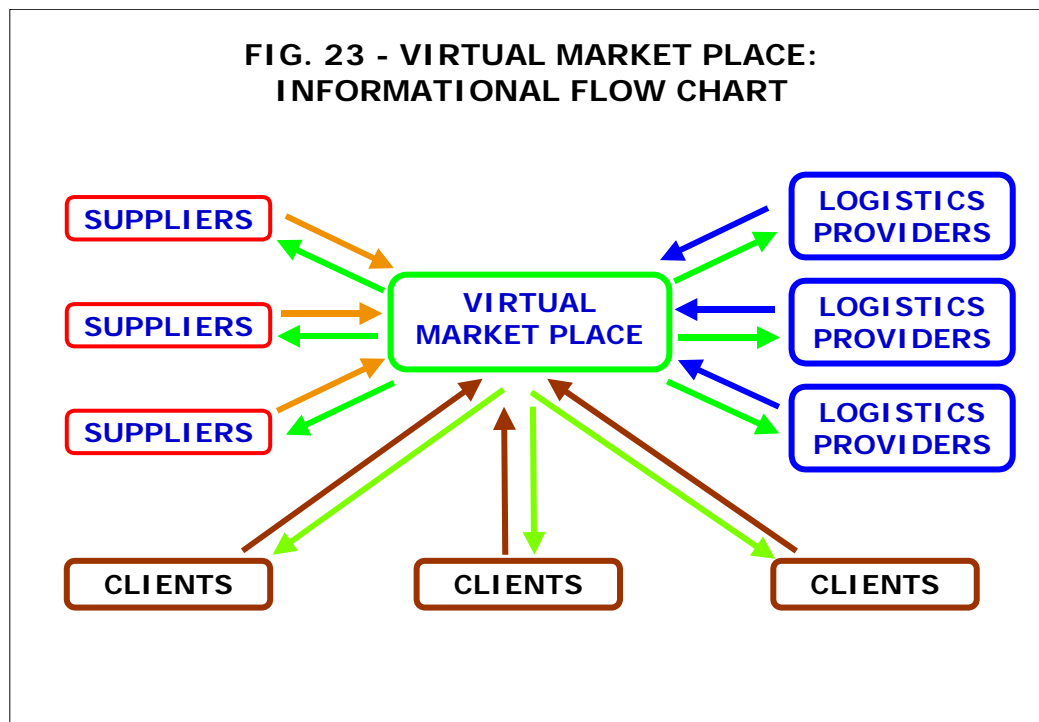
i.e. the so called LAMP (**L**inux, **A**pache, **M**ySQL, **P**HP) architecture that became very popular in the Web industry as a way of deploying inexpensive, reliable, scalable, secure web applications.

3.7.1.2 - Action plan

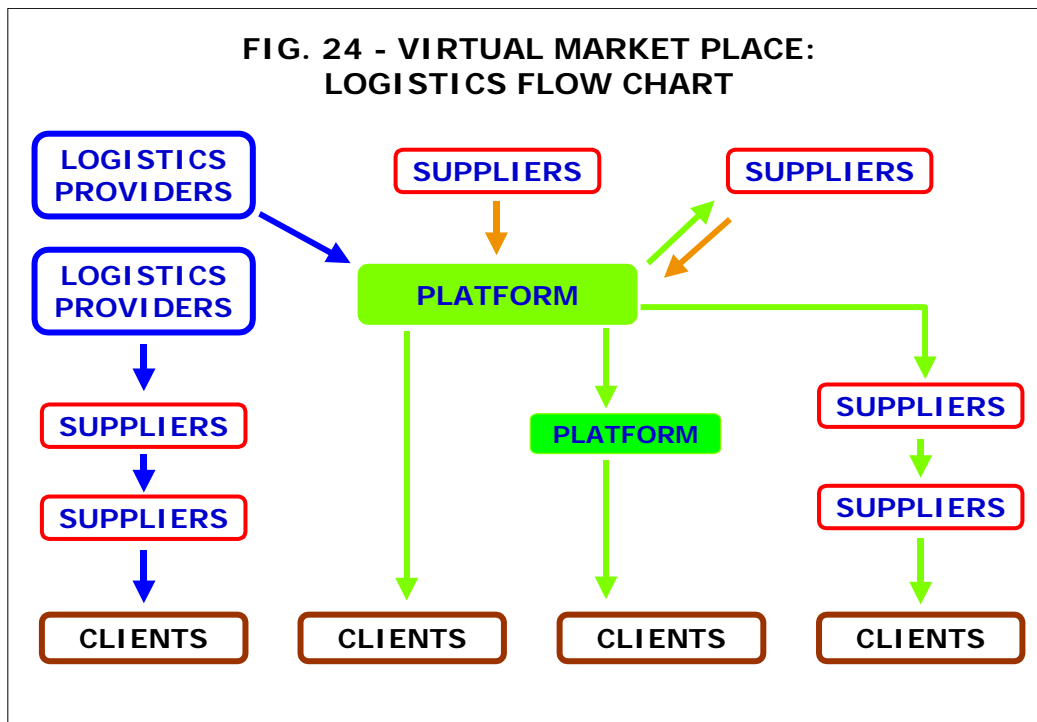
Once singled out the project idea, the Imonode Consortium - on the basis of the present logistics chains survey - realized the analysis of the informational and logistics flow chart for fresh produce. With regard to the informational flow chart, the 3 kind of operators involved in the process (suppliers, logistics providers and clients) have been linked in the way reported in the following figure.

In general terms the informational flow chart highlights that the VMP is an IT tool able to receive information on supply and demand from several sources and is able to serve in the better way possible the needs of the clients linked to the Virtual Market Place.

As a matter of fact, suppliers send their information about the products (supply) to the VMP, logistics providers send their request about demand to the VMP while clients ask for services/products. Once received all the information from the involved parties, the VMP processes these information and forward as a feedback the results of its activity to suppliers, logistics providers and serve the clients fulfilling their requests just with a limited number of operations. In this first phase, cargoes fulfilment is made manually using an assistant function able to help the operator in the cargoes operations in a stated number of lines already defined. In the near future, on the basis of the experience, it is foreseen an algorithm development to automate this process on the basis of a series of optimisation parameters.



In the same way, the logistics flow chart of operators and structures involved in the process (suppliers, logistics providers, clients and platforms) have been linked in the way reported in the following figure. The latter foresees the possible basic solutions. The best flow chart optimisation in terms of flows and logistics activities is based on a supplier-platform-client connection. Anyway, also the other possible solutions could be realised and part of the VMP. On the basis of the experience acquired in the operative field, in the VMP development it will be possible to automate the logistics choice optimising a series of parameters such as time and cost.



With regard to the organisational aspects, the fully operating VMP should be opened and requests just the clients/suppliers accreditation to the VMP in two different areas:

- external area - used by accredited clients of logistics service where it is imputed the transport demands;
- internal area - used by accredited logistics providers, that verify the transport demands and, on the basis of the service supply, accept and set up the travel.

Anyway, in the start up phase it is open just to a limited number of operators to test and validate its operation and functionalities.

3.7.1.3 - Functionalities

On the basis of the surveys (scenario analysis, bottlenecks, macro-needs, etc.), project idea and goals of the VMP, the Imonode Consortium defined the following main functionalities:

- receiving order from client;
- order acceptance from client;
- order unification and optimisation of the cargo shipment;
- travel plan and automated forward of the information to client and consignee;
- on line availability of the cargo logistics and administrative informational tracking;
- finalisation of the travel and document registration.

These functionalities are those yet implemented in the start up development of the VMP.

Moreover, to realize a tool with a wide possible operative choice, the Imonode Consortium defined a series of additional functionalities to be taken under consideration in the design activity and implemented in the future development activities:

- RFID management opportunities;
- support track and tracing of perishable goods along the whole supply chain;
- development of informational service within the carrier, to manage the goods and packaging return and to optimise carrier return;
- analysis system for economic suitability of the transport solutions with time deferment;

- optimisation system among different logistics providers;
- optimisation system for empty loads.

3.7.1.4 - Structure

On the basis of the results of the analysis and design activities realized in the previous steps of the Virtual Market Place definition, the Imonode Consortium decided to develop the software structure of the VMP in the following way:

- insert orders;
- search orders;
- accept orders;
- display lines saturation;
- insert trips;
- search trips;
- combine orders;
- statistics;
- clients;
- receivers;
- vectors;
- paths.

In the following pages it is presented some function screen captures of the software functions.

FIG. 25 - VMP INSERT TRIPS SCREEN CAPTURE

The screenshot displays the 'VMP INSERT TRIPS' interface. On the left is a sidebar menu with the following items: Insert orders, Search orders, Accept orders, Display lines situation, Insert trips, Search trips, Combine orders, Statistics, Clients, Receivers, Vectors, and Paths. The 'Insert trips' item is highlighted. The main area is titled 'Orders' and contains a form for 'OUTWARD TRIP CREATION'. The form includes fields for 'Loading date' (18/10/2005), 'Unloading date' (19/10/2005), 'Plate number', 'Driver 1', 'Driver 2', and 'Path' (MARCHE - ABRUZZI). There are also 'Today' and 'Tomorrow' buttons next to the unloading date, and a 'Confirm' button at the bottom right of the form.

FIG. 26 - VMP: PATHS SCREEN CAPTURE

| Orders | | | |
|--------|---------------------------|--|-------|
| Code | Description | | |
| 2 | LOMBARDIA | | Conf. |
| 4 | TRENTINO | | Conf. |
| 6 | LAZIO - UMBRIA - CAMPANIA | | Conf. |
| 10 | MARCHE - ABRUZZI | | Conf. |
| Code | Description | | |
| New | | | Conf. |

3.7.1.5 - Testing activities

To verify the operation of the Virtual Market Place, the Imonode Consortium from 15th of July 2005 to 15th of August 2005 realized a testing activity on the web based software. The testing activity was realized on the following parameters:

- 4 logistics operators in Cesena area;
- 4 transport lines (destination areas) around Italy:
 - Lombardia (IT2);
 - Trentino (IT31);
 - Lazio (IT6), Umbria (IT52) and Campania (IT8);
 - Marche (IT53) and Abruzzo (IT71);
- 8 clients in different Italian areas;
- 1.273 orders;
- 22.263 pallets or parts of pallet corresponding 14.816 conventional pallets (600 kg/each one);
- 802 trips.

Considering the limited number of operators integrated in the VMP and the lack of a concentration structure, it was not possible to reduce the number of unloading activities but just optimise their saturation. As a matter of fact, the involved transport lines have been based on different unloading points (124 in the different lines).

The testing activities highlighted that average lorries saturation in the software test (without any other intervention) increased from the present 64% related to the operators involved to 77,5%. So a significant increase of +13,5% in the lorries saturation, with the consequent improvement in terms of:

- road traffic reduction;
- theoretically transport cost reduction from concentration platform to destination;
- pollutions and other social costs reduction;
- increase of produce freshness.

Chapter 3

FEASIBLE EVOLUTION IN THE DEMONSTRATORS AREAS

TAB. 48 - VIRTUAL MARKET PLACE TESTING ACTIVITIES: TOTAL PALLETS

| Op./Line | LOMBARDIA | TRENTINO | LAZIO - UMBRIA - CAMPANIA | MARCHE - ABRUZZO | TOTAL |
|--------------|-----------------|-----------------|---------------------------------|---------------------|------------------|
| Operator1 | 4.853,93 | 1.638,15 | 1.663,17 | 2.230,04 | 10.385,29 |
| Operator2 | 601,08 | 0,00 | 1.420,73 | 321,50 | 2.343,31 |
| Operator3 | 0,00 | 707,87 | 301,00 | 0,00 | 1.008,87 |
| Operator4 | 175,07 | 0,00 | 0,00 | 904,15 | 1.079,22 |
| TOTAL | 5.630,08 | 2.346,02 | 3.384,90 | 3.455,69 | 14.816,69 |

Source: VMP testing activities

**TAB. 49 - VIRTUAL MARKET PLACE TESTING ACTIVITIES:
% LINE/OPERATOR**

| Op./Line | LOMBARDIA | TRENTINO | LAZIO, UMBRIA, CAMPANIA | MARCHE, ABRUZZO |
|-----------|-----------|----------|-------------------------------|--------------------|
| Operator1 | 86,21% | 69,83% | 49,13% | 64,53% |
| Operator2 | 10,68% | 0,00% | 41,97% | 9,30% |
| Operator3 | 0,00% | 30,17% | 8,89% | 0,00% |
| Operator4 | 3,11% | 0,00% | 0,00% | 26,16% |

Source: VMP testing activities

TAB. 50 - VIRTUAL MARKET PLACE TESTING ACTIVITIES: CLIENT/LINE

| Client/Line | LOMBARDIA | TRENTINO | LAZIO, UMBRIA, CAMPANIA | MARCHE, ABRUZZO | TOTAL |
|--------------|-----------------|-----------------|-------------------------------|--------------------|------------------|
| Client1 | 1.573,15 | 1.257,00 | 854,77 | 321,00 | 4.005,92 |
| Client2 | 7,17 | 0,00 | 0,00 | 0,00 | 7,17 |
| Client3 | 124,50 | 0,00 | 849,27 | 0,00 | 973,77 |
| Client4 | 784,21 | 0,00 | 0,00 | 38,08 | 822,29 |
| Client5 | 0,00 | 0,00 | 0,00 | 301,87 | 301,87 |
| Client6 | 27,00 | 0,00 | 201,25 | 0,00 | 228,25 |
| Client7 | 124,21 | 0,00 | 54,00 | 0,00 | 178,21 |
| Client8 | 2.989,83 | 1.089,02 | 1.425,62 | 2.794,75 | 8.299,22 |
| TOTAL | 5.630,07 | 2.346,02 | 3.384,91 | 3.455,70 | 14.816,70 |

Source: VMP testing activities

**TAB. 51 - VIRTUAL MARKET PLACE TESTING ACTIVITIES
% CLIENT/LINE**

| Client/Line | LOMBARDIA | TRENTINO | LAZIO, UMBRIA, CAMPANIA | MARCHE, ABRUZZO |
|-------------|-----------|----------|-------------------------------|--------------------|
| Client1 | 27,94% | 53,58% | 25,25% | 9,29% |
| Client2 | 0,13% | 0,00% | 0,00% | 0,00% |
| Client3 | 2,21% | 0,00% | 25,09% | 0,00% |
| Client4 | 13,93% | 0,00% | 0,00% | 1,10% |
| Client5 | 0,00% | 0,00% | 0,00% | 8,74% |
| Client6 | 0,48% | 0,00% | 5,95% | 0,00% |
| Client7 | 2,21% | 0,00% | 1,60% | 0,00% |
| Client8 | 53,10% | 46,42% | 42,12% | 80,87% |

Source: VMP testing activities

3.8 - SUMMARY

The analysis reported in the previous Chapters highlighted that the present fresh produce products supply chain needs a rationalization of the role and activities of each kind of TLT and operator involved in the scenery, for a fresh produce development and networking.

On these bases the Imonode Consortium realized a feasibility analysis of territorial logistics structures in the areas of Cesena and Taranto, to draw up a new business model for fresh produce logistics able to rationalize the traffic of fruit and vegetables and highlight the basis of a possible future development of the intermodal transport for fresh produce in the reference area.

This new model designed by the Imonode Consortium has been based on:

- (regional) concentration platforms in producing areas (Cesena and Taranto);
- network among concentration platforms (Virtual Market Place and intermodality between sea and road) and terminal platforms in defined lines (www.freshlog.it).

Feasibility analysis realized in the two demonstrators areas highlighted that this new model of concentration platform is able to reduce the number of lorries on the road among lines served by the pilots in CADSES area related to:

- increasing lorries saturation load (full lorries of mixed cargoes) around 10-15% of total volume shipped;
- increasing reverse logistics among platforms in different complementary areas around 10-15% of one-way volumes.

In the same way, the testing activities realised with regard to the VMP www.freshlog.it highlighted that average lorries saturation in the software test (without any other intervention) increased of +13,5%.

In this way, the main added value results achievable with the new logistics model implemented by the Consortium of partners in the framework of the Imonode project are related to:

- pollution reduction in the lines covered by the demonstrators in CADSES area;
- logistics costs reduction in the lines covered by the demonstrators in CADSES area per transport unit (pallet) due a progressive substitution of picking activities with cross docking and improvement of reverse logistics. As a matter of fact, in the Cesena demonstrator resulted a cost reduction of 5,7% in 2007-2009 horizon;
- volumes concentration at the producing level as first necessary step to promote the use of intermodality between rail and road.

It means that this new model for logistics operation in the fresh produce system represent a viable solution - to be repeated in other logistics contexts - to rationalize the supply and logistics chains, to reach the critical masses required for coordination of flows to optimise cargoes (full lorries and mixed cargoes), to improve back logistics, to reduce the impact of traffic by road, to realize the main necessary bases to promote the use of road-railway intermodalities, to fulfil the continuous changing requirements to improve quality and freshness of the products by the retailers.

With these results, the Imonode Consortium hopes that this new model could reach a wider audience of bodies entities involved in the fresh produce trade to promote a great rationalization of the transport of fruit and vegetables and promote intermodal transport in South East Europe.

A.1 - FLOWS AND PATHS METHODOLOGY: THE IMONODE DATABASE

This section reports the methodology developed for identifying, selecting and analysing the characteristics of fresh produce in terms of its logistics in relation to the possible development of intermodality in homogeneous territories, defined as “basins”, within CADSES area.

From a logistical point of view, in consideration of the lack of data regarding transport of fruit and vegetables useful for the purpose of the Imonode project and that it was not viable - almost always - a direct survey in consideration of the complexity of these products and the fragmentation of the involved operators (with regard to the territorial extension of CADSES area), the preliminary key elements in making this analysis were production and consumption of fruit and vegetables in relation to their different seasonal variations and quality in the various zones. The perishable nature of these goods, as a rule, leads to a preference for local provisions, when these are available, but when supply exceeds demand this gives rise to outward flow, and inward flow when local production is lower than demand or is absent.

So, for the lack of statistical data mentioned above, it was adopted an indirect methodology to determine the volumes and the routes of the fresh produce flows.

To develop the analysis it was necessary to take account that the data collected according to NUTS 2 specification lacked homogeneity in terms of the particular products and/or the categories surveyed and sometimes incomplete due a lack of information about specific products and/or NUTS 2 divisions, making it necessary to homogenise, integrate and verify the available information by cross tabulation with different statistical sources and also with the information built up in collaboration with the specific panels of experts in the several field of analysis.

Furthermore, since quantitative data for the products was to be collected and was to be verified over a period of at least two years - in this case the years 2000 and 2001³⁹ - and also given that fruit and vegetables is typically subject to severe fluctuations, as a consequence of the numerous variables involved, such as the cyclic nature of the sector, climatic events and pathogenic agents, the frequent lack of available data for the particular two years was a further limiting factor.

Finally, further lack of uniformity arose from the different classification systems and/or research studies to produce statistical data that had led to different product groupings for the various National Statistical Offices. In order to adopt a single classification system, common to all the Countries involved, the items and groupings used by FAO (Food and Agriculture Organisation) were chosen with some modifications and integration.

Production totals were weighted to take account of individual seasonal variations in terms of commercial availability, in order to draw up a calendar of supply for consumption at local level or for export to other NUTS zones. On the basis of the commercial supply calendars in each NUTS 2, obtained either from institutional or private sources, it was built up the seasonalities (commercial supply calendar) tables for each NUTS 2 in analysis, in collaboration with the specific panel of experts.

In order to evaluate the hypothetical quantitative surplus or deficit of a product, of a group of products and thereby of the macro-category for each NUTS 2 zone to be analysed, it was decided to estimate the level of consumption in each zone. Then, the cross-tabulation of consumption and production of each NUTS 2 area - taking account of seasonal variations as previously explained - calculate an hypothetical import inflow or an export outflow.

The starting point for these hypotheses was estimating the level of consumption for fresh produce. Verified the lack of statistics for fresh product consumption for NUTS 2 areas in the Countries analysed, an “apparent consumption” (i.e. apparent domestic purchase + apparent foodservice consumption) estimate was formulated on the basis of the self-sufficiency balance obtained⁴⁰ at NUTS 0/1 level by adding to the production data the import figures and subtracting the export figures obtained from the United Nations database SITC Rev3 classification system, and where this

³⁹ About Bulgaria the production data analysed were those for 1999 and 2000, because the data for 2001 were not so reliable and they had not a level of investigation by products to realize an analysis able to obtain figures the nearest possible to the real value in the sector. About Greece, it was analysed the data of 1999 and for Serbia-Montenegro the data of 2001 for the same reasons above mentioned for Bulgaria.

⁴⁰ On the basis of the official FAO algorithm: Production+Change in Stocks+Gross Import-Gross Export-Amount for Feed-Amount for Seed-Amount to Manufacture-Waste of product. In this case Imonode Consortium adopted a simplified formula in consideration that it was possible to calculate directly the production to the fresh consumption (such as highlighted in the following pages of this publication), so the algorithm applied is: Production+Gross Import-Gross Export.

was not available, from HS 1996 classification system of the United Nations database. To calculate the self-sufficiency balance, given that the Imonode Consortium have utilised data from different sources, an official correlation table were used to link the FAO/National Statistics Offices and the United Nations codes.

The calculations for NUTS 2 area consumption took the self-sufficiency balance at NUTS 0/1 as a starting point, then, breaking down the consumption for NUTS 2 as a function of the NUTS 2 population compared (as a percentage) to the NUTS 0/1 population. This simplification, based on a per-capita consumption constant at NUTS 2 levels within the NUTS 0/1 framework, is acceptable for the aims of the Imonode project because the shift between the NUTS 2 areas, where it exists, is normally quite small and irrelevant if, such as in this case, the analysis is for categories of product (i.e. apples and not yellow apples, peaches and not white peaches, etc.), considering that only for single products (i.e. yellow apples, red apples, green apples, etc..) the volume are considerably different, while on the category prevail the Country's habits. Moreover, it was considered that different self-consumption (i.e. production directly consumed by the producer and rural population) directly related to the local availability of products tend to make quite similar the domestic purchase and foodservice consumption in the different NUTS 2 of each Country.

Taking into account that the original United Nations source of import and export data are statistics for single Countries, there was frequently a lack of correspondence between the export data from the Country of origin and the corresponding import data from the destination Country. It was therefore necessary to harmonise the product flows calculating an average of the two years period in analysis for the destination-Country imports and the corresponding origin-Country exports.

In order to obtain both a consumption estimate the nearest possible to the real value and the export potential, it was considered only production destined to the fresh consumption. Where these figures were not available, the total production of each NUTS 2 zones was weighted by corrective index for each area and for each product, with the aim of excluding those products destined for industrial use, waste and animal feed.

On the basis of the Imonode Consortium experience and on data about industrial production, waste, self-consumption, obtained either from institutional or private sources, it was built up the correction index tables for each NUTS 2 in analysis verified by the panel of experts.

Once the apparent consumption for each NUTS 2 area, based on the resident population, has been estimated, this was apportioned at seasonal level according to the commercial supply calendars for local production, to the quantity and seasonality of the imported products. These data were then verified - where available - with continuous research on fruit and vegetables consumption carried out by leading research companies (research carried on with representative samples of the general population in the form of family panels of consumers).

When, for each year in analysis, the apparent consumption for each NUTS 2 area and for each product was defined - using the aforementioned corrective weighting - it was calculated two indicators (Balance Import or incoming flows and Balance Export or outgoing flows) for each one of the two years. Then were calculated an average of two years to describe the various NUTS 2 areas in terms of import potential (Balance Import) or export potential (Balance Export)⁴¹.

These analyses produced positive results to identify potential export basins (NUTS 2), when production of a particular product of a basin (NUTS 2) was quantitatively greater than consumption in a certain period and/or potential import basins (NUTS 2) when overall consumption of a basin (NUTS 2) of a particular product was quantitatively greater than the production available within the same basin (NUTS 2) in the same period.

The estimates thus obtained - after a preliminary verification with the experts panel involved to develop this part of the analysis - were represented both numerically (as the average of the two years analysed), and graphically in the form of GIS maps in which the import and export potential for the various perishable products in the NUTS 2 areas were indicated by different colours (for export and import) and shades (within export and import to highlight different range of volumes).

At this level, it is important to emphasize that the results of this analysis represent very prudential estimates (because underestimated) due to the methodology utilized and also because for fruit and vegetables it has been analysed just the major categories of products. For the others fresh produce categories of minor importance (i.e. beans, peas, asparagus, etc.), the Imonode Consortium decided to not realize the analysis due a lack of statistical data both at production and trade level

⁴¹ The database used to identify potential import and export basins comprises a national database for each Country analysed. Each national database is created as a Microsoft Excel file containing a series of spread sheets showing production and consumption levels, corrected according to the indices previously described and the balances for each of the two years surveyed. On the tables, the X axis represents the products, product groupings and the macro-categories, while the Y axis represents the national divisions at NUTS levels 0/1/2.

and considering that meagreness and fragmentary nature of the flows do not justify a direct survey.

Summarizing, with the methodology reported in the previous pages, the Imonode Consortium has been able to provide the following information:

- for each NUTS 2 area and for every product analysed:
 - an average figure for the period in analysis of the estimated potential export flows (Balance Export or outgoing flows), without destination, due to the lack of statistical data for the trade in fresh produce between NUTS 2 zones;
 - an average figure for the period in analysis of the estimated potential import flows (Balance Import or incoming flows), without origin, due to lack of statistical data for the trade in fresh produce between NUTS 2 zones;
- for every NUTS 0/1 and for each product analysed:
 - average exports by destination NUTS 0/1 for the period in analysis for CADSES area Countries;
 - average imports by NUTS 0/1 of origin for the period in analysis for all CADSES area Countries.

In order to identify the volume of traffic and the traffic routes inside CADSES area, given that official statistics for traffic of fresh produce between the NUTS 2 zones are not currently available, the data given above were cross-tabulated and analysed to reach the estimates needed for the project aims.

Regarding exports from the various NUTS 2 zones, it was calculated:

- quantitative data for fruit and vegetables shipped from every NUTS 2 zone of each NUTS 0/1 to other NUTS 2 zones within the same NUTS 0/1;
- quantitative data for fresh produce shipped from every NUTS 2 zone of each NUTS 0/1 to the NUTS 2 zones in other NUTS 0/1 of CADSES area;
- quantitative data for fruit and vegetables shipped from each NUTS 2 zone in every NUTS 0/1 to other Countries outside CADSES area considered as relevant for the study aims.

Regarding imports from the various NUTS 2 zones, it was calculated:

- quantitative data for fresh produce that every NUTS 2 zones of each NUTS 0/1 receives from other NUTS 2 zones in the same NUTS 0/1;
- quantitative data for fruit and vegetables that every NUTS 2 zone in each NUTS 0/1 receives from NUTS 2 zones in the other NUTS 0/1 of CADSES area;
- quantitative data for fresh produce that each NUTS 2 in every NUTS 0/1 zone receives from other Countries outside CADSES area considered as relevant for the study aims.

The methodology used is based on the following assumption verified with the experts panel of the macro-categories involved in the project:

- there are often major seasonal differences in production both between different NUTS 2 zones in a single NUTS 0/1 and between different NUTS 0/1. This causes shifts in available products from NUTS 0/1/2 with a temporary surplus towards NUTS 0/1/2 with a temporary shortage;
- a single product may have a range of different varieties and/or qualities in different NUTS 0/1/2 which can cause physiological movements among these NUTS 0/1/2;
- the factor of geographic proximity (distance) - excluding cases where it is necessary to cross the sea - while it does affect transport costs, appears less important than the aforementioned factors at this level of analysis. As a matter of fact, the overall transport cost rises less in proportion to the increase in distance in so far as handling costs (loading and unloading) remain fixed and also represent a substantial proportion of the overall cost.

From the above methodology, the following hypothesis was applied:

- the "Balance Export" (which generates a potential outward flow) of a particular NUTS 2 zone, is the export flow either towards the other NUTS 2 zones in the same NUTS 0/1 showing a demand, albeit temporary (that is a Balance Import > 0), or towards other NUTS 0/1 (with or without NUTS 2 specification) which import from the NUTS 0/1 that includes the NUTS 2 zone in analysis. The method for determining individual outward flows is as follows: the flow towards NUTS 0/1/2 as described above is expressed as a proportion of

the demand in the other NUTS 2 zones (Balance Import) in the same NUTS 0/1 and/or exports to other Countries;

- in the same way, the “Balance Import” (which generates a potential inward flow) of a particular NUTS 2 zone, is the import flow either originating from other NUTS 2 zones in the same Country showing a surplus, albeit temporary (Balance Export > 0) or from the other NUTS 0/1 (with or without NUTS 2 specification) which export to the NUTS 2 zone in the Country in analysis. To determine individual flows, the flow inward from NUTS 0/1/2 as described above is based on the potential outward flow (Balance Export) of the other NUTS 2 zones in the same NUTS 0/1 and/or imports from other Countries.

These assumptions are acceptable, also considering that both the trade among NUTS 2 and the trade involving different NUTS 0/1 are managed, in the first phase of the traffic, by national or international operators and only subsequently, by local operators. For this reason the single origin tend to be assigned in a uniform way with reference to the consumption needs.

Based on the above hypotheses, it was estimated the flows between the various NUTS 2 zones in the NUTS 0/1 inside CADSES area and the flows between these and the other Countries outside CADSES areas. The calculations were carried out in the phases reported afterwards.

Phase 1: for each NUTS 0/1 and each product it was realized the following steps:

- calculate the total Balance Export and the total Balance Import for each NUTS 2 zone in the NUTS 0/1 in analysis, in order to obtain the volume of exports and imports of the NUTS 2 in question, whether this is to/from another NUTS 0/1 or to/from the other NUTS 2 zones in the same NUTS 0/1;
- calculate the export/import percentage for each NUTS 2 zone, comparing the Balance Export and Balance Import of individual NUTS 2 zones to the total calculated in the previous step;
- calculate the exports and imports of each NUTS 2 zone to/from each NUTS 0/1 by multiplying the total exports and imports to/from each NUTS 0/1 by the two percentages calculated in the previous step;
- subtract, for each NUTS 2 zone, the exports and imports to/from other NUTS 0/1, as calculated in the previous step from the Balance Export and Balance Import. For each NUTS 2 zone, this provide the quantities of exports/imports to/from the other NUTS 2 zones of the same NUTS 0/1;
- calculate the percentage volume that each NUTS 2 zone ships/receives to/from each other NUTS 2 zone in the same NUTS 0/1, comparing its Balance Export and Balance Import to the figures calculated in the previous step;
- calculate the quantities that each NUTS 2 zone exports to other NUTS 2 zones in the same NUTS 0/1 by multiplying the percentage obtained above by the total quantity that the NUTS 2 zone exports to the other NUTS 2 zones. In the same way was calculated the quantities that each NUTS 2 zone imports from other NUTS 2 areas.

Phase 2: this analysis was carried out by cross-tabulating the data related to exchange of trade by pairs of Countries in CADSES area, specified by NUTS 2 zone. In the first phase, the analysis was realized for single NUTS 0/1, calculating for each NUTS 2 area the total figures for exports/imports to/from other NUTS 0/1 without specification by NUTS 2 area of the origin/destination NUTS 0/1. In this phase the data were analysed for pairs of NUTS 0/1 by NUTS 2 zone specification.

The basic hypothesis, in the absence of other statistical information, was the same as that adopted for Phase 1 to calculate the outward/inward flows for the various NUTS 2 zones to/from other NUTS 0/1: the flows were broken down in the same way by outward/inward volumes in relation to the totals.

For the purposes of analysis the calculations were carried out for each pair of NUTS 0/1 as follows:

- select a pair of NUTS 0/1 (A & B);
- add the reciprocal imports or exports for the various NUTS 2 zones for the NUTS 0/1 pair selected in the previous step. This will show, for example, the exports of the A NUTS 0/1 specified by NUTS 2 zone to the B NUTS 0/1 overall and the imports of the B NUTS 0/1 by NUTS 2 area originating from the A NUTS 0/1;
- divide the exports from each NUTS 2 zone of the A NUTS 0/1 of origin by the B NUTS 0/1 total imports. This will show the percentage for the NUTS 2 zone of the A NUTS 0/1 of the total imports from the B NUTS 0/1 and therefore, given the above hypothesis, for each destination zone;

- multiply the above percentage by the total imports of each NUTS 2 zone of the destination B NUTS 0/1. This will show the export value of each NUTS 2 zone of the exporting A NUTS 0/1 to each NUTS 2 zone of the importing B NUTS 0/1.

By the same methodology the calculations for the imports of the A NUTS 0/1 from the B NUTS 0/1 show all the reciprocal flows between the two selected NUTS 0/1 by NUTS 2 zone specification. With this methodology all CADSES area NUTS 0/1 was analysed by NUTS 2 zone specification.

Phase 3: In this phase it was calculated the total product quantities exchanged between NUTS 2 zones and/or between NUTS 0/1, by adding all the flows for every fruit and vegetables product analysed, for each pair of origin/destination zones.

Once calculated the total product quantities exchanged between NUTS, it was verified the results with the specific panel of experts involved in the project. This verification highlighted that the results achieved - following the methodology and on the hypothesis presented above - were greatly acceptable and they did not need any other adaptation with regard to the aims of the project.

Once identified all flows related to a NUTS 0/1, it was identified the physical logistics chains used for fresh produce transport and then assigned to each flow the most probable path and carrier within CADSES area on the basis of an empirical collection of information from several on field and statistical sources such as highlighted in the following steps:

- analysis of statistical data from recent studies or periodical reports of organisations involved in the traffic of goods about the national and international trade, with particular reference to the fresh produce;
- considering that almost all the trade of fresh produce within the Cases area are made by lorry⁴², it was defined the best paths using routing programmes utilised by professional operators to find out the fastest and/or shortest routes and possible integration on the basis of the analysis made in the previous steps;
- in deep investigation through the experts panel verification. This investigation aimed to highlight characteristic of carriers and routes utilized for each macro-category and product analysed, with particular reference to any relevant limits and obstacles that may slow down and/or hinder transits.

In detail, the analysis was carried out in the following way:

- identification of transport typology and carriers for each macro-categories and product in analysis;
- definition of the best path/routes using two professional routing software - Moover and ViaMichelin - favouring the bigger and easier routes;
- identification of origins and destinations nodal points;
- evaluation of the paths/routes determined by the two software above mentioned with a verification analysis made with the experts panel, with regards to any relevant limits, obstacles and bottlenecks as above mentioned. In particular, it was considered the route conditions, presence of strict check in customs, etc.. So, in some cases it has diverted the routing software on the routes indicated by operators;
- about the sea trade, hardly ever used within the software utilized, it has identified the routes on the basis of the information received from the experts panel during the verification analysis stated in the previous step of this part of the analysis and also on the available statistics of the ports of CADSES area.

Every route is identified by several elements:

- a point of origin: the nodal point landmark for each NUTS 2 has been identified with the chief town/capital of the NUTS or with nearest main town to the NUTS in analysis. The nodal points are highlighted in the analysis realized on each NUTS 0/1 if it is a flow originate from a NUTS 0/1 of CADSES area or the entry point to CADSES area. In the latter case, it is the border point between two NUTS 0/1 or with a nodal point such as a port;
- one or more border points: they are passes or frontier points or nodal points (e.g. ports) touched by goods along their route from the place of origin to the place of destination;
- a point of destination: it has the same characteristics illustrated above for the point of origin.

⁴² Ref. note n. 10.

By adding up all the traffics along a route or across a border or nodal point of the NUTS 0/1 analysed, it was possible to calculate the traffic volume created by the trade of the fresh produce among the NUTS 0/1/2 of CADSES area and between these NUTS 0/1 and the rest of the World.

In order to highlight such traffics within one NUTS 0/1, it was created two analyses providing the following information:

- traffic at border and nodal points: it indicates the annual amount of goods crossing the point, expressed in MT;
- traffic along the routes: it indicates the annual amount of goods travelling along a route, expressed in MT.

The aim of this analysis is to determine the total volumes of traffic of fresh produce in order to highlight any possibilities of aggregation along the different routes and, thus, any possibilities of using existing nodal points or any need to create new nodal points to enable the use of different means of transport and, particularly, the use of combined or multimodal transport.

In this way, the Imonode Consortium realized a database (Microsoft Access based) for fresh produce (and other perishables goods) able to provide data on flows and their positioning on the roads of CADSES area, in the reference period (average 2000-2001) on the basis of the present logistics chains.

As a matter of fact, the so called Imonode database for fresh produce (FPID) is the starting point of any analysis made in the project and - with simple integration of statistics, conditions and assumptions - it is able to provide a series of data able to support any other analysis of the trade/traffic and logistics for fresh produce within CADSES area.

Actually, applying an endless number of assumption, with the FPID is possible to calculate:

- flows of fresh produce from NUTS 0/1/2/3 to another NUTS 0/1/2/3;
- transits of fresh produce across NUTS 0/1/2/3;
- flows of fresh produce passing across a single TLT;
- new paths for the traffic of fresh produce in a monomodal scenery;
- new paths for the traffic of fresh produce in a intermodal scenery;
- forecasting analysis in terms of:
 - flows (export, import, transit);
 - paths;
 - means of transport.

A.2 - INTERMODAL TRANSPORT MODELLING: PRESENT SITUATION

This section of the present publication reports the input/conditions applied to realize the intermodal transport modelling in the Adriatic-Ionian corridor for fresh produce traded in the South-North direction and fresh produce+meat flows from North sources to South destinations.

The modelling comprise 4 logistics areas and it was applied following the assumption reported afterwards:

- **Node 1** - located between ITA (Sicilia, Italy) and IT93 (Calabria, Italy) - just across the Straits of Messina - potentiality both on the Island (Sicilia, ITA) and on the dry land (Calabria, IT93) - taking for granted that this node is able to concentrate all the production of Sicily. In this node there is the changing of modal transport: from lorry to train or ship in the route to Puglia (IT91), Emilia-Romagna (IT4), Lombardia (IT2), Veneto (IT32), Trentino Alto-Adige (IT31), Austria (A) and Germany (D). The final redistribution market of Node 1 for the North-South traffic is the whole Sicilia region (ITA).
- **Node 2** - located in IT91 area (Puglia, Italy), a node that concentrate for:
 - South/North traffics arriving from Node 1 and the product of Puglia (IT91), Calabria (IT93), Basilicata (IT92) and Campania (IT8) to Emilia-Romagna (IT4), Lombardia (IT2), Veneto (IT32), Trentino Alto-Adige (IT31), Austria (A) and Germany (D);
 - North/South traffics arriving from the Node 3 and the product of Puglia (IT91), Basilicata (IT92) and Campania (IT8) with destination Sicilia (ITA).
 The final redistribution market of Node 2 is the area of Puglia (IT91), Basilicata (IT92), Campania (IT8) and Calabria (IT93).
- **Node 3** - located in IT4 area (Emilia-Romagna, Italy), a node that concentrate for:
 - South/North traffics arriving from Node 2 and the product of Emilia-Romagna (IT4), Toscana (IT51) and Marche (IT53) to Austria (A) and Germany (D);

- North/South traffics arriving from Node 4 and the product of Emilia-Romagna (IT4), Lombardia (IT2) and Veneto (IT32) to Puglia (IT91), Basilicata (IT92), Campania (IT8), Calabria (IT93) and Sicilia (ITA).
- The final redistribution market of Node 3 are:
- for South/North traffics the area of Emilia-Romagna (IT4), Lombardia (IT2), Veneto (IT32), Trentino Alto-Adige (IT31);
 - for North/South traffics the area of Emilia-Romagna (IT4), Marche (IT53) and Toscana (IT51).
- **Node 4** - located in AT21 area (Kaernten, Austria), a node that concentrate the product of Austria (A) and Germany (D) to Emilia-Romagna (IT4), Lombardia (IT2), Marche (IT53), Toscana (IT51), Puglia (IT91), Basilicata (IT92), Calabria (IT93), Campania (IT8) and Sicilia (ITA). The final redistribution market of Node 4 for the South-North traffics is the whole Austrian Country (except product with destination Germany).

A.3 - INTERMODAL TRANSPORT MODELLING: FORECAST ANALYSIS TOWARD 2015

This section reports the input, conditions and methodology applied to realize the intermodal transport modelling in the Adriatic-Ionian corridor in time horizon 2015.

With regard to the methodology, to obtain a reasonable estimation nearer to the real future trend of production and consumptions, it was realized a qualitative range of tendencies to 2015 related to an average volume increase or decrease (as reported in the following table) and it was attributed these classifications (in term of %) to each macro-category, with help of the specifics panel of experts.

| PRODUCTION/CONSUMPTION INCREASE | PRODUCTION/CONSUMPTION DECREASE |
|---------------------------------|---------------------------------|
| Unchanged = 0% | Unchanged = 0% |
| Slightly = +15% | Slightly = -15% |
| Low = +30% | Low = -30% |
| Middle = +45% | Middle = -45% |
| Wide = +75% | Wide = -75% |
| Twofold = +100% | Twofold = -100% |

In this way, it was estimated 2 growth rates that indicate the forecast changing of the traffic flows from 2000-2001 to 2015:

- production growth rate for each NUTS 2 of the Countries within CADSES area and for each selected NUTS 0/1 outside CADSES area;
- consumption growth rate for each NUTS 2 of destination within the CADSES area and for each selected NUTS 0/1 of destination outside CADSES area.

Moreover, to further refine the forecast it was considered a competition effect on the NUTS 2 or NUTS 0/1 of destination, analysing the competitors trade, in consideration of the changing scenery of import/export within the perishable agro-food products. To this goal, for each macro-category and for each NUTS 0/1 and NUTS 2 it was realized a qualitative analysis of the trade behaviour of competitors to estimate a growth rate for each combination of products and NUTS. The qualitative analysis was based on the Imonode Consortium knowledge and on the official time series survey of the trade data in the period 1995-2003.

Once again, it was realized a qualitative range of tendencies to 2015 related to an average competition effect (as reported in the following table) and it was attribute these classifications (in term of %) to each macro-category, with help of the related experts panel.

| POSITIVE COMPETITION EFFECT ON FLOWS FROM ORIGIN NUTS 2 | NEGATIVE COMPETITION EFFECT ON FLOWS FROM ORIGIN NUTS 2 |
|---|---|
| Unchanged = 0% | Unchanged = 0% |
| Slightly = +15% | Slightly = -15% |
| Low = +30% | Low = -30% |
| Middle = +45% | Middle = -45% |
| Wide = +75% | Wide = -75% |
| Twofold = +100% | Twofold = -100% |

In this way, it was estimated the growth rate of the competition effect in the destination market from 2000-2001 to 2015.

These 3 growth rates were cross tabulated and applied to each traffic flows coming from the origin/destination matrix (FPID), considering a series of condition and limitation that have been applied to the calculation:

- the origin NUTS 2 consumption have been considered stable from 2000-2001 to 2015 to simplify the forecast. Anyway, this is an assumption that with regard to the production areas considered in this forecasting analysis is acceptable for the aims of the Imonode project, because in the production areas under survey - that are big and diversified⁴³ growers of fresh produce, industrialized Countries, with a small incidence of the expenses to food products on the whole expenses and with an high level of consumption of perishables - the consumption increase/decrease is normally quite small and irrelevant if, such as in this case, the analysis is for categories of product instead for single products;
- a greater or smaller volume of production in a specific NUTS 2 or NUTS 0/1 of origin represent a potential increase or decrease (same than the production change) of traffic flows from that NUTS 0/1/2;
- the increase/decrease of flows is applied in a proportional way to the export volumes considering that the incidence of a NUTS 2 or NUTS 0/1 of destination on the total export of the NUTS 2 or NUTS 0/1 of origin remain stable from 2000-2001 to 2015;
- the competition effect is applied on the flows. It means that:
 - in a scenario of consumption level unchanged in the destination NUTS, a bigger competition effect reduces the possibility to increase the export flows of the origin NUTS 2;
 - in a scenario of consumption level unchanged in the destination NUTS, a lower competition effect increases the possibility to raise the export flows of the origin NUTS 2.

In this way it was realized a forecast of flows to 2015, and these results have been verified with the panel of experts that highlighted the results achieved were greatly acceptable and they did not need any other adaptation with regard to the aims of the project.

A.4 - INTERMODAL TRANSPORT MODELLING: FORECAST ANALYSIS TOWARD 2015 IN THE LIKELY AND DREAM SCENERIES

This section reports the input, conditions and methodology applied to realize the intermodal transport modelling in the Adriatic-Ionian corridor in time horizon 2015 in the Likely and Dream sceneries.

To estimate the flows in the routes under analysis - such as reported in Appendix A.2 and Appendix A.3 - the following steps was followed:

- analysis of the production of each NUTS 3 under survey and its reference area. These data come from a specific in deep analysis realized with on desk analysis made with data available from official statistical institution and where not available official statistical data with on field survey made with the help of the experts panel. Then, these data have been cross tabulated with the exporting volumes of NUTS 2, breaking down the export of fruit and vegetables for each NUTS 2 as a function of the NUTS 3 production compared (as a percentage) to the NUTS 2 production⁴⁴;
- analysis of the flows in transit in each NUTS 3 under survey;
- analysis of the consumption data for imported products (from abroad and from other NUTS 2 within the same Country of the NUTS 3 under analysis). Verified the lack of statistics for fresh product consumption for NUTS 3 areas in the Countries analysed, it was decided to estimate the level of consumption of imported products on the basis of the population of each NUTS 3. From an operative point of view, it was broken down the import of fresh

⁴³ Diversified growers means that they are producer of a wide range of products of the same macro-category.

⁴⁴ This simplification, based on a production constant at NUTS3 levels within the NUTS 2 framework, is acceptable for the aims of this study because the shift between the NUTS 3 areas, where it exists for specific products, is normally quite small and irrelevant for the fresh produce category.

produce for each NUTS 2 as a function of the NUTS 3 population compared (as a percentage) to the NUTS 2 population⁴⁵;

- analysis of the import of EU-25 and Italy from the main eastern Mediterranean basin Countries (Cyprus, Egypt, Israel, Turkey, Syria, Jordan and Lebanon) and Far East Countries (Australia, China, New Zealand, Philippines, Pakistan, Japan, India and Myanmar) across Suez Channel in Egypt;
- estimation of the share of volume flows traded with the intermodality in the case of the supply chain rationalization foreseen by “Dream scenery”. The estimation has been made on the basis of the Imonode Consortium experience, the potential development of intermodality toward 2015 for fruit and vegetables and verified with the panel of experts;

Afterward are reported the conditions (set by the Imonode Consortium with the help of the exports panels) and statistics (Istat, Statistik Austria and Eurostat) applied to the flows estimation in the case of monomodality:

FRUIT AND VEGETABLES

- South Puglia⁴⁶ (IT91-S) production of fruit is 58,7% of the Puglia (IT91) production;
- South Puglia (IT91-S) production of vegetables is 35,4% of the Puglia (IT91) production;
- East Sicilia⁴⁷ (ITA-E) production of fruit is 72,2% of Sicilia (ITA) production;
- East Sicilia (ITA-E) production of vegetables is 66% of Sicilia (ITA) production;
- Romagna⁴⁸ (IT4-R) production of fruit is 45% of Emilia-Romagna (IT4) production;
- Romagna (IT4-R) production of vegetables is 13,3% of Emilia-Romagna (IT4) production;
- Basilicata (IT92) export across Taranto is estimated at 100% of the total fruit and vegetables export of Basilicata;
- Campania (IT8) export across Taranto is estimated at 0% of the total fruit and vegetables export of Campania;
- Calabria (IT93) export across Taranto is estimated at 70% of the total fruit and vegetables export of Calabria;
- Sicilia (ITA) export across Taranto is estimated at 70% of the total fruit and vegetables export of East Sicilia (ITA-E);
- Marche (IT53) export across Cesena-Ravenna is estimated at 100% of the total fruit and vegetables export of Marche (IT53);
- Taranto (IT91-S) attraction area of imported fruit of EU-25 from East Mediterranean Sea and Suez Channel is estimated at 1% of the flows;
- Taranto (IT91-S) attraction area of imported vegetables of EU-25 from East Mediterranean Sea and Suez Channel is estimated at 6% of the flows;
- Cesena (IT4-R) attraction area of flows coming from South Italy is estimated at 100% of flows crossing Taranto with destination Northern Italy, Austria and Germany;
- Villach (AT21) attraction area of flows coming from Italy is estimated at 100% of flows crossing Taranto and Cesena NUTS 3 with northbound destinations;
- imports of EU-25 and Italy from the main eastern Mediterranean basin Countries (Cyprus, Egypt, Israel, Turkey, Syria, Jordan and Lebanon) and Far East Countries (Australia, China, New Zealand, Philippines, Pakistan, Japan, India and Myanmar) are as reported in Tab. 52.

**FIG. 27 - SUB-REGION
DEFINITION AND NUTS 3
LOCATION**



⁴⁵ This simplification, based on a per-capita consumption constant at NUTS 3 levels within the NUTS 2 framework, is acceptable for the aims of this study because the shift between the NUTS 3 areas, where it exists for specific products, is normally quite small and irrelevant for the fresh produce category.

⁴⁶ Taranto, Brindisi and Lecce.

⁴⁷ Messina, Catania, Siracusa, Enna and Ragusa.

⁴⁸ Forlì-Cesena, Ravenna and Rimini.

**TAB, 52 - EASTERN MEDITERRANEAN COUNTRIES
AND FAR EAST COUNTRIES EXPORT TO EU-25 AND ITALY (in MT)**

EXPORT OF FRUIT TO EU-25

| | 2000-2001 | estimated growth rate to 2015* | 2015 |
|--------------|----------------|--------------------------------|------------------|
| | MT | % | MT |
| Australia | 7.302 | 30% | 9.493 |
| China | 10.323 | 500% | 61.938 |
| Cyprus | 63.324 | 30% | 82.321 |
| Egypt | 20.944 | 200% | 62.832 |
| India | 8.077 | 500% | 48.462 |
| Israel | 202.480 | 45% | 293.596 |
| Japan | 109 | 15% | 125 |
| Jordan | 247 | 1000% | 2.717 |
| Lebanon | 21 | 1000% | 231 |
| Myanmar | 0 | 1000% | 0 |
| New Zealand | 321.029 | 15% | 369.183 |
| Pakistan | 823 | 500% | 4.938 |
| Philippines | 571 | 100% | 1.142 |
| Syria | 37 | 1000% | 407 |
| Turkey | 270.947 | 45% | 392.873 |
| TOTAL | 906.234 | - | 1.330.259 |

EXPORT OF FRUIT TO ITALY

| | 2000-2001 | estimated growth rate to 2015* | 2015 |
|--------------|---------------|--------------------------------|---------------|
| | MT | % | MT |
| Australia | 425 | 30% | 553 |
| China | 342 | 500% | 2.052 |
| Cyprus | 11.002 | 30% | 14.303 |
| Egypt | 149 | 200% | 447 |
| India | 0 | 500% | 0 |
| Israel | 10.091 | 45% | 14.632 |
| Japan | 0 | 15% | 0 |
| Jordan | 1 | 1000% | 11 |
| Lebanon | 0 | 1000% | 0 |
| Myanmar | 0 | 1000% | 0 |
| New Zealand | 13.937 | 15% | 16.028 |
| Pakistan | 0 | 500% | 0 |
| Philippines | 4 | 100% | 8 |
| Syria | 17 | 1000% | 187 |
| Turkey | 4.667 | 45% | 6.767 |
| TOTAL | 40.635 | - | 54.987 |

EXPORT OF VEGETABLES TO EU-25

| | 2000-2001 | estimated growth rate to 2015* | 2015 |
|--------------|----------------|--------------------------------|------------------|
| | MT | % | MT |
| Australia | 21.147 | 30% | 27.491 |
| China | 32.025 | 500% | 192.150 |
| Cyprus | 65.357 | 30% | 84.964 |
| Egypt | 136.558 | 200% | 409.674 |
| India | 3.965 | 500% | 23.790 |
| Israel | 121.961 | 45% | 176.843 |
| Japan | 5 | 15% | 6 |
| Jordan | 1.380 | 1000% | 15.180 |
| Lebanon | 87 | 1000% | 957 |
| Myanmar | 623 | 1000% | 6.853 |
| New Zealand | 113.010 | 15% | 129.962 |
| Pakistan | 49 | 500% | 294 |
| Philippines | 0 | 100% | 0 |
| Syria | 10.475 | 1000% | 115.225 |
| Turkey | 4.026 | 45% | 5.838 |
| TOTAL | 510.668 | - | 1.189.227 |

EXPORT OF VEGETABLES TO ITALY

| | 2000-2001 | estimated growth rate to 2015* | 2015 |
|--------------|---------------|--------------------------------|----------------|
| | MT | % | MT |
| Australia | 280 | 30% | 364 |
| China | 3.974 | 500% | 23.844 |
| Cyprus | 2.190 | 30% | 2.847 |
| Egypt | 63.123 | 200% | 189.369 |
| India | 0 | 500% | 0 |
| Israel | 1.154 | 45% | 1.673 |
| Japan | 0 | 15% | 0 |
| Jordan | 0 | 1000% | 0 |
| Lebanon | 0 | 1000% | 0 |
| Myanmar | 0 | 1000% | 0 |
| New Zealand | 0 | 15% | 0 |
| Pakistan | 0 | 500% | 0 |
| Philippines | 0 | 100% | 0 |
| Syria | 408 | 1000% | 4.488 |
| Turkey | 1.765 | 45% | 2.559 |
| TOTAL | 72.894 | - | 225.145 |

Source: Imonode Consortium on Eurostat data - *Imonode consortium and expert panel estimation

MEAT

- Cesena/Ravenna (IT4-R) attraction area for meat production shipped to southbound is estimated at 95% of Emilia-Romagna (IT4) export to southern destinations;
- Villach (AT21) attraction area for meat production of Austria (AT) is estimated at 97% of Austria (AT) export with destination Italy (IT);
- Villach (AT21) attraction area for meat production of Germany (D) is estimated at 30% of Germany (D) export with destination Italy (IT);
- Cesena/Ravenna (IT4-R) attraction area of imported meat is estimated at 24,5% of Emilia-Romagna import from Austria (97%) and Germany (30%);
- Cesena/Ravenna (IT4-R) attraction area of imported meat from Austria with destination Marche (IT53) is estimated at 97% of Marche import from Austria;
- Cesena/Ravenna (IT4-R) attraction area of imported meat from Germany with destination Marche (IT53) is estimated at 30% of Marche import from Germany;
- Cesena/Ravenna (IT4-R) attraction area of imported meat with destination Toscana (IT51) is estimated at 0% of Toscana import from North;

- Taranto (IT91-S) attraction area of imported meat is estimated at 44,4% of Puglia import from North;
- Taranto (IT91-S) attraction area of imported meat with destination Campania (IT8) is estimated at 0% of Campania import from North;
- Messina/Reggio Calabria (ITA-E/IT93) attraction area of imported meat is estimated at 100% of Sicilia and Calabria import from North.

In the same way, afterward are reported the conditions (set by Imonode Consortium with the help of the experts panels) and statistics applied to the flows estimation in the case of intermodality:

FRUIT AND VEGETABLES

- Taranto (IT91-S) attraction area of fruit produced in Puglia (IT91) is estimated at 80% of whole Puglia export, while the flows that could be traded via intermodality are estimated at 30%;
- Taranto (IT91-S) attraction area of vegetables produced in Puglia (IT91) is estimated at 60% of whole Puglia export, while the flows that could be traded via intermodality are estimated at 30%;
- Basilicata (IT92) export/shipment across Taranto is estimated at 100% of the total fruit and vegetables export of Basilicata, while the flows that could be traded via intermodality are estimated at 30%;
- Calabria (IT93) export/shipment across Taranto is estimated at 100% of the total fruit and vegetables export of Calabria, while the flows that could be traded via intermodality are estimated at 30%;
- Sicilia (ITA) export/shipment across Taranto is estimated at 100% of the total fruit and vegetables export of East Sicilia (ITA-E), while the flows that could be traded via intermodality are estimated at 30%;
- Campania (IT8) export/shipment across Taranto is estimated at 10% of the total fruit and vegetables production of Campania, while the flows that could be traded via intermodality are estimated at 100%;
- Romagna (IT4-R) production of fruit is 45% of Emilia-Romagna (IT4) production, while the flows that could be traded via intermodality are estimated at 20%;
- Romagna (IT4-R) production of vegetables is 13,3% of Emilia-Romagna (IT4) production, while the flows that could be traded via intermodality are estimated at 20%;
- Marche (IT53) export across Cesena-Ravenna is estimated at 100% of the total fruit and vegetables production of Marche (IT53), while the flows that could be traded via intermodality are estimated 20%;
- Taranto (IT91-S) attraction area of imported fruit of EU-25 from East Mediterranean Sea and Suez Channel is estimated at 30% of the flows, while the flows that could be traded via intermodality are estimated at 30%;
- Taranto (IT91-S) attraction area of imported vegetables of EU-25 from East Mediterranean Sea and Suez Channel is estimated at 30% of the flows, while the flows that could be traded via intermodality are estimated at 30%;
- Cesena (IT4-R) attraction area of flows coming from South Italy is estimated at 100% of flows crossing Taranto with destination Northern Italy, Austria and Germany, while the flows that could be traded via intermodality are estimated at 30% for flows coming from Southern Puglia (IT91-S), Basilicata (IT92), Calabria (IT93) and Sicilia (IT) and 100% for flows coming from Campania (IT8);
- Villach (AT21) attraction area of flows coming from Italy is estimated at 100% of flows crossing Taranto and Cesena NUTS 3 with northbound destinations, while the flows that could be traded via intermodality are estimated at 30% for flows coming from Southern Puglia (IT91-S), Basilicata (IT92), Calabria (IT93) and Sicilia (IT), 20% for flows coming from Romagna (IT4-R) and Marche (IT53) and 100% for flows coming from Campania (IT8).

MEAT

- Cesena/Ravenna (IT4-R) attraction area for meat production shipped to southbound is estimated at 100% of Emilia-Romagna (IT4) export to southern destinations, while the flows that could be traded via intermodality are estimated at 20%;
- Villach (AT21) attraction area for meat production of Austria (AT) is estimated at 97% of Austria (AT) export with destination Italy (IT), while the flows that could be traded via intermodality are estimated at 40% to 100% on the basis of the destination market;

- Villach (AT21) attraction area for meat production of Germany (D) is estimated at 40% of Germany (D) export with destination Italy (IT), while the flows that could be traded via intermodality are estimated at 40% to 100% on the basis of the destination market;
- Cesena/Ravenna (IT4-R) attraction area of imported meat is estimated at 24,5% of Emilia-Romagna import from Austria (97%) and Germany (40%);
- Cesena/Ravenna (IT4-R) attraction area of imported meat from Austria with destination Marche (IT53) is estimated at 97% of Marche import from Austria;
- Cesena/Ravenna (IT4-R) attraction area of imported meat from Germany with destination Marche (IT53) is estimated at 40% of Marche import from Germany;
- Cesena/Ravenna (IT4-R) attraction area of imported meat with destination Toscana (IT51) is estimated at 0% of Toscana import from North;
- Taranto (IT91-S) attraction area of imported meat is estimated at 70% of Puglia import from North (Austria, 97%, Germany, 40%, Lombardia, 70%, Veneto, 70%, Emilia-Romagna, 70%);
- Taranto (IT91-S) attraction area of imported meat with destination Campania (IT8) is estimated at 5% of Campania import from North;
- Taranto (IT91-S) attraction area of imported meat with destination South is estimated at 100% of import from North;
- Messina/Reggio Calabria (ITA-E/IT93) attraction area of imported meat is estimated at 100% of Sicilia and Calabria import from North.

Then, the information collected in the stated way and the conditions applied was cross tabulated to have a quantitative picture and a qualitative frame of the situation of each NUTS 3, in order to estimate the share of flows caught by each NUTS 3 in analysis in the framework of "Likely scenery" and "Dream scenery" in time horizon 2015;

So, on these bases, on the ground of the Imonode Consortium experience and with the help of the related panel of experts, it was realized a quanti-qualitative estimation of how many (in term of %) volumes in the flows among the NUTS 2 analysed in tendency analysis made previously could be potentially caught by each NUTS 3 selected during this step of the analysis: the share of flows of fresh produce that any NUTS 3 in analysis could reasonably catch in both sceneries alone.

A.5 - POTENTIAL TRANSITS ACROSS TARANTO

This section reports the input and conditions applied to calculate the potential transits across Taranto of fresh produce coming from South Italy and destined to the North and those coming from North (Italy and Europe) bounded to the Southern part of Italy.

First of all, from the analysis made on the basis of the official Italian statistical office (ISTAT) emerges:

- Taranto+Brindisi+Lecce (IT91-S) production of fruit and vegetables is 49,7% of the Puglia production;
- Messina+Catania+Siracusa+Enna+Ragusa (ITA-E) production of fruit and vegetables is 70,1% of Sicilia;
- Taranto+Brindisi+Lecce (IT91-S) import of fruit and vegetables is 44,4% of the Puglia import.

In the same way, the Imonode Consortium with the help of the experts panel considered as acceptable the following assumptions:

- Basilicata (IT92) export across Taranto is 100% of the total export of Basilicata;
- Calabria (IT92) export across Taranto is 70% of the total export of Calabria;
- Sicilia (ITA) export across Taranto is 70% of the export of Messina, Catania, Siracusa, Enna and Ragusa (ITA-E).

From the origin/destination matrix (FPID) coming from the previous steps of the project, with regard to fruit and vegetables comes the following inputs/conditions:

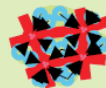
- export from the southern part of IT91 (Puglia) to all the other NUTS 2 of Italy. These data have been calculated broking down the production of fruit and vegetables of the southern NUTS 3 of Puglia - those south of Taranto (IT91-S) - as a function of the NUTS 3

production compared (as a percentage) to the Puglia production. The percentage so calculated has been applied to the export flows⁴⁹;

- export of IT92 (Basilicata) to all the other NUTS 2 of Italy. In consideration of the results of the analysis reported above, the Imonode Consortium considered 100% of these flows crossing Taranto;
- export of IT93 (Calabria) to all the other NUTS 2 of Italy except IT51 (Toscana), IT52 (Umbria), IT6 (Lazio), IT8 (Campania), ITA (Sicilia) and ITB (Sardegna). In consideration of the results of the analysis reported above, the Imonode Consortium considered just 70% of these flows crossing Taranto;
- export of ITA (Sicilia) to all the other NUTS 2 of Italy except IT51 (Toscana), IT52 (Umbria), IT6 (Lazio), IT8 (Campania), IT93 (Calabria) and ITB (Sardegna). These data have been calculated broking down the production of fruit and vegetables of the eastern NUTS 3 of Sicilia - those located in the eastern part of Sicilia (i.e. Messina, Catania, Siracusa, Enna and Ragusa) as a function of the NUTS 3 production compared (as a percentage) to the Sicilia production. The percentage so calculated has been applied to the export flows. In consideration of the results of the analysis reported above, the Imonode Consortium considered just 70% of these flows crossing Taranto;
- import of IT91 (Puglia) from all the other NUTS 2 of Italy except those coming from Basilicata (IT92), Calabria (IT93) and Sicilia (ITA), in consideration of the fact that these flows are already considered in the export flows of Basilicata (IT92), Calabria (IT93) and Sicilia (ITA). These data have been calculated broking down the population of the southern NUTS 3 of Puglia - those south of Taranto (IT91-S) as a function of the NUTS 3 population compared (as a percentage) to the Puglia population. The percentage so calculated has been applied to the import flows⁵⁰;
- import IT92 (Basilicata) from all the other NUTS 2 of Italy except those coming from Puglia, in consideration of the fact that these flows are already considered in the export flows of Puglia (IT91);
- import of IT93 (Calabria) from all the other NUTS 2 of Italy except IT51 (Toscana), IT52 (Umbria), IT6 (Lazio), IT8 (Campania), IT92 (Basilicata), ITA (Sicilia) and ITB (Sardegna). Moreover, also the flows from Puglia have been excluded, considering that these flows are already considered in the export flows of Puglia (IT91);
- import of ITA (Sicilia) from all the other NUTS 2 of Italy except IT51 (Toscana), IT52 (Umbria), IT6 (Lazio), IT8 (Campania), IT92 (Basilicata), IT93 (Calabria) and ITB (Sardegna). Moreover, also the flows from Puglia have been excluded, considering that these flows are already considered in the export flows of Puglia (IT91);
- export IT91-S (South Puglia) to all the foreign NUTS 0/1/2. These data have been calculated broking down the production of fruit and vegetables of the southern NUTS 3 of Puglia - those south of Taranto (IT91-S) as a function of the NUTS 3 production compared (as a percentage) to the Puglia production. The percentage so calculated has been applied to the export flows;
- export from IT92 (Basilicata), IT93 (Calabria) and ITA (Sicilia) to all the foreign NUTS 0/1/2;
- import of the southern part of IT91 (Puglia) from foreign NUTS 0/1/2. These data have been calculated broking down the population of the southern NUTS 3 of Puglia - those south of Taranto (IT91-S) as a function of the NUTS 3 population compared (as a percentage) to the Puglia population. The percentage so calculated has been applied to the import flows;
- import of IT92 (Basilicata), IT93 (Calabria) and ITA (Sicilia) from foreign NUTS 0/1/2.

⁴⁹ Ref. note n. 44.

⁵⁰ Ref. note n. 45.



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