

What can be done to improve innovation in Small and Medium Sized Enterprises (SME) in the transport sector?

How does innovation spreads into the market? What is the role of networks in promoting innovation? Which impact do European and national policy measures have on innovation?

This handbook gives an overview over innovation in the transport sector related to SMEs in the sectors of public transport, freight and logistics. Very important for success and sustainability of innovations are policy measures, e.g. law, regulation and guidelines.

Steinbeis-Europa-Zentrum as coordinator of the EU project POSMETRANS has analysed the situation of SMEs in the transport sector. The results from the POSMETRANS survey show that laws and regulations result to be the measures, which mostly influence the innovation processes.

This handbook presents an insight into the whole transport sector and the problems of SMEs concerning EU funding programmes, networks and policy measures.

As a core result several recommendations have been elaborated and are presented in this handbook. The partners of the POSMETRANS project expect that the recommendations will be helpful for policy makers to improve the capability of SMEs in the whole transport sector.

POSMETRANS
European logistic and transport. **Efficiency & Innovation.**



Robert Gohla, Jens-Jochen Roth (Lead authors)

POSMETRANS

Policy measures for innovation in TRANSPORT sector with special focus on Small and Medium sized Enterprises – factors and recommendations for success and sustainability

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SEVENTH FRAMEWORK
PROGRAMME

Robert Gohla, Jens-Jochen Roth (Lead authors)

Aude Pélisson-Schecker, Samantha Michaux, Julia Sliwinski,
Juan Saenz-Arostegui, Bogna Grochola, Katarzyna Nosal,
Andrzej Szarata, Cengiz Akdeniz, Mustafa Cakir, Aykut Gülalanlar,
Marta Serrano, Paola Capello, Giulia Maccario (Contributors)

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Imprint

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Robert Gohla, Jens-Jochen Roth (Lead authors)
Contributors: Aude Pélisson-Schecker, Samantha Michaux, Julia Sliwinski,
Juan Saenz-Arostegui, Bogna Grochola, Katarzyna Nosal, Andrzej Szarata,
Cengiz Akdeniz, Mustafa Cakir, Aykut Gülalanlar, Marta Serrano, Paola Capello,
Giulia Maccario

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Foreword/Introduction

Mobility is an essential component of Europe's economic, social and cultural development. The transport demand is continuously increasing with a predicted growth of 50% in passenger transport and over 80% in freight transport in the EU between 2000 and 2030.

Transportation stands in a constantly strained relationship between a society that demands more mobility and a public opinion that is increasingly making exception to chronic delays and a moderate quality that certain transportation providers produce. The constantly growing transportation requests in Europe cannot be managed solely by the building of new infrastructures. Therefore, innovative solutions to produce an efficient and sustainable effect in the execution of transport are requested. Here SMEs play a key role because they generate the largest turnover and the most jobs in the research sector.

Innovations are a central component to the entrepreneurial action and at the same time an orientation guide for political initiatives. To implement innovations in the market, the European Commission issued research programmes and initiatives, such as the Seventh Framework Programme (FP 7) or the Marco Polo programme. The White Book of the European Commission published contains measures to improve the situation in the transport sector. Various support actions, such as POSMETRANS were implemented with the goal of initiating appropriate measures for the improvement of the current situation.

About POSMETRANS

The POSMETRANS project is a Coordination and Support Action funded by the European Commission within the scope of the Seventh Framework Programme (FP7). It aims at promoting sustainable surface transport by providing policy support for innovative technologies and processes in transport.

On the basis of an international network consisting of five partners from five different countries, the POSMETRANS project explored the efficiency of European policy measures for innovation in the transport sector with special focus on Small- and Medium- sized Enterprises (SMEs).

POSMETRANS has been focusing on innovative processes in two main areas:

- Public Transport and
- Freight and Logistics.

In each of these areas the project partners have been studying the impact of innovation on vehicles and infrastructures for roads, railways and water transport. Innovations in the field of Greening Technologies, New Materials, Information and Communication Technologies (ICT), as well as Safety & Security have been addressed in particular. Furthermore, the co-modal transport chain was emphasised as well.

POSMETRANS is pursuing two core goals:

1. Providing a frame for the impact assessment and evaluation of EU measures aiming at innovation.
2. Elaborating recommendations for future policy measures in order to accelerate the market take up of innovative technologies and processes in surface transport.

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In addition, we would like to thank the numerous companies, research institutes, networks, organisations like public bodies, and chambers of commerce who participated in the POSMETRANS survey. Last but not least, we would like to thank the experts from a variety of countries in Europe who gave their feedback in our panel meetings during the transport logistic fair 2011 in Munich.

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Executive Summary

Small and medium sized companies are very important for the economical prosperity in Europe. The sector generates the highest quantity turnover and produces the most employment. Regarding this issue the goal of the POSMETRANS project is to evaluate if this important sector could benefit from innovative policy measures, action plans and funding schemes.

The project has been focusing on innovative processes in two main areas: Public Transport and Freight & Logistics. Different activities have been carried out during the project.

In a first step, the partners identified innovative technologies and concepts in different European countries through desktop research. In a second step, the collected data had to be ranked. The ranking procedure was based on criteria defined by the consortium and was used to estimate the relevance/importance of each collected data, each criteria being moreover weighted and classified in one of four categories (functional, social, economical and environmental). Taking into account the complex situation of criteria of various nature and importance, a Multi Criteria Decision Aid (MCDA) methodology was followed. On the basis of MCDA it was possible to identify innovation trends in the domain of surface transport concerning innovative technologies, to identify the most relevant policy measures and to select key players in innovation.

As a next step, a survey was conducted. In this case four different questionnaires have been developed and adapted to different key players (e.g. companies, RTD institutes, networks and organisations like public bodies). The survey's main objective was getting answers concerning the following questions:

- How does innovation spread into the market?
- How is the influence of networks on the stimulation of the innovation process?
- What kind of impact do European and national policy measures have on the market?

Overall 48 interviews have been conducted (21 companies, 13 institutes, 6 networks and 8 organisations), most of them were SMEs. The results of the survey were presented to experts in panel meetings considering the main questions mentioned before. In close collaboration with these persons, the findings of the analysis and the survey have been discussed and the results became the basis for recommendations from experts. Another goal of the panel meetings was the identification of "best practices" in relation to different policy measures.

Executive Summary

The recommendations affect the whole transport sector in the field of public transport and freight and logistics as well as issues concerning SMEs. All recommendations on vehicle technologies are described for both sectors as the technological aspects correlate. Furthermore, the recommendations related to infrastructure technologies are discussed together as well because they affect the public transport as well as the freight and logistics sector.

Overall, the recommendations are the basis for future policy measures in order to accelerate the market take-up of innovative technologies and processes in surface transport related to SMEs. In this handbook several recommendations concerning policy strategies were elaborated. These recommendations focus on the whole transport sector as well as on public and freight and logistics separately. Likewise, recommendations on vehicle and infrastructure technologies and finally on SMEs have been identified.

1 Concept and project objectives

1.1 Project aims

The main goal of the POSMETRANS project is to analyse the innovation process on transport markets in order to support two main objectives, as follows:

Objective 1: Providing a frame for the impact assessment and evaluation of EU measures aiming at innovation in the transport sector.

Objective 2: Drawing recommendations for policy measures in order to accelerate the market take-up of innovative technologies and processes.

The project POSMETRANS will concentrate on the innovative process in two main areas: Public Transport and Freight & Logistics. In each of these areas, we will study the impact of innovation on vehicles and on infrastructure, respectively for roads, railways and water transport. The co-modal transport chain will also be emphasised specifically.

1.2 Project methodology

The POSMETRANS project is using the following concept: On the one hand, transport and transportation are indispensable requirements for the competitiveness of the European market but also for the trade off in trade, economy and culture. Transportation stands in a constantly strained relationship between a society demanding more mobility and a public opinion increasingly making exception to chronic delays and a moderate quality produced by certain transportation providers.

The constantly growing transportation requests in Europe cannot solely be managed by building new infrastructures. Therefore, innovative solutions which will produce an efficient and sustainable effect in the execution of transport are being requested. Innovations are a central component to entrepreneurial action and an orientation guide for political initiatives, at the same time.

The innovative process in the surface transport sector is manifold and quite complex as it involves several means of transport on road, railways and water as well as large technology domains e.g. Information and Communication Technologies (ICT), New Materials and Greening Technologies. Innovative concepts in the domains of Co-modality and Safety & Security are also involved.

2 Approach and methodology

2.1 Overall approach

Vehicles are the means of transport while infrastructure develops the networks needed to efficiently and effectively move vehicles from one place to another. Within the context of this project there are three means of transport: road, railway and waterway, all of which could be categorized under the term “surface transport”. Each of these means of transport has their individual network in which they are structured.

These vehicles and their respective infrastructures are individualized to best suit their specific needs consequently the technologies are also diverse. There are five special technology fields which will be emphasized on in the area of the co-modal transport chain: Greening Technologies or New Materials for Vehicles and Co-modality and Safety & Security for infrastructures. ICT plays an important role in both areas.

This project distinguishes between the individual vehicles and infrastructures in addition to the respective technologies to determine a) how they are produced, b) how sufficient they would work on the market, and c) which added value they could generate (economical, ecological, sustainable). These technologies are not meant to specifically benefit one area within the vehicles or infrastructures domain but to be used for one or more elements within each area. For example, New Materials should not just benefit road transportation but also railway and/or waterway transport.

The project concentrates on the innovative process in the two main areas: Public Transport and Freight & Logistics.

In each of these areas, a study concerning the impact of innovation on vehicles and on infrastructure, respectively for road, railway and water transport is available. A special focus is laid on the co-modal transport chain as well.

The POSMETRANS work structure is based on a logical framework with three main phases: Phase 1: Data collection, Phase 2: Analysis, Phase 3: Elaboration of Recommendations.

The tasks contained in each work package allow the progressive implementation of the project as a whole and focus on achieving clear and attainable specific objectives.

2.2 Data collection

The data collection is the basis for all further steps in the POSMETRANS project. The most suitable methodologies in regard of the project implementation were compared and assorted. Relevant European and national policy measures were identified. Furthermore, relevant technologies and trends which foster the innovation process in the five related domains ICT, Greening Technologies, New Materials, Co-modality and Safety & Security through European and national technology platforms and networks were identified, too. Following the identification, a competence matrix with key players of innovation was elaborated. Last but not least, four different questionnaires adapted to different key players (companies, RTD institutes, networks and organisations like public bodies) have been developed.

2.2.1 Methodological approach

In the following paragraph the methodology which is used to make a ranking of innovative technologies and policy measures collected in the project is described. The same methodology will also be used to make a ranking of key players which will be identified later. The ranking procedure is based on criteria defined by the consortium and used to estimate the relevance of each data collected, each criteria being moreover weighted and classified in one of four categories (functional, social, economical and environmental). To take into account the complex situation of criteria of various nature and importance, a Multiple Criteria Decision Aid (MCDA) methodology was being followed.

The multi-criteria decision is characterized by methods supporting planning and decision processes through collecting, storing and processing different kinds of information and constructing a viable idea of how to solve a multi-criteria decision problem. In regard of POSMETRANS the MCDA method allows taking different aspects of the problem (technical, economical, social or environmental) into consideration.

The aim and expected benefits of such a ranking methodology for POSMETRANS are the following:

- **Innovative technologies:** identify innovation trends in the domain of surface transport in Europe. These trends will be used to establish a technological profile of people filling out questionnaires. Technology trends will also be used while dealing with the analysis of market adoption of innovative technologies;
- **Policy measures:** identify the most relevant policy measures that will be analysed and on which the impact of policy measures will be studied;

- **Key players in innovation:** select POSMETRANS experts for the expert panel consultation.

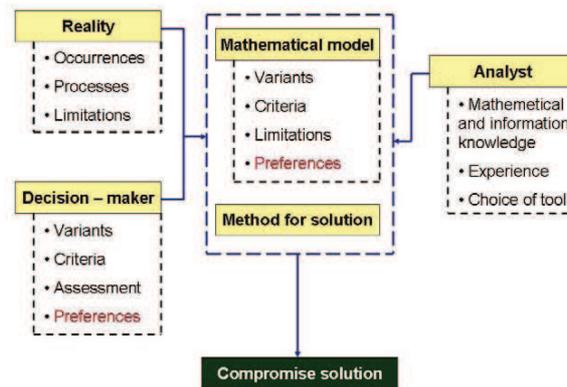
In contrast to the classical techniques of operations research, multi-criteria methods do not yield “objectively best” solutions as it is very difficult to generate such solutions which take all points of view into consideration.

The main attributes of multiple decision problems are: set of action/variants/solutions A and a consistent family of criteria F. The set of action A is a set of decision objectives, candidates, variants or actions which are analysed and evaluated during decision procedures. The set of A can be defined directly in form of a complete list or indirectly in form of certain rules and formulas that determine feasible actions/variants/solutions, e.g. in form of constraints. The consistent family of criteria F should be characterised by the following features: it should provide a comprehensive and complete evaluation of A, each criterion in F should have a specific direction of preferences (minimised – min or maximised – max) and should not be related to other criteria in F. The domain of each criterion in F should be disjoint with the domains of other criteria.

The MCDA approach identifies the major participants of the decision aiding process, such as: the DM (decision maker) and the analyst and describes their roles in this process. The DM (an individual or a group of individuals) defines the objectives of the decision process, expresses preferences and finally evaluates the generated results. Finally, one can select the best solution, the most desired variant. The analyst, who is external to the decision problem, handles the decision supporting process. His role is to construct a decision model and select the most appropriate tool to solve the decision problem. The analyst explains to the DM the consequences of certain actions and finally recommends the most desired action.

The following Figure 1 shows the model of the decision making process with all the factors that are taken into account.

Figure 1: Model of decision making process



2.2.2 Collection of innovative technologies

Having analysed and selected the best suited methodologies for the project, a list of innovative technologies and trends within the transport sector has been realized. The objective is to collect those technologies and trends which represent the current innovation process in the transport sector better. The criteria selected is used to rank the identified trends and technologies, in order to use those best positioned to analyse the impact that innovation policy measures have on them.

The list of technologies selected will be used for designing questionnaires for the survey, and to acquire the necessary background knowledge in order to be able to contact different stakeholders. Moreover, source documents containing information about innovative technologies were uploaded onto the POSMETRANS database. Each document was carefully documented as to easily find it again and use it for the analysis.

The methods and tools that have been used for collecting technologies and trends are the following:

- Definition of keywords for search engines
- Web browsing
- Review of EU and national action plans, white and policy paper, surveys

Approach and methodology

- Review of EU and national projects & programmes in the transport sector
- Review of technical literature (scientific journals)
- Taking part in workshops, congress, symposia

The structure of the list of technologies is explained in the following paragraphs.

The work focuses on innovative technologies on vehicles and infrastructures, respectively for roads, railways and water transport, considering the intermodal transport chain field as well. There are also five special technology fields: Greening Technologies or New Materials for vehicles and Co-modality and Safe & Security for infrastructures. ICT plays an important role in both areas as it is closely related to the technological fields of safety and security. Thus, the list is organized in six thematic technology fields which are considered in the description of work sharing search activities between partners. Each technology field was allocated to the partner who could show the most experience in the respective area (e.g. through the participation in previous projects).

Both vehicle and infrastructure technologies are subdivided in four levels creating a tree structure. The second level are the technological fields defined above (Greening, Materials, ICT, Co-Modality, Safety & Security). Third and fourth level group technologies in several subgroups within each technological field.

The application field of each technology was identified with respect to the transport modes (road, rail, water) as well as the type of transport (passenger transport or freight and logistics) targeted in POSMETRANS ("Transport" columns in the technology table). A similar identification through transport and technology keywords was performed for policy measures as to facilitate the cross-linking of technologies with policy measures and stakeholders.

The next columns (Table 1) correspond to the list of criteria selected for the assessment of innovative technologies. The table below includes a detailed description of each criterion as well as further specifications to allow all partners to evaluate technologies according to those criteria.

Table 1: Description of criteria

DESCRIPTION OF CRITERIA				
Criterion	Description	Group of criteria	Unit	Values of the criterion to be used in the evaluation of policies
Transferability	Transferability: Criterion indicates whether or not technology can be transferred and implemented in different conditions, e.g. in a different country.	Functional	[-]	Please, put values from 1 to 5, where: 1- very difficult to transfer and implement, 2 - difficult to transfer and implement, 3- medium-difficult, 4 - easy, 5 - very easy
Position of SMEs	This criterion is an estimation of the amount of SMEs (percentage of the total number of enterprises in the field) involved in the industrialization of an innovative technology.		[%]	Please, put values from 1 to 5, for the SME participation, where: 1- 0-10%, 2- 11-20%, 3- 21-30%, 4- 31-40%, 5- 41-50% and 6->51%
Customers' acceptance	It means the innovative technologies are well perceived and thought as valuable, useful and efficient by the end-users.	Social	[-]	Please, put values from 1 to 5, where: 1 - very low acceptance, 2 - low, 3- medium, 4 - high, 5 - very high
Risk management	Criterion indicates how high the identification, assessment and prioritization of risk followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of unfortunate events concerning innovation.	Economical	[-]	Please, put values from 1 to 5, where: 1 - risk management issues are not addressed, 2 - quickly mentioned, 3- partially addressed, 4 - sufficiently addressed, 5- fully addressed
Environmental friendly	Criterion indicates whether or not the technology inflicts harm on the environment, e.g. concerns renewable energies commitment and CO2 reduction commitment.	Environmental	[-]	Please, put values from 1 to 4, where: 1 - very harmful to the environment, 2 - harmful to the environment in medium way, 3- inflicts minimal harm on the environment, 4 - inflicts no harm on the environment at all

Each partner has evaluated his list of proposed technologies according to the defined criteria with at least 5-10 colleagues within the respective organization. This survey was created for those people who were knowledgeable in the specific technological field. Thus, the list is ready for a future ranking of technologies by MCDA analysis. The results of the ranking will be included in the questionnaires. A technology profile of each stakeholder will be set up, enabling them to indicate the relevance of each cited technology in their daily business.

The last column shows "Related Policies" which are included in the list of transport related policies. Thus, technologies are classified and located in the relevant transport field, including policy relationships for a later preparation of questionnaires.

2.2.3 Collection of relevant policy measures

Policy measures were identified both at national and EU level, as far as the project partners could find sufficient information on those measures to assess them in a reliable way. The aim was to give an overview of the situation, enabling a comparative analysis of EU and national levels at a later stage of the project. In particular, the present list of policy measures and its preliminary analysis were used for innovative technologies & trends established by the project partners at the same time. In addition, it was planned to collect feedback of innovation stakeholders via an electronic survey and interviews. The elaboration of the list of policy measures on EU and national levels were served as a basis to develop questions for stakeholders (for instance, questions dealing with the "impact of European and national policies"). This way, the

results of the data collection and those of the POSMETRANS survey were comparable and could be analysed together.

All EU countries were considered in the first instance. Being aware of the fact that the identification of policies in foreign countries (i.e. countries which are not represented among the POSMETRANS partners) is not necessarily easy simply because of language barriers, it was decided to concentrate on the partner countries only, but to try to extend our study to further countries as far as documents could be found in English or in a language understood by one of the partners (e.g. German, French). For instance, countries such as Greece, Cyprus, Bulgaria and Romania which were first considered to be included in the study were excluded at a later stage of the data collection, simply because the responsible partner could not find the necessary information (in English) to evaluate any of the criteria for the corresponding policy measures. All policy measures previously identified for those countries were therefore deleted in the final version of the deliverables since they could not be taken into account in any comparison and ranking of policies based on the POSMETRANS criteria.

Since it is impossible to collect all European or national policies (laws, orders, regulations, Programs etc.) dealing with transport and logistics themes/issues the partners decided to collect mainly those to which they have direct links due to their daily business or vocational education. The latter is important since the required evaluation and ranking of policies can be done more precisely the better the respective policy is known.

The results of the data collection have been placed in a table in the following tree structure (consisting of four distinct levels and sublevels):

- EU: EU funding programmes, EU laws and / or regulations and EU white papers, action plans, guidelines
- National: 21 Countries (most of the collected policy measures coming from Turkey, Poland, Spain, Ireland, Great Britain, Germany, France, Italy, Switzerland and Austria).
- Other (regional or multi-national): e.g. Nordic countries, Baltic States, Alpine countries, France/Germany
- Global: e.g. convention (if they have a direct influence on EU policies)

2.3 Survey

One of the most important actions of the POSMETRANS survey was the elaboration of four different questionnaires adapted for different key players. The content of the four questionnaires is described in the following section.

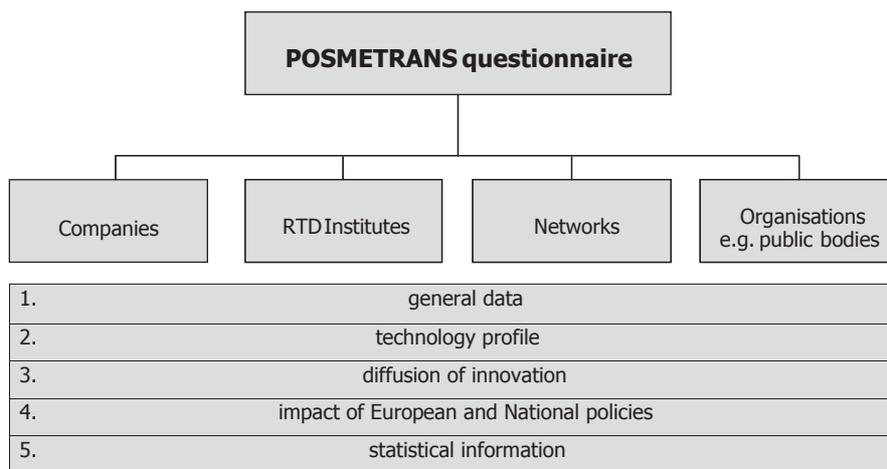
2.3.1 Elaboration of target group related questionnaires

The questionnaire was addressed at individual stakeholders. In the survey, stakeholders from SMEs and large companies, research institutes, networks and organisations like public bodies were involved. The main objective of the survey has been getting answers concerning the following questions:

- How does innovation spread into the market?
- How high or low is the influence of networks on the stimulation of the innovation process?
- How do European and national policy measures impact the market?

The questionnaires are structured as follows in Figure 2:

Figure 2: Structure of the questionnaire



The questionnaire consists of different sections. The first section contains general information concerning the interviewed (name of the institution, contact name etc.) and provides an overview concerning the individual stakeholder (companies, R&D institutes, networks and organisations/public bodies).

The main goal of the second section, called technology profile, is to get answers concerning ICT, Greening, Co-Modality, Safety and Security, other e.g. Materials.

In the third section, the focus lies on the diffusion of innovation. The POSMETRANS survey wants to know how important innovation is for stakeholders, how do they get information concerning innovation and what are the main difficulties encountering R&D activities.

The fourth section focuses on the impact of European and national policies. In a first step, the questions are kept general concerning the knowledge of EU-Research Programmes/Policy and the experience of the stakeholder with such programmes (e.g. skills and know-how, reputation, economic benefits). In the second step, there are questions concerning the positive and negative experiences of the interviewed persons with EU Funding programmes. At least, there are questions concerning the requirements to participate in EU-Programmes.

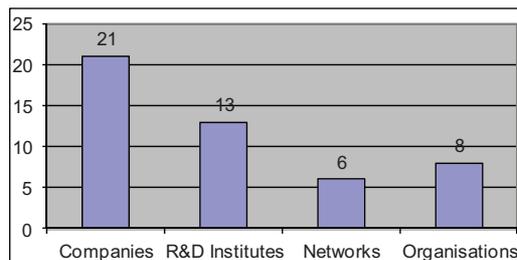
The last section is about statistical information of the company, institute, organisation or network.

In comparison to the questionnaire regarding companies, R&D institutes and organisations the questionnaire addressed to networks consists of six sections. The added section is in regard to the role of networks, demands concerning network services, the usage of these services and the importance of networks for political initiatives.

2.3.2 Interviews

The survey has been conducted with 48 interviews with stakeholders. It was running from January to March 2011. The following table shows the structure of the interviewed participants from different institutions:

Figure 3: Interviews conducted



Following the table you will see that most of the interviews have been done with stakeholders from companies (n=21). Overall 17 of these companies have less than 250 employees and four have more than 250 employees which shows that SMEs are well represented in this survey. In regard to R&D institutes, 13 stakeholders have been interviewed. Six stakeholders from networks and eight from organisations have participated in the survey.

2.4 Expert validation

Another important goal of the POSMETRANS activity is the integration of different experts. In collaboration with these experts the findings of the survey have been discussed and the results form the basis for the recommendations. In the following section the process of the expert validation is described.

2.4.1 Selection of experts

Starting from the list of identified key players, each expert was evaluated by a set of criteria defined by the consortium according to a MCDA ranking.

Afterwards, an initial list of 60 potential experts was established in which each partner was in charge of 10 potential experts (20 for SEZ). To ensure a good balance in term of country of origin and type of stakeholder organisation, each partner selected 10 experts from his or her own list of identified stakeholders chosen as follows:

- the two best ranked networks (from MCDA ranking);
- the three best ranked SMEs;
- the best ranked large company;
- the two best ranked research organisations;
- the two best ranked public bodies.

Note:

- A ratio of 3 to 1 between SMEs and large companies was chosen because the focus of the POSMETRANS study is on SMEs.
- Since many experts belong to several thematic sectors, the balance between different thematic sectors was easily established. Nevertheless it was checked at the end of the nomination procedure.

In addition, each partner assigned his experts to one of the three expert panel sessions (*1- How innovation spreads into the market, 2- How innovation could be stimulated in networks, 3- Impact of policy measures*) to ensure a good diversification of experts in the three organized panel meetings.

Each partner was put in charge of contacting his invited stakeholders, collecting answers and filling them in the collective list of potential experts. The consortium as a whole was then entitled to choose whether a potential expert, who had given a positive answer, was officially nominated

as a POSMETRANS expert and to whom a confirmation of his participation to one of the expert panel meetings could be sent.

SEZ, as task leader, ensured a regular control of the status of expert invitations. After it was decided that more than the initial list of 60 experts should be invited as to reach the target number of 24 nominated experts (8 per panel meeting, about 4 per partner), the decision was made that for each received negative answer, the responsible partner should immediately invite the next best ranked stakeholder. As a result, the list of invited experts shows a balance between transport actors that were identified using web browsing and other database searching, and actors identified by the partners among their own business contacts.

In total, 24 experts were nominated for the three expert panel meetings. 74 stakeholders were contacted following the procedure described above to come out with the required number of experts. The whole procedure lasted about three months, including last minute cancellation of participants, replacement of missing experts and shifts between expert panel meetings.

Table 2: Answers received from the invited experts per panel and per stakeholder group.

	Positive answers				Total
	Panel 1	Panel 2	Panel 3		
Networks	1	3	0		4
SMEs	2	2	2		6
Large companies	0	1	1		2
R&D institutes	4	1	3		8
Public bodies	2	1	1		4
Total	9	8	7		24
	Negative answers				Total
	Panel 1	Panel 2	Panel 3	unassigned	
Networks	2	5	2		9
SMEs	6	2	4	1	13
Large companies	1	2	1		4
R&D institutes	3	3	2		8
Public bodies	1	4	7		12
Total	13	16	16	1	46
Total answers	22	24	23	1	70

On average, the nominated experts all have a broad range of expertise and belong to several of the thematic sectors targeted in POSMETRANS. They are distributed as follows:

Table 3: Amount of nominated experts having an expertise in each thematic sector

SURFACE TRANSPORT					
Transport related Technology Sector		Public Transport		Freight and Logistics	
	VEHICLES				
Greening, ICT, Materials	Road	15	S 1	20	S 7
Greening, ICT, Materials	Rail	10	S 2	18	S 8
Greening, ICT, Materials	Sea	8	S 3	12	S 9
	INFRASTRUCTURES				
Co-modality, Safety, ICT	Road	16	S 4	21	S 10
Co-modality, Safety, ICT	Rail	11	S 5	19	S 11
Co-modality, Safety, ICT	Sea	8	S 6	12	S 12

The required number of at least two experts per thematic sector is therefore achieved.

As a result, the Expert Panel Meeting 1 was composed by independent experts coming from six different European countries, the Expert Panel Meeting 2 by independent experts coming from four different European countries, and the third Panel Meeting was composed by experts coming from five different European countries. In order to have a balanced composition of experts,

POSMETRANS partners coordinated their efforts in order to invite experts covering different – and complementary - fields of expertise.

2.4.2 Expert panel meetings

To cover the three investigated fields of the POSMETRANS project, there were also three panel meetings on the following subjects: how innovation spreads in the market, the role of networks and network policies for innovation and how policy measures affect innovation.

The main aim of organising the three Expert Panel Meetings was to present the first results emerging from the POSMETRANS survey to a competent panel of experts, in order to critically analyse and complement them.

The main objectives of the Expert Panel Meetings are identified as follows:

1. Validation of the findings presented.
2. Foster dissemination of POSMETRANS and its results.

In order to give the experts a general overview about the project and the results of the questionnaires implemented, they were provided with a drafted SWOT analysis summarising the main findings from the questionnaires' implementation in advance.

The methodology used for the data collection was:

a.) List of policy measures

Objectives: Analysis of policy measures in the surface transport sector both at EU and national level to find out how these measures can influence the market take-up of innovation technologies and processes.

Implementation: Elaboration of a list of policy measures with each partner being responsible for the given policies on European level and for given European countries at national level.

b.) List of policy measures on EU and national level

The list consists of the following EU and national levels:

- funding programmes
- laws and/or regulation
- white papers, action plans, guidelines

The results were presented on slides (cf. D5.1) with the help of graphs and tables in order to make them more understandable. The Expert Panel Meeting 3 was conducted in three main parts:

1. General presentation of POSMETRANS
2. Presentation of survey results
3. Discussion with experts

3 Findings and conclusions related to the question how innovation spreads into the market

In the following section findings and conclusions related to the question how innovation spreads into the market will be described. The results are presented in the following chapter.

3.1 Key findings

This section is divided in findings concerning data collection of the survey and of expert validation.

3.1.1 Findings on data collection

The data collecting work has been done regarding innovative technologies using the example of case studies. The findings of how the technologies studied are spread into the market are shown in this section.

The methodology of this project aims to establish a common tool (MCDA analysis) to assess all technologies using the same criteria. This task becomes very difficult since the transport sector is a fragmented sector. Therefore, collecting data on what is actually being done and where it is done is an almost impossible task. The analysis of case studies permits us to keep a better focus on the objectives of this task. Due to the fact that the sample of selected technologies is considerably small obtaining a relevant conclusion is an easier task.

As a general conclusion, we can say that the introduction and the acceptance of innovative technologies on the market depend on costs and performance. Deployment of innovative technologies cannot be considered sustainable if cost reductions of innovative solutions are based on subsidies.

Greening technologies are divided in different groups: electric vehicle related technologies, alternative fuels and renewable sources. Electric vehicles could be part of the solution for urban mobility but not for long distance routes. For long distance transportation the other propulsion technologies, alternative fuels or renewable sources should be considered. Alternative fuels are a viable technology to increase fuel efficiency. Coordinated and coherent policy instruments such as a regulatory framework on fuel efficiency would have to be established in the EU in order to accelerate the shift to low carbon vehicles and to have an impact on the market.

In addition to propulsion, another important area is the application of light, smart, and innovative materials, which also plays an important role for further improvements in efficiency and lower energy consumption. As analyzed, *new materials* are well positioned in the market. There is a reality of success in the market launch of some new material solutions, as lightweight materials

for vehicle interiors, new materials for wheels, antifouling materials in ships, etc. This area is important to get new solutions as well as it is one of the most important areas in which improvements could transform the European transport sector.

Co-modality technologies play an important role within technological solutions in the development of a more sustainable transport system. Improving co-modality and developing better interfaces for seamless door-to-door transport chains is seen as one of the research areas with a large potential for improvement whilst competition should focus on the performance within the transport chain rather than on performance between different modes. As analyzed, intermodal platforms for freight chains and integrated ticketing in public transport are innovative solutions that can obtain a success for sustainable transport chains and urban mobility.

Safety and security technologies are closely related to the *ICT* field, both for *vehicles* and for *infrastructures*, as all technologies involved in safety and security are mainly information and communication technologies. It all can be part of an ITS concept (Intelligent Transport System) which covers all technological solutions focused to provide cleaner, more efficient, more comfortable, and safe and secure transport. An ITS concept is based on intelligent mobility towards fully informed people, towards zero accidents and zero delays with a reduced impact on the environment where services are affordable and seamless, and with privacy respected and security provided. During the past decade a lot of effort has been put in the research and development of intelligent transport systems and services. However, actual wide-scale deployment of ITS, especially for multi-modal applications, is lagging behind. In order to achieve a proper development and deployment of ITS in Europe in the future, it is necessary for many actors such as local authorities, transport infrastructures, vehicle developers, information networks and telecommunication providers to work together.

ICT in infrastructure, as mentioned a part of an ITS concept focuses also to give solutions to freight actors in order to exchange information efficiently. As analyzed in case studies, some projects are launched but so far those solutions have not yet spread into the market. In practice, the application of these communication standards to current transport operatives is a slow process and the costs of modernization of the current infrastructures are nameable.

3.1.2 Findings on the survey

Due to the purpose of the survey, it is assumed that all entities surveyed have a high technological profile. However, the project partners would like to distinguish between those entities with high success in the innovation process and those entities that are less successful despite its technological approach. The aim is to identify the key factor and the main barriers to get the innovation spread into the market.

For that purpose, we asked Companies, R&D Institutes and Networks about the percentage of their innovations implemented on the market. Public bodies are not considered, and will be analyzed separately. Responses are classified with three groups, although we only considered two groups for the analysis:

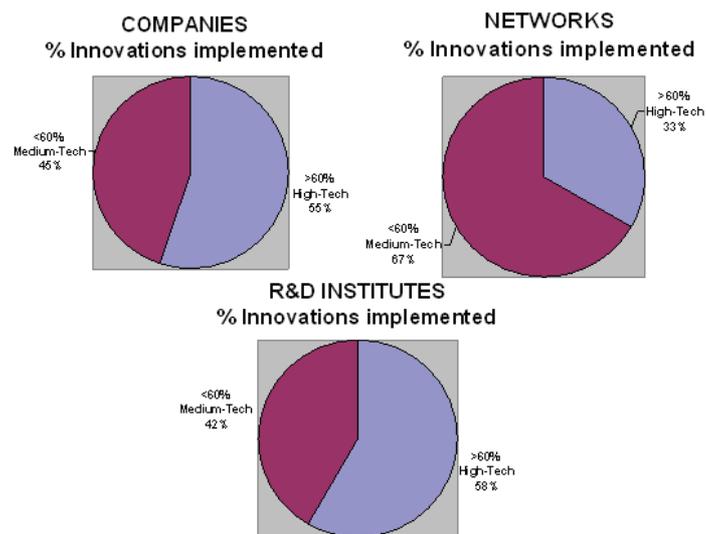
> 60%: means high success. For this analysis, henceforth entities within this range are called high-tech.

< 60% - 40%: means medium success. Henceforth, they are called medium-tech.

< 40%: means no response.

In the following, findings about the classification of the high-tech and medium-tech entities are represented:

Figure 4: Percentage of implemented innovations



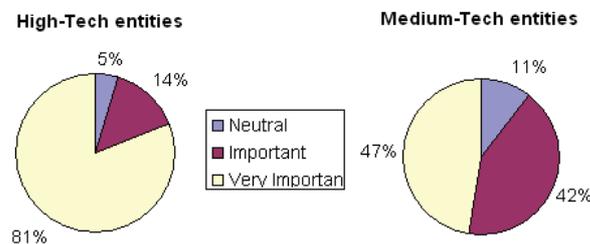
We can observe that most of the companies and R&D institutes interviewed are high-tech entities. On the other hand, most of the networks surveyed are medium-tech.

Nevertheless, we have enough representatives for both types of entities within companies, R&D institutes and networks. For further analysis, we focus on the main differences between the two types of entities, how they face the innovation and what their role in innovation boosting is.

Figure 5 shows a clear difference between high-tech and medium-tech and how each group assesses the innovation within their organisations. High-tech entities give more importance to innovation than medium-tech entities. This affirmation validates the distinction made between

the two groups. As we can see in the graph below, most of the surveyed high-tech entities rate innovation as very important. On the other hand, there is a mix of responses among medium-tech entities. Clearly, high-tech entities get more success in innovation because they consider it as a key factor within their organisations.

Figure 5: Importance of innovation



In the following an analysis of key factors that could determinate how stakeholders are positioned in innovation matters, that were identified by the consortium in the questionnaires, is presented. The main factors considered are innovation strategy, sources of information, training of personnel, factors for motivation, and limitations.

Innovation strategy

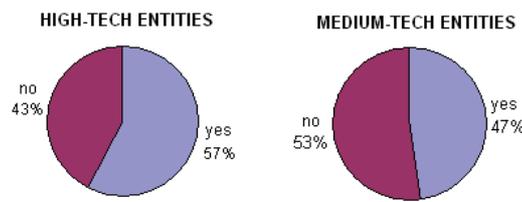
There are different approaches to implement an innovation strategy in companies, R&D institutes and networks. In companies an innovation strategy can lead to higher profit by helping to unlock innovative cost saving opportunities which are a catalyst to growth. Innovation is a priority for specialized companies if they want to succeed. Innovative companies in the transport sector continuously search for better ways to satisfy their consumer base by improving quality, service, and price. This comes to fruition in innovation with advanced technologies and organizational strategies.

Networks are entities that support innovation. Its main task is to create links between companies and other companies and institutions (R&D institutes, public bodies...) within the transport sector. Those links would allow them to collaborate on projects and initiatives to work towards a sustainable transport and mobility and to help the industry become more innovative and competitive. Main tasks would be to maintain an open view towards collaboration: licensing, consortia, strategic alliances etc, to propose initiatives, new regulations and standards, to manage intellectual property and to give visibility to the innovation environment in the transport sector through exhibitions, conferences, technology fairs etc.

R&D institutes play a key role in the transport sector, not only for forming human capital and generating knowledge but also as a catalyser to develop transport companies through the dissemination and transference of new technologies. The innovation strategy of the R&D institutes should be based on bringing companies to the technological frontier by strengthen the capacity of transfer, adaptation and wider dissemination of technology. The work has to be based on generating research excellence and capacity generation in scientific and technological areas, targeted on industrial challenges as well as on environmental and social challenges.

Companies, networks and R&D institutes have been asked if they have an internal innovation strategy within their organisations. The responses are quite heterogeneous although all stakeholders surveyed have a technological profile.

Figure 6: Innovation strategy - high-tech and medium-tech entities



Most of the companies surveyed are SMEs and they have no internal innovation strategy. On the other hand, most big companies, R&D institutes and networks that belong to high-tech entities respond positively to the question. As a conclusion, a consolidated innovation strategy linked to the organization's culture is a key factor to be successful in innovation in the transport sector.

In the following, some cases described by the stakeholders surveyed inform about how innovative strategy can be implemented.

Companies:

- Constant search for the latest technologies available on the market and study of competitors and trying to propose something better considering a fair price, as well.
- Development of new ideas and concepts internally and coordinates the marketing networks. The products themselves are produced by third parties (contracting firms).
- One company bases the innovation strategy on technological surveillance and receives inputs from the marketing department.

Networks:

- Base the innovation strategy on the development of a market strategy based on an internet platform, and the implementation of a public relation management.

R&D institutes:

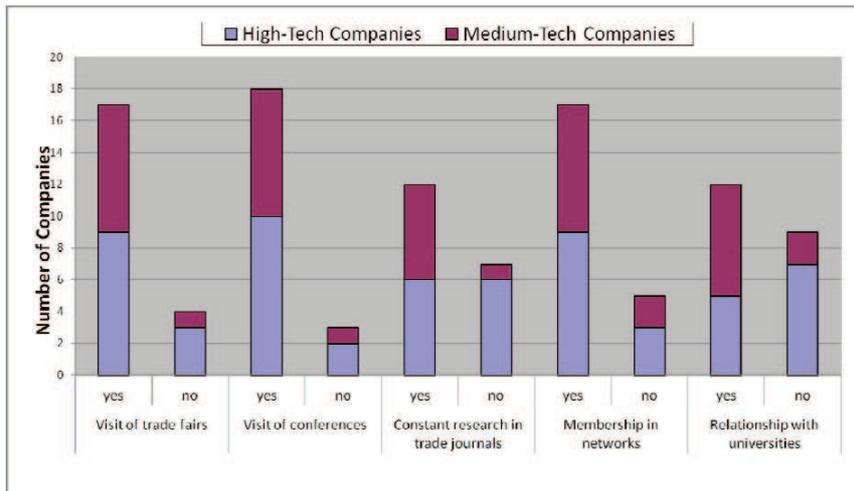
- Projects aligned between a technological plan and relations with companies.

- Implementation of a technology watch process based on an idea selection and management.
- One huge technological centre based its strategy on the diversification of specific working groups.
- Innovation strategy based on trend analysis of related technologies and the development of an institute in relation to upcoming trends.

Sources of information

In order to know how stakeholders get information regarding new technologies and innovation the questionnaires give some alternatives considering the most common practices. As shown in the chart below, most companies use different information channels to stay updated about new technologies and innovation. The instruments that are mostly used are visits to trade fairs and conferences, and a network membership. Apparently, there is no significant difference between high-tech and medium-tech companies. Surprisingly, there are high negative responses among high-tech companies mostly regarding two instruments: constant research in trade journals and relationship with universities. A reason for this difference could be the specialization and isolation which being a high-tech company sometimes entails. On the other hand, we can see how medium-tech companies are more concerned about how to get information than high-techs.

Figure 7: Sources of information - companies

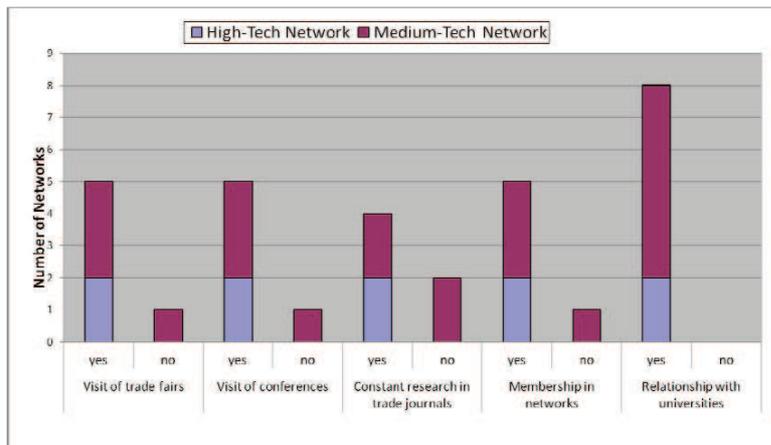


Some companies submit other answers regarding information channels that are not considered in the survey: Some point internet as one of their most common tool to gather information concerning innovation, and one organization uses European Commission sources to be updated.

Concerning the networks, they are also in charge of promotional work supporting organisations to stay updated. For this purpose networks need to update themselves first and then offer different tools for organisations or manage different events as considered in the survey.

Access to innovation sources is a widely requested service noted by most of the companies and organisations. Networks apparently promote the participation in trade fairs and conferences, they are members of innovative clusters, and develop relationships between companies and universities as suitable instruments to approach innovation. The number of the medium-tech networks surveyed is higher, and we can see they are highly focused on developing relationships between companies and universities. On the other hand, there are no negative responses from high-tech so they are fully participating in all promotional instruments.

Figure 8: Sources of information - networks

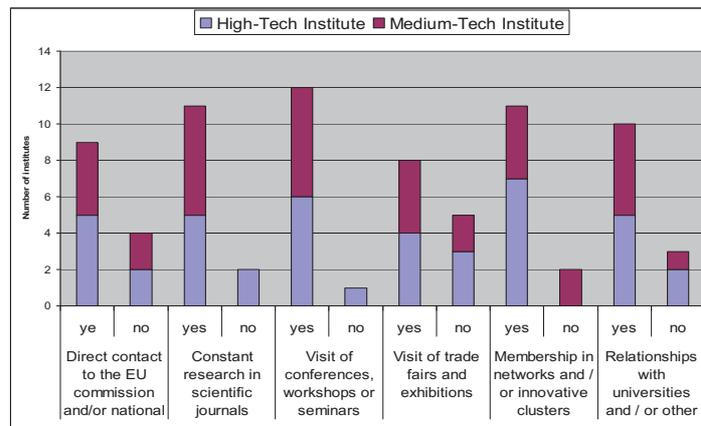


A French network relating to electric cars, points out another way to get information based on the relation with the industry.

Concerning R&D institutes, we can see that all instruments are used by most of the R&D institutes surveyed. But there are some exceptions. Apparently, institutes are more familiarized to make constant research in scientific journals, visit conferences, workshops or seminars and be a member of networks or innovative clusters. In contrast, a significant number of R&D surveyed are not used to have a direct contact to the EU commission or national point and neither visit trade fairs. There is no significant difference between high-tech and medium-tech R&D institutes

but some aspects can be pointed out. The high-tech entities surveyed are all participating in networks and clusters, on the other hand all medium-tech institutes surveyed are involved in constant research in trade journals and attending conferences or workshops.

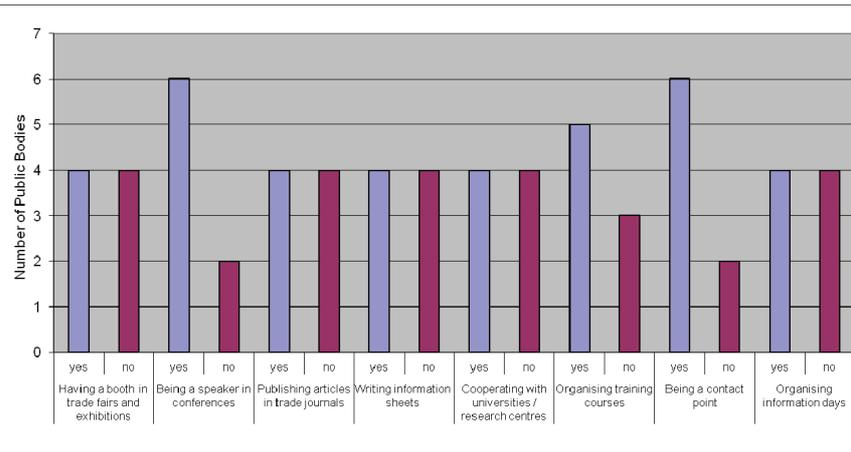
Figure 9: Sources of information - R&D institutes



In the case of public bodies, there are different instruments covering the same areas. One of the main features of public bodies is to guide and update organisations regarding political framework and guidelines to follow in terms of innovation. Concerning information, their role is more focused on dissemination work.

One can see that most of the surveyed public bodies use all information channels, mainly as a speaker in conferences, workshops or seminars, and as the contact point for interested companies. However, there are a high number of negative responses in the rest of the instruments. It is an interesting point to consider. There must be more implication of public bodies in the dissemination of information concerning innovation, besides participating as speaker in conferences and being a contact point to increase the use of more instruments like participating in trade fairs, writing articles and papers for networks, and improving cooperation with universities and research centres.

Figure 10: Sources of information - public bodies



Training of personnel

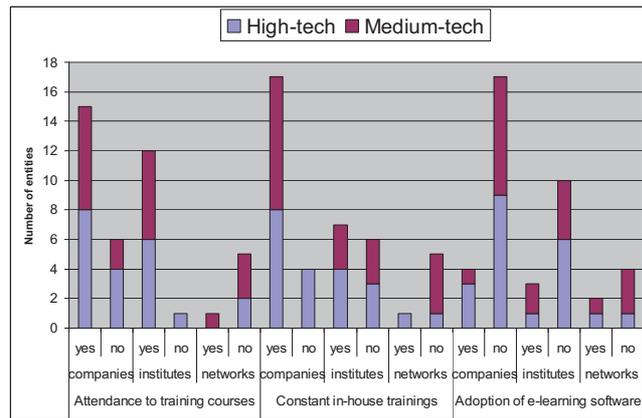
This section analyses the instruments that stakeholders use to improve the skills of their personnel. Tools considered in the survey are training course attendance, constant in-house trainings and the adoption of e-learning software.

Concerning the attendance of training courses, one can observe that this is a common practice for most companies and institutes but not for networks. It could be possible that companies and institutes use trainings to improve technical skills and networks do not. However, there are other types of courses that could be interesting for companies and institutes but mainly for networks referring to management and personal skills.

There is less interest in constant in-house training; this does not count for companies but for institutes and again for networks. There is a difference between high-tech and medium-tech companies observing that medium-tech companies use mainly in-house trainings. On the other hand, there are a significant number of institutes that prefer external training courses.

In the case of adapting to e-learning software, we can state that this type of methodology for training personnel is not too extended among stakeholders. Only some of them (around 20%) use e-learning software.

Figure 11: Training of personnel



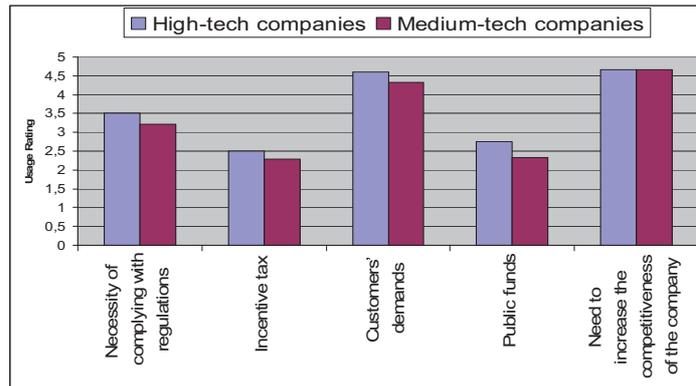
There are other instruments pointed out by some stakeholders. The personnel of one company participate in working groups of the European Commission. Personnel of another one participate in engineers networking and one institute works in collaboration with industrial partners.

Factors motivating innovation

There are several reasons that can motivate stakeholders to innovate in the transport sector. These motivations are linked to how stakeholders face innovation and which type of strategy is designed in order to be successful. Factors considered for the analysis are: necessity of complying with regulations, incentive tax, customers' demands, public funds, and the need to increase the competitiveness (companies), size (networks) or publicity (R&D institutes).

Factors highest valued by companies are customers' demand and the need to increase the competitiveness of the company. In conclusion, the market position of a company in the transport sector prevails over regulation compliance. New regulations in the near future concerning environmental restrictions will force a technological effort that could also change motivations to comply with the regulations. In this situation, there are two scenarios. In the first one, it is an opportunity for the technological industry as it will have to obtain new products based on these new regulations. In the second one, transport companies will have to face big investments to comply with the regulations and an incentive and public funds to adopt new technologies. On the other hand, there is no noticeable difference between high-tech and medium-tech companies.

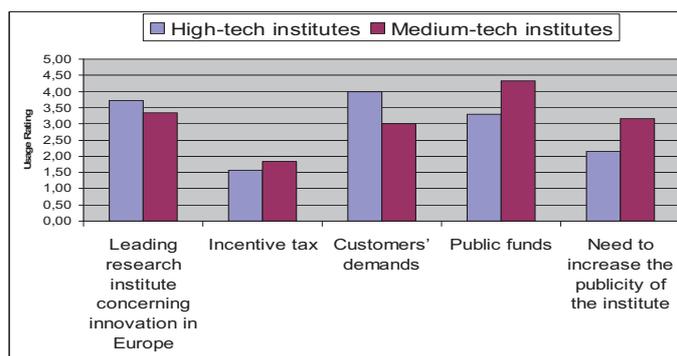
Figure 12: Factors motivating innovation - companies



Other answers made by the companies surveyed are: A warning about the motivation of saving lives through implementation of their devices, and one pointed out open new segments in the market to close related to increase competitively.

R&D institutes have distributed different motivations. The main motivations are as shown in Figure 13: leading research activities in Europe, customers' demand and getting public funding. Apparently, there is a difference between high-tech and medium-tech institutes. High-tech institutes rated highly for leading in Europe and customers' demand, and medium-tech institutes rated highly for incentives, funds and the need to increase publicity. This position is reasonable since high-tech means consolidated and specialized, and medium-tech are looking for a better market position.

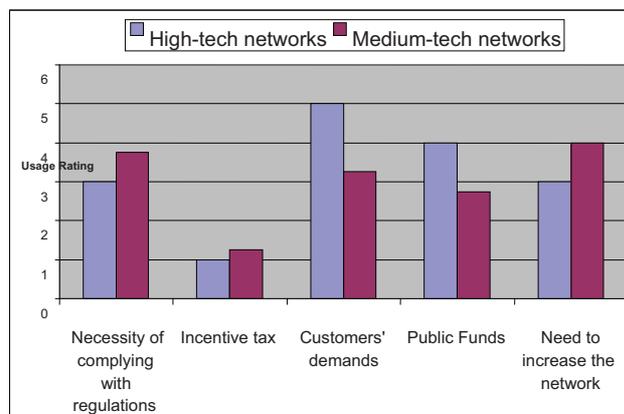
Figure 13: Factors motivating innovation - institutes



Another answer given by a research institute in Poland is related to legal requirements and Green Public Procurement, not mentioned for this group in the survey.

The main motivation factor for networks, as diagrammed in Figure 14 is the customers' demands. It can be observed that medium-tech networks consider the need to increase the network as a main factor following by the necessity of complying with regulations. Public funds are also remarkable for high-tech networks.

Figure 14: Factors motivating innovation - networks



A French network points out other options for motivation like creating new jobs and improving the competitiveness of companies.

Concerning public bodies, the valuation is not too high corresponding to the motivation factors considered in the survey. Public bodies give the same importance to both factors: improvement of the situation of SMEs while increasing its competitiveness, and combat the effects of the climate change and pollution. There are of course more factors that could be considered but there are no responses in the free answer section for this question. Hence, it could be assumed that public bodies are concerned about both issues, the improvement of competitiveness in the transport industry, on the one hand, and to ensure environmental sustainability of the transport sector in Europe, on the other hand.

Limitations for innovation

There are several factors describing possible limitations which stakeholders have to face and which sometimes interfere with the innovation success. These are the factors considered:

Skills and know-how

- Lack of qualified personnel
- Do not know R&D performers to ask for help (for example Universities and research centres)

Financial barriers

- Lack of internal co-financing
- Difficult access to venture capital

Funding programmes related barriers

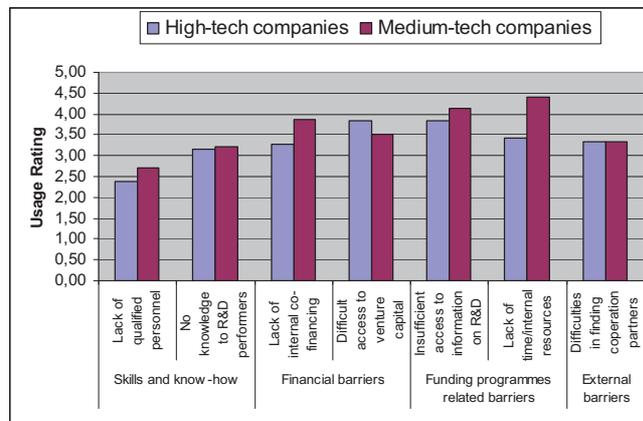
- Insufficient access to information on R&D funding programmes and awareness of the most appropriate ones
- Lack of time and/or internal resources to dedicate to the writing of the projects and to the management

External barriers

- Difficulties in finding cooperation partners

As we can observe in the chart below, the main barriers for companies are insufficient access to information to R&D and lack of internal resources. There is not too much difference between high-tech and medium-tech companies. Medium-tech companies value the lack of internal resources and the lack of internal co-financing slightly higher. As shown below, the main difficulties are financial barriers and funding programmes related barriers.

Figure 15: Limitations for innovation - companies



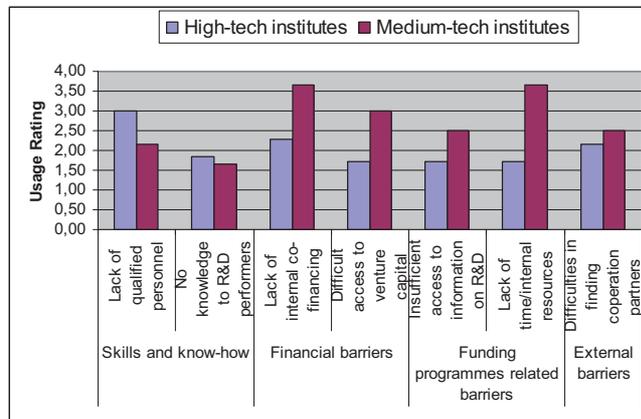
Several surveyed companies point out other limitations like investment risk, limited access to funding pointed and the bureaucracy related issues to public funding as a barrier to innovation.

Concerning R&D institutes, there are also high values mainly within the barriers related to financial and funding programmes. Surprisingly high-tech institutes put their highest values in limitations related to skills and know-how. On the other hand, apparently medium-tech have higher

limitations than high-tech institutes in financial barriers, funding programmes related barriers and external barriers, mainly because of a lack of internal co-financing and internal resources.

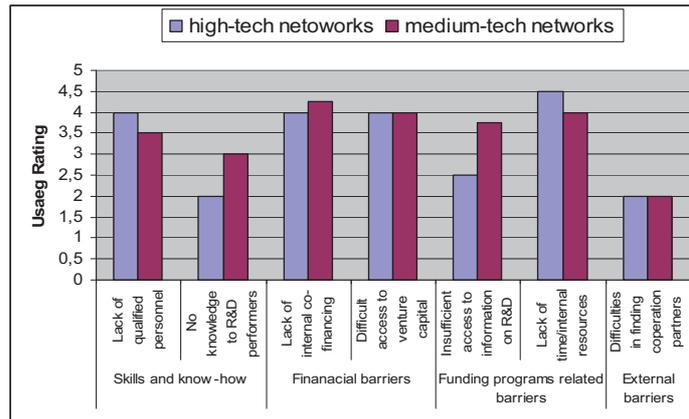
There are also free responses from some surveyed institutes. One institute refers to public models interpretation as a barrier. Another one points out that they have difficulties in finding markets willing to buy developments and their financial problems to update old equipment. It was also mentioned that the cost of replacing equipment to face new projects is too high, and the one institute complains about an available public funding budget that is insufficient.

Figure 16: Limitations for innovation - institutes



For networks the main limitations also lie in financial barriers, and funding programmes in a lesser measure. There is not a remarkable difference between high-tech and medium-tech networks, only the necessity for medium-tech to overcome limitations concerning the knowledge of R&D performers and insufficient access to information on R&D programmes that are better faced by high-tech.

Figure 17: Limitations for innovation - networks



One network refers also to the lack of qualified personnel focused on R&D management, the decrease in public national grants in Spain and long-term return of investment associated to R&D dimensions of the companies.

3.1.3 Findings of expert validation

Different questions have been discussed in the first expert panel on how innovation spreads into the market.

The first question was about the criterion studied and if they are the sufficient amount for the analysis and their weighting. The experts hinted that the price for specific innovations was not considered and that the sector aeronautic is missing.

Another question was if projects aimed at technology transfer and the identification of best practices should be better promoted. Here is a good example from Krakow; the CIVITAS programme (smooth technology transfer/ public transport available by phone) was mentioned by the experts. Such programmes give SMEs the possibility to work with a small consortium to implement the product/ technology in another country first. An example for the fact that smaller projects focussed on SMEs are better is the EUROSTARS programme. The experts also stated that the main motivations for innovation are the customers. A good project is also the one that can be further conducted without funding which should be considered as criteria for the EU.

Concerning the main barriers for SMEs for innovation in the transport sector the experts mentioned that nowadays, many SMEs have an innovation strategy and structure; they do not know why they should innovate more. Furthermore, their access to information is problematic/ limited as they have limited collaborations with research institutes and public bodies. They also do not

have any access to external financial resources, due to the fact that they do not have any money for the training of employees. They are limited in getting/ winning financial resources, as they only get limited information about available funding programmes. The access to venture capital is unavailable, as well. Often, the innovation but not the implementation (the costs are 5 times as high as the initial development) is funded, due to the fact that there is a lack of co-financing. Most of the time the board of management makes decisions but they are not the individuals who should make decisions concerning innovation as the priorities differ (e.g. business plan). There should be an innovation manager or trend scouts. Innovation is often not the focal point. EU funding is not targeted at SMEs but at large companies. Also the aspects of training and risk management have been mentioned. SMEs are often the last link in the value chain and the speed of development often overstrains SMEs.

The subject if the research strategies/ agendas are in compliance with the needs / demands of users was critically discussed. The experts think that the strategies do not define the needs of users and that it is very important to speak to customers / end users like the municipality in Krakow talked about the transport for people with reduced mobility (e.g. elderly people who might have problems with the ticketing machines). The experts do not think that policy measures should aim at minimising the risk of innovative technologies. They think the decision should be made by the SMEs as these are the specialists. It is not the aim of policies. It is the job of specialists.

To promote co-modality the consideration of external costs in the transport prices is considered a good deal. Furthermore, the decarbonisation was discussed and bio fuels and more efficient engines have been taken into account. Here the lack of encouragement and motivation for innovation was named.

Another question was what the experts consider as key factors to be the best innovative organisation in the transport sector. At this point, it was mentioned that services are very important and should be significantly considered. Life cycle analysis and life cycle costs are important (nowadays only a part of the life cycle is taken into account) It is important not to think in terms of the product only but also in terms of services e.g. service of moving freight from point A to point B → before: only rolling stock, now: rolling stock + ticketing + management system solution, i.e. full service. The experts also stated that there are enough funding programmes, the problem is the measurement of risks; a market analysis should normally be done. Risk analysis is crucial and products & services are important.

3.2 Conclusions

In the following section the conclusion from the project analysis and from the experts will be described.

3.2.1 Conclusions from the project analysis

According to the examined data about how surveyed entities face innovation within their organization the further step is to summarize the main conclusions.

The questionnaires were spread among the key players identified earlier, mainly in countries where partners are located: Germany, Spain, Italy, Poland and Turkey and some other countries like Belgium and France. 40 answers were received, 21 from companies, 13 from R&D institutes, 6 from networks and 8 from public bodies.

A consolidate *innovation strategy* linked to the organization's culture is a key factor to be successful in innovation in the transport sector. There are some good examples within the surveyed stakeholders who show their innovation strategy: technological surveillance, relation to marketing departments and networks, align projects with internal technological plans and relation with companies, etc.

Sources of innovation most used by companies are to visit trade fairs and conferences and to be a member of a network, also mentioned is internet research. Networks are, with regard to promotional work, supporting organisations to be updated, for that reason they have to be updated as well. According to the surveys, networks promote the participation in trade fairs and conferences; they also participate in innovative clusters and develop relationships between companies and universities as suitable instrument to approach innovation. R&D institutes are more likely to conduct constant research, publish in scientific journals, visit conferences, workshops or seminars, and be a member of networks as well as innovative clusters. Public bodies, as well as in the role of information provider, mainly participate as a speaker on conferences, and usually function as the contact point for interested organisations in innovation matters. As conclusion for the latest group, it can be considered that there must be more implications of public bodies in the dissemination of information concerning innovation in the transport sector through the use of more instruments like participating in trade fairs, writing articles for networks and improving cooperation with universities.

Concerning *training of personnel*, we can observe that the attendance of external and in-house training courses is a common practice in most companies. R&D institutes base the training on external courses and networks usually do not spend resources on training internal staff. In the case of the adoption of e-learning software for trainings, we can conclude that this methodology is not widespread among the stakeholders in the transport sector.

Factors motivating innovation are strongly linked to how stakeholders face innovation and which type of innovation strategy is adopted. As it can be observed, a main motivation factor for companies is the increase of competitiveness. R&D institutes give priority to leading research institutes concerning innovation in Europe, and, surprisingly, getting public funding is prioritized over customers' demand. It can be summarized that the reduction of public funding affects the capacity of R&D institutes directly. On the other hand, the main motivation factor for networks is the costumers' demand as well as other options mentioned, for example the creation of new jobs and improvement of the companies' competitiveness. Public bodies are concerned about both the improvement of competitiveness in the transport industry and the insurance of environmental sustainability of transport chains and mobility as motivators to support innovation.

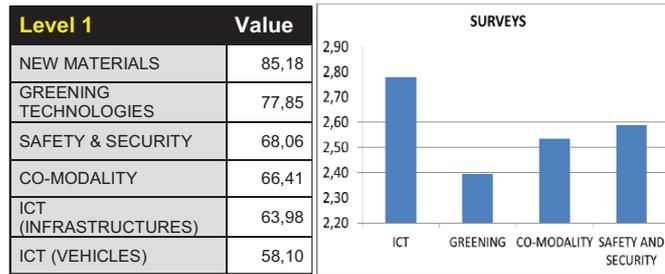
Companies, R&D institutes and networks coincide in financial barriers and funding programmes related barriers as main limitations to innovate. They cannot assume investments without access to public funding which has the inconvenience of complex bureaucracy. Another aspect mentioned by R&D institutes is the cost of replacing equipments to face new projects is too high. In turn, networks point out the lack of qualified personnel focused on R&D management and the long-term return investment associated to R&D dimension of the companies.

It is demonstrated that stakeholders positioned as medium-tech entities have more difficulties to innovate. In contrast, high-tech entities are part of a more specialized group in the transport sector and are more experienced. This can be compared to those large automotive suppliers that dominate R&D in Europe and who have more impact on innovation than the rest of the industry. This situation could be more in favour of SMEs in R&D and innovation. One motivation for SMEs to increase their participation in R&D which consequently would have more impact on the innovation performances, would be to improve their accessibility to research funds for SMEs and make the application regulations simpler.

Other remarkable aspects can be considered as general conclusion within this analysis, such as the need of cooperation between stakeholders trying to address the whole transport system as one in Europe. For that purpose, global actions in order to overcome the discrepancies existing among national solutions are required.

Finally, we compare how partnership and key players have evaluated the technologies. Following below we have a table with the MCDA results on the left and the results from surveys on the right. It is to mention that the ranking represents the positioning of technologies related to innovation according to a set of criteria established through partnership, and results from surveys representing the importance level that key players give to different technologies. Assuming that key players are innovation related stakeholders we can point some interesting conclusions from the comparison.

Figure 18: Ranking vs. surveys



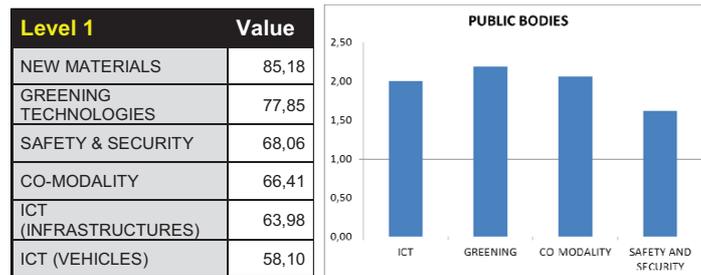
First, it is essential to state that although the field of new materials was the best valued in the partnership ranking, it was not included in the selection of technologies in the survey. This was due to the technological profile of the key players surveyed which was more oriented to ICTs and other fields. From this fact, we can conclude that new materials, in spite of being the highest valued by partnership, are not the main strategic field for stakeholders among transport sector.

On the other hand, regarding the common fields we can observe two main differences between results from ranking and surveys.

- Concerning ICTs, as we can see, key players surveyed consider this field as one of the most important areas of interest. However, partnership rated this field as lowest.
- Concerning greening technologies, surprisingly it is the lowest field valued by key players being in second place in the ranking.

The main reason we can point from this differences is that the preferences related to technological fields depend on the role of the stakeholders. Partnership evaluation is based on a general idea of how each technology is positioned related to innovation. In this regard, position of partnership is linked with general preferences. If we observe the figure below we see that the results from public bodies have more commonalities with partnership but not in the case of companies.

Figure 19: Ranking vs. surveys



According to the results analysed, economical interests of companies which pull research institutes and networks, is not completely linked to strategic agendas and interests of administrations.

3.2.2 Conclusions by the experts

As a summary of experts' observation the following can be stated:

The sample size of the survey is too small to evaluate the market potential of innovation but the cases of best/worst practices gave a good idea of what should be improved regarding the cooperation possibilities between the different stakeholders in order to promote innovation. In general the experts thought that it is a good analysis although it is not easy to evaluate the innovation potential in this sector. As one main factor, it was discovered that SMEs often don't trust themselves to invest in innovation as they cannot afford to take the risks if the new technology will not be implemented or be unsuccessful.

From these findings the experts also made some recommendations:

- They advised that a similar survey and analysis would be very interesting and instructive in the sector of aeronautics.
- The information about funding programmes should be better disseminated in order to motivate SMEs to invest more in innovation; therefore, the access to those programmes should be easier for SMEs.
- To better involve them, SMEs should promote new collaboration with large companies.
- Regarding R&D projects, the project partners should more disseminate the results in order to promote innovation and motivate new stakeholders to build new cooperation.
- A market analysis about risk measurements in the transport sector should be done.

4 Findings and conclusions related to the role of networks

4.1 Key findings

Related to the POSMETRANS project, a network is an extended group of stakeholders acting in the sector of transport and logistics which remains in contact for mutual support, makes use of synergies between the members involved, builds a know-how pool and bundles their individual specialisations in order to concentrate their strengths.

In the framework of the POSMETRANS project, the consortium refers to the following grouping structures at local, national and/or international level:

- clusters
- platforms
- SMEs associations
- technology parks

For the very specific purpose of this paragraph, six examples of networks have been considered. Those networks made a relevant contribution to the questionnaire returned to the partners.

Starting with the analysis of six networks operating in the transport sector, identified as significantly active in the field of innovation, this part has the intent to firstly examine the level and the kind of participation in networks, and what network partners expect from their membership. Secondly, the services actually provided by networks are analysed, and compared with requests, in order to reflect about a networks' effectiveness and to identify critical aspects.

As far as expectations of members with regard to their participation in networks are concerned, information services result to be a priority on the whole: in particular referring to information on funding options, on laws and regulations, and on action plans and guidelines. Network support also seems to be widely demanded in order to find new contact opportunities while the lowest needs for services appear to be related with real innovation development and its introduction into the market.

From the offer side, the survey confirms that services provided by networks mainly satisfy the request for new contacts and for information about technology trends and funding opportunities, through the organization of brokerage events and technology matchmaking, through the participation in trade fairs and conferences, as well as through the support offered to search for new partners for R&D projects and new clients and business opportunities. On the other hand, the request of information on action plans and guidelines seems to get a lower answer from current network services.

At this point, the research proceeds with the identification of some good examples of networks/clusters which are succeeding in their mission to stimulate innovation among SMEs providing effective results. Anyway, from the analysis in object several critical aspects emerge, firstly connected to difficulties in communicating the opportunity services, and to the risk, for networks, to be seen by SMEs only as a means to get funding without a real feeling of commitment.

Subsequently, the survey remarks that there is a problem related to the low information provided on action plans and guidelines, despite the quite huge demand from members. Moreover, the survey remarks the need for a major inclusion of networks in the decisional process, and for them to be more representative of SMEs needs in their lobbying activity.

Furthermore, the low rate concerning the adoption of SMEs innovation is discussed with a reflection on the necessity for a revision of technology transfer strategies adopted by networks, and on the major effectiveness of sectoral networks in comparison with general ones.

Finally, the main critical aspects are identified referring to the usage of European funding schemes by networks and network partners for the development of R&D projects. These are mainly connected with complex requirements and administrative barriers but also with a low interest due to little information flow and too general objectives.

Those critical aspects, related to the survey's results, lead to the identification of a list of "open questions" to be further discussed, being the base for the Experts Panel Meeting that was held on 11th May 2011 at the transport logistic fair in Munich (Germany).

4.1.1 Findings on data collection

The data collection was, as mentioned above, based on 6 main networks that were analysed and considered significantly active in the field of innovation. To be specific, the networks analysed were mainly born in the early years after 2000 and have been running for five to ten years now. Their contribution and expertise is thus significant to our survey in relation with their influence on market entry for new products.

We have remarked that in most cases a network, association or cluster has been typically founded on a voluntary basis, probably because of a need to gather potential and complementary competences. However, 50% of the cases reflect a mandatory approach as well. This is normal for a framework of funded projects aimed at promoting innovation and development.

As far as their nature is concerned their members belong to several categories, although SMEs and public bodies are mainly represented. A particular case refers to a group of industrial nature exclusively and a second network of universities and public bodies. However, most of them involve organisations of different nature.

In terms of investment, generally speaking, it is observed that the financial support is mostly represented by the contribution of each one of their members, i.e. registration fees.

More than 50% also receive public funds through national funding schemes. But apparently, low engagement of European funds on a proportional level is remarked.

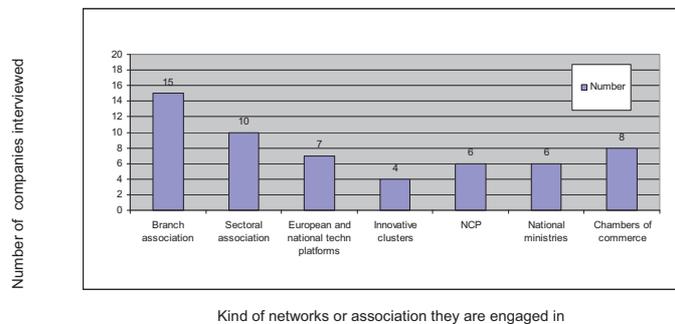
4.1.2 Findings on the survey

From the analysis of the collected data, it is observed that most companies, research institutes and organisations belong at least to one network. Nearly all of the companies and institutes and all organisations interviewed participate in networks. It is clear that there is a need of sharing knowledge and skills, in order to face an increasingly global competitive market.

A second essential step is to comprehend how much European enterprises are aware of the relevance of innovation in their production cycle and of the role of innovation clusters to strengthen their performance and competitiveness.

Apparently, even if companies seem to be engaged in networks or associations, according to Figure 20 reported below it is noticeable that just a few companies are members of innovation clusters/groups.

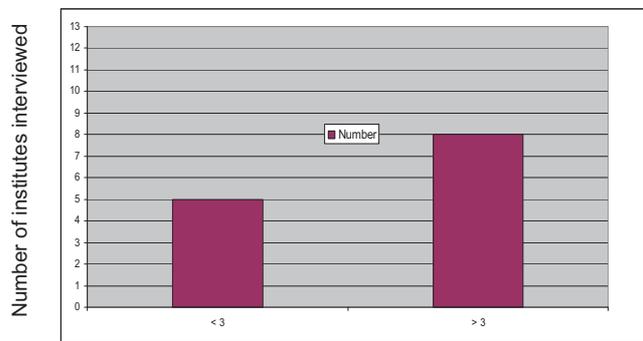
Figure 20: Network partnership distribution for companies



Indeed, most companies appear as a part of branch associations, sectoral associations or chambers of commerce while technological platforms and innovative clusters present a lower rate of membership among the interviewed companies. As a result, it seems that further efforts are required to foster the participation in networks as catalysts for innovation. On the other hand, as will be pointed out in the next paragraphs, it has to be considered that sectoral networks dealing with the transport sector seem to have a stronger effectiveness, and consequently, gives reason to wonder about the opportunity to support these kinds of networks more than general ones.

However, institutes and organisations have been analysed in terms of global recognition of network and associating services. Therefore, it seems that institutes and organisations show important appreciation of their value, revealing an average rate of more than three membership commitments as presented in Figure 21.

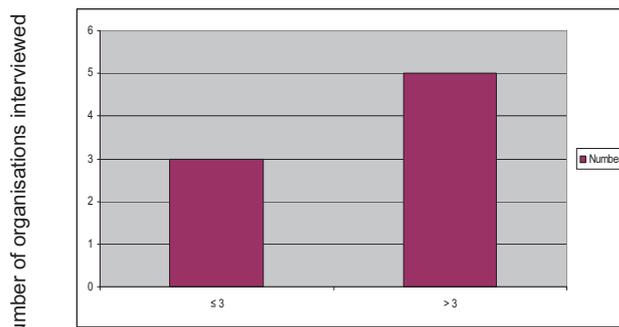
Figure 21: Institutes and membership commitments



Number of membership commitments

In the sections below the expectations of members with regards to networks and their promoting innovation is analysed. The Figure 22 shows the number of membership commitments among the interviewed organisations.

Figure 22: Organisations interviewed and membership commitments



Number of membership commitments

A reflection of the role which networks could play to stimulate the innovation processes has to start from an analysis of what their users expect from their participation and the other way round.

The interviewed samples highlight a correspondence between the services most required by companies and institutes. Probably, they both primarily seek for information on funding options (respectively 3,4% and 4,1%) and for new contact opportunities (respectively 3,7% and 4,4%); i.e. networks are conceived as functional to their normal operations.

The graphics below (Figure 23, Figure24) provide a comparative analysis of what companies and R&D institutes expect from networks in terms of services.

Figure 23: Companies

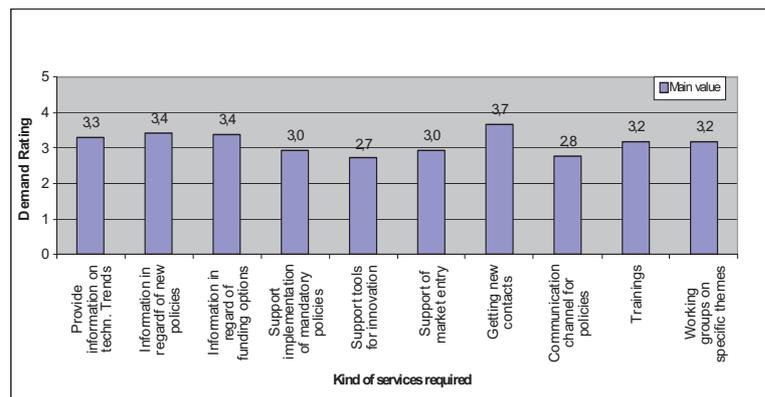
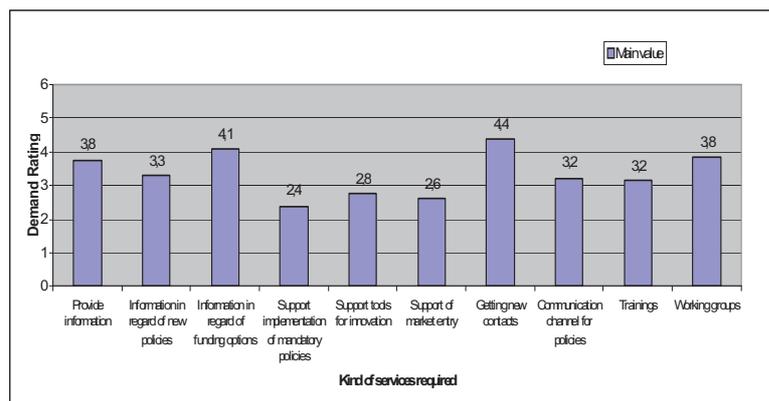


Figure 24: R&D institutes



Information services are a priority on the whole. Especially, as far as funding opportunities are concerned. Such services may be connected with innovation strategies, as both the identification of new funding opportunities and the research of new contacts may lead to the creation of partnerships for joint R&D projects.

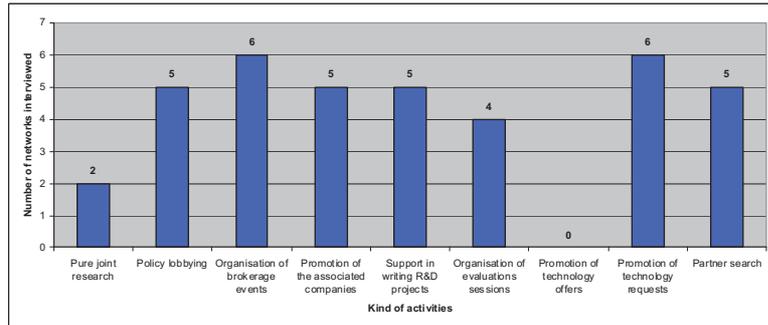
A good deal of attention is, as well, paid to the opportunity to get information on technological trends (mainly by research institutes) through networks. Support tools for innovation are equally considered by both categories whereas support for market entry has, logically, priority to companies rather than to R&D institutes. Using networks as direct communication channels towards specific targets is a key feature for both groups. On a medium level range, training on innovation is noticed to be an important service sought, as well.

The lowest needs for services seem to be related to real innovation development and its introduction into the market. On the other hand, networks are mainly identified as a source of contacts and information about laws and regulations. In this regard, training and information actions deliver fundamental results to companies, particularly as far as the implementation of legislation at EU, national and local level is concerned.

From the collected questionnaires, a great interest in being updated about action plans and guidelines can be identified. As above, the instruments considered most useful are the organization of training measures and of regional information days while coaching services, and information days, too, are mainly demanded in order to get information on action plans and guidelines.

Having considered the aforementioned requests revealed by the questionnaires, it is time to compare such real network service offers which are going to be analysed in the next section. The services mainly offered by networks appear to fulfil requests for new contact opportunities and for information on funding options. As shown in Figure 25 brokerage events and technology matchmaking are often promoted as network services. In fact, they are mainly involved in the organization of brokerage events and in the support of technology transfer, by promoting technology offers and requests. Furthermore, networks offer support to search for new partners and new clients and new opportunities for business. In many cases, assistance for writing R&D projects is also provided which very often is a relevant service related to information on funding opportunities.

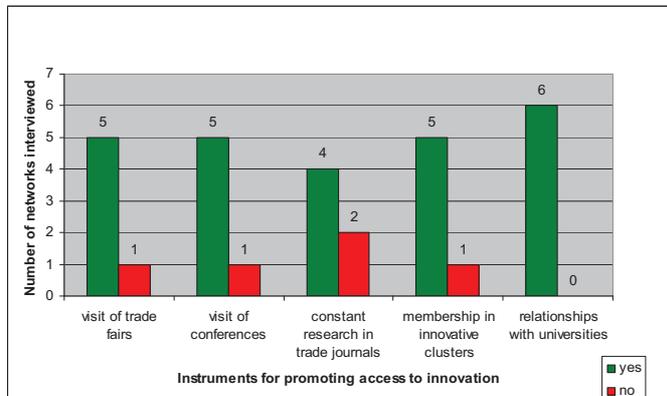
Figure 25: Kind of activities concerning the networks



Concerning the information methods the interviews show that they are fully fulfilled, referring to the updating on new technologies developments.

Figure 26 presents that access to innovation sources is a widely requested service mentioned by most companies. Networks apparently promote the participation in trade fairs, conferences, and develop relationships with universities as suitable instruments to approach innovation.

Figure 26: Number of Networks and Instruments



The highest rate is assigned to the link with universities that are well considered as worthy innovation developers.

As pointed out in the previous section, the request of information on action plans and guidelines emerged especially from research institutes. However, it seems to get a lower answer from current network services. In fact, most of the networks interviewed do not offer this kind of information. Therefore, networks should boost its service in this are, in order to meet the clients' de-

mand: in particular in the kind of activities mainly requested which are the organization of coaching services and of information days.

Company employees need to be constantly trained and updated, in order to be as qualified and as efficient as possible. All interviewed networks seem to be aware of this, and the preferred way to fulfil this aim appears to be the adoption of e-learning programmes, followed by a constant in-house training and the attendance to training courses.

An assessment on this specific item has been made on a general basis and no concrete reference to training programmes on innovation was made. However, the survey reveals the importance of such an aspect and satisfactory results on behalf of networks.

Two thirds of the interviewed networks declare to actively participate in European funding programmes. This confirms their role of actors more and more recognised as key subjects for the economical development and the support for innovation in Europe. Nevertheless, as it will be explained in the next paragraphs, several critical aspects remain regarding the participation in EU funding programmes. They are mainly related to complex requirements and administrative barriers but also to a low interest due to little information and to general objectives.

Normally networks are promoters of coordination and support actions which might bring benefits to many organisations and companies in their territory. In order to participate in European projects, it is significantly important that networks develop relationships with other partners which most often are other networks. The collected data shows in particular, that most of them are members of a large network and/or are national branches of a European platform.

For this purpose, we saw the need, to foster also transnational relationships between networks at the same level, offering complementary skills, or aiming at similar research interests, as well, confirming what was pointed out by the European Commission previously.

Moreover, talking about research projects, networks should enhance their relationship with research institutes, too, to strongly assure the exploitation of research results. On the other hand, SMEs should not be forgotten, as they may as well offer an essential help to achieve high levels of excellence and innovation. Networks are suggested to concentrate their efforts on playing their role of intermediaries, in order to get as much synergy as possible between all actors involved in each R&D project.

Summing up the data analysed in the previous sections, it is time to compare the usage one can have of the services mentioned before. These results are presented in the following Figure

27 and Figure 28. Apparently, information on funding opportunities and support in making new contacts are the most appreciated and involving services. However, on a general basis it is remarked that R&D institutes and, on a lower level, companies make enormous usage of events and tools for promoting innovation.

Figure 27: Usage of network services - Companies

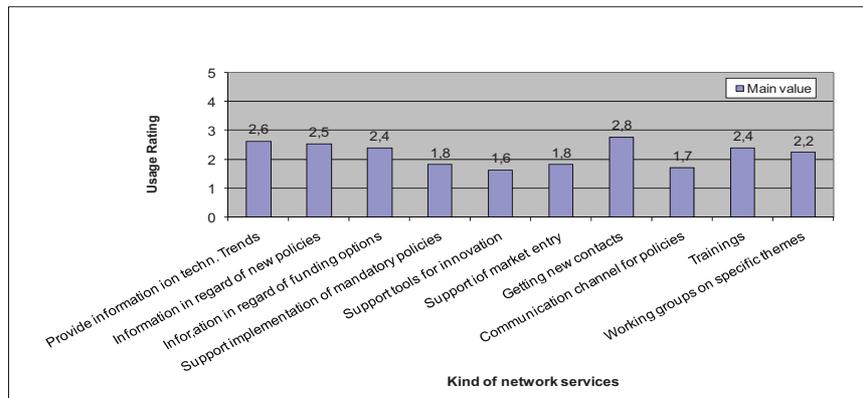
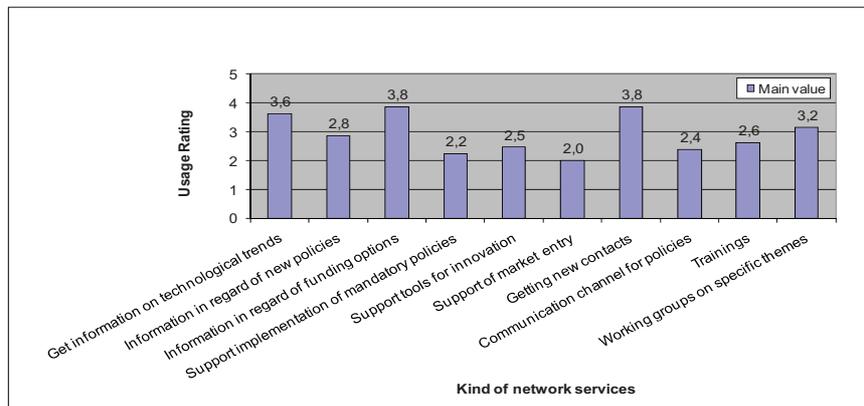


Figure 28: Usage of network services - Institutes



These necessities lead to identify the organization of brokerage events and the promotion of technology transfer as an effective, and mainly required, activity, to be further enhanced in the future.

At least, by comparing usage rates with offer rates, regarding network services on the whole, figures cause for the thought for reviewing methodologies, subjects and real needs. Indeed, it seems that the real demand is not widely met by networks, as the relevant problem is probably related to how to communicate these opportunity services.

Then again, a main threat emerges concerning this situation, as networks risk to be seen by SMEs only as a means to get findings, with a lack of information or awareness. SMEs often take networks as functional, and do not really feel committed to them.

4.1.3 Findings of expert validation

In the second expert panel meeting the experts were asked different questions related to the role of networks in Innovation.

As a result of the POSMETRANS survey addressed to companies and research organisations, evident differences are noticeable and it appears that the latter know more about funding opportunities than companies. The experts mentioned that the main issues seem to be a lack of time to follow the evolution of programmes and thus lack of information. In addition the bureaucratic burden implied by participation rules, probably, decrease an interest on the side of SMEs as well in general terms, SMEs are in any case better to be involved in small projects rather than in larger scale ones (short-term thinking). Some bad experiences when starting with a project to large were mentioned and the perception of SMEs often leads to a misunderstanding and the thinking that networks dismiss their needs.

Generally speaking companies show lower usage of network services than research institutes. Why are companies not interested in these services? As far as clusters are concerned, they are set up because of a specific demand by SMEs (companies) and normally work efficiently and are well recognised by their members (know the point, why they meet etc.). In other cases, they are founded upon evolution of former networks and it becomes a sort of networking of networks. Small networks know each other better and know why they exist. The threat may appear when they offer a variety of broad services as SMEs better appreciate a focus on specific services actually responding to a need which in fact occurs in the target sector. Concerning the promotion of technology, the experts stated that for example in the sector of cargo transport (e.g. maritime sector), there are no SMEs, only big companies. Whereas ICT is concerned related to the food sector, often SMEs are producers; they follow the regulations but are not fully aware of the possible tracer based on ICT available on the market. About 10 years ago, RFID technology has seemingly not been used in a broad field. Nowadays it is introduced "everywhere".

Participating in technology platforms should be mentioned as a valuable tool to bring significant feedback from industry to EC (European Commission).

It is difficult to establish a general statement concerning networking valid for all member States. Sometimes “clustering” is considered as a bad practice in itself as SMEs often think or focus their needs on a short-term basis, usually referring to a current functional need. In Spain and Italy, it is normal in business to plan ahead for 6 months but not years. Therefore, investments and commitment on grouping practices are not a valid practice in those countries. Reports about Turkey show a situation in which SMEs leave innovation to large companies whereas they prefer to focus on daily short-term operations. To counteract this situation, the framework programme includes special calls for SMEs to participate in projects. However, the big problems usually arise after a project is completed. Innovation vouchers could be more efficient and sufficient in order to involve a larger number of SMEs by funding smaller projects instead of major ones.

It is difficult to measure the success of a network as far as SMEs are concerned (it would be interesting but difficult to measure histories). One of the main indicators for success of a network is its sustainability.

The current state of the art reveals limited means for SMEs. However, there are many national SME programmes which should be extended if necessary. These facts should guide many efforts on a national basis, in particular. For this purpose, networks that have a larger influence than single actors could bring key benefits.

About the importance of networks in the establishment of political initiatives, the policy lobbying activities of networks and how to increase the awareness of industry and research actors, experts mentioned that networks surely have an important role to play as they are involved in many lobbying actions (writing position papers etc.). As far as the added value of networks is concerned, there are two levels: one for participants and one for public authorities (national and EU level). Networks fill the gap of knowledge between ministries, public bodies and companies regarding the field of experience. They provide a general overview of a section, its situation and evolution. For example, European technology platforms were only created to take in the role of advisory council for the EU.

The importance of networks in policy driving actions is confirmed by experts but it is very time consuming and the value is generally not recognised by SMEs. It is observed that many networks start and end according to new project objectives repeating the same start from scratch with other partners, as was the case of the networks of excellence in FP5. It is difficult to implement the idea that there should be a business structure able to finance the project on a self-sustainable basis. Indeed, good networks do not need long-term government subsidies as

they can manage themselves autonomously. Clusters created through private initiatives are the best example and good practices as they are applied to concrete requirements.

For example, 30 strategic projects have been defined by EC for European transport networks. The experts have been asked if they think that those strategies are well related to or synchronised with priorities in funding programmes. Their answer was that we should not compare TEN T projects to R&D projects. TEN T are not innovation projects (no R&D) and consequently not technology driven. For example the main task in Transitects: go through priority corridors for containers for synchronisation problem / subcontracting with SMEs to get them in the project but they have a very indirect experience of those priorities. These projects do not encourage future projects, as there is no future if SMEs cannot participate → where is the R&D approach? Recommendation: R&D should be combined with investment programmes.

Besides the examples for best practices on networking (France: "Pôle de Compétitivité"): One of the first to have applied this model e.g. 7 pc in France in the transport sector is well known for their performance on a self-sustainability basis, policy driving, public/private collaborative projects, technology driven. A few years ago, the Piemonte region has created 12 innovation poles following this model, too. And networks such as EEN offer services like customer management, brokerage events, partner search, etc.) the experts mentioned the following:

The ESA technology platform represents a good model of how to spread a patent on the market but at the EU level of funding programmes, there is a loss of innovation by lack of communication and a real use after projects have ended.

In other countries, there are further well-noticed best practices:

- "Aviation Centre for Advanced Technology" – network of excellence;
- "Institute for aeronautics engines" – provide support for NCP for e.g. PR, workshop organisation etc.
- Geoinformation that counts several success stories but no significant quantitative measures Platform Logistop (ES)
- Logistic network in Baden-Württemberg
- ITA and regional network of SMEs in ICT (ES)

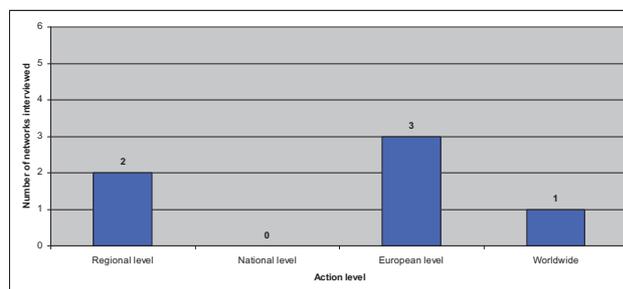
4.2 Conclusions

The following section shows conclusions by the experts and conclusions related to the role of networks regarding the projects analysis.

4.2.1 Conclusions from the project analysis

Starting from the examined data on the actual usage of network services, the further step is a reflection on their effectiveness which is going to be discussed in the following paragraphs.

Figure 29: Mainly operating levels of networks



The data analysis results show that the most operative networks are those acting at European or regional level. It is interesting to note how these data are in line with the general trend of a European space in

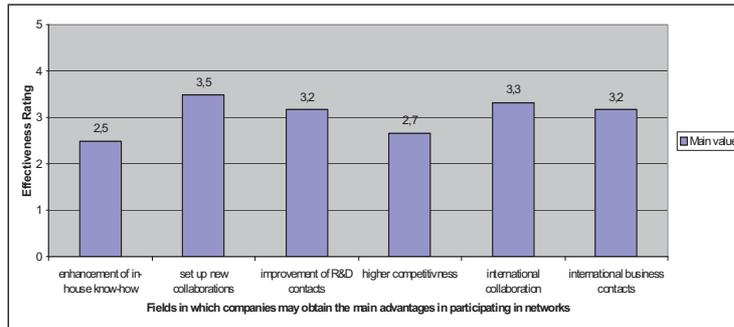
which national frontiers are being overcome due to their more frequent transposition of interests, business and activities at European or regional level. For this reason, it is becoming more and more important among networks to cooperate cross-border and interregional, in order to create a European innovation space.

Nevertheless, cross-border networks should be the result of working groups on national levels. The most efficient strategies link European to national policies. Very often they are the drivers of globalization in one country.

Network's activity has then to be compared with their effectiveness in terms of services offered and added value provided.

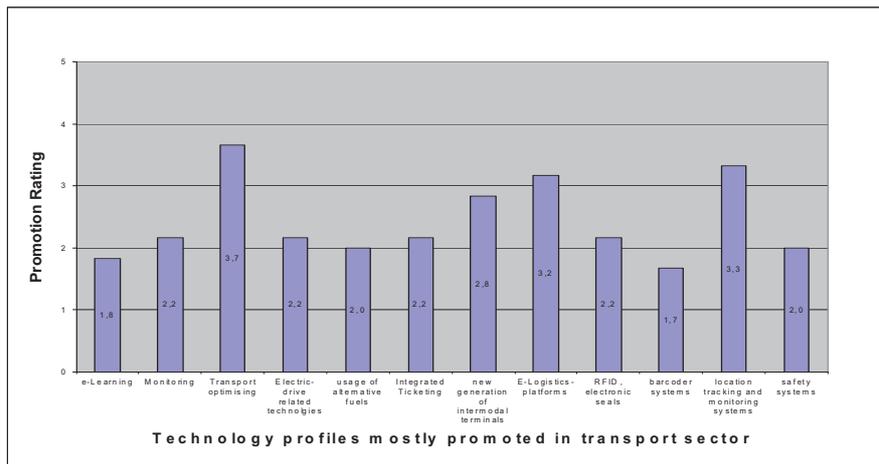
The analysed networks seem to get the best results in setting up new collaborations (see **Figure 30** below): which means that this field results to be the one in which companies may obtain the main advantage through participating in these networks. Generally speaking, a network's major effectiveness may be found in their capacity to find new contacts and establish international cooperation both for business and for research & development activities. Services such as brokerage events and technology promotion offers and requests should then be especially supported by public authorities as most effective innovation boosting services.

Figure 30: Main value-added services



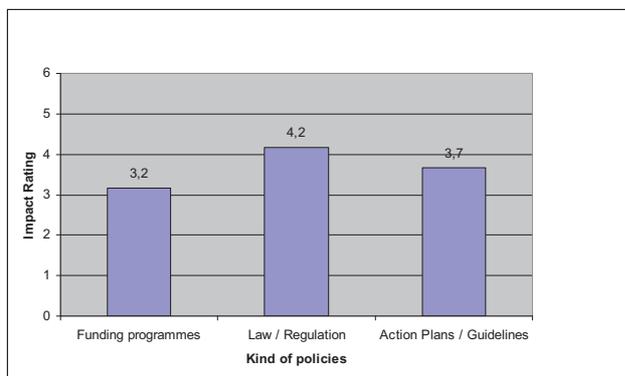
Most of the work aimed at seeking new contacts is made by promoting technological profiles: the graph below (Figure 31) points out that, in particular, in the transport sector, technology offers and requests mainly promoted are related to the areas of transport optimising, e-logistic platforms, location tracking and monitoring systems. Technologies in these specific sectors seem then to be easier to be introduced into the market: such a statement should lead to a reflection on the sector network effectiveness, and, as a consequence, to wonder about the opportunity to support these kinds of networks more than general ones. A cross-sectoral cooperation could then be stimulated through the creation of a meta-cluster with common interests and complementary skills.

Figure 31: Technology profile promotion



The purpose of network policies coincides with the main goal to support networks and stimulate their potential as innovation catalysts. POSMETRANS analysis is aimed at identifying which network policies have the more effective impact on business and innovation (Figure 32).

Figure 32: Impact of policies on daily business and innovation



The survey conducted has pointed out that laws and regulations mostly influence the innovation processes; they are followed by action plans and guidelines, and, to a lesser degree, by funding programmes.

As a consequence, given the effect of such policies on networks effectiveness, it results extremely important to verify how many networks are there to influence the legislative and the policy making processes and how they can influence it. Meaning that it is important to discover how effective networks are in their lobbying activity.

Half of the interviewed networks seem to be able to have some influence on the legislative process aimed at the elaboration of laws and regulations. As seen above, it is a field of activity networks are really interested in as by complying with regulations, networks and their members can both get important advantages and confront specific difficulties.

The advantages are mainly in terms of new inputs to carry out research activities, in line with the legislative requests. Furthermore, but in a lesser degree, by complying with regulations, networks seem to achieve an improved and more positive image, as well.

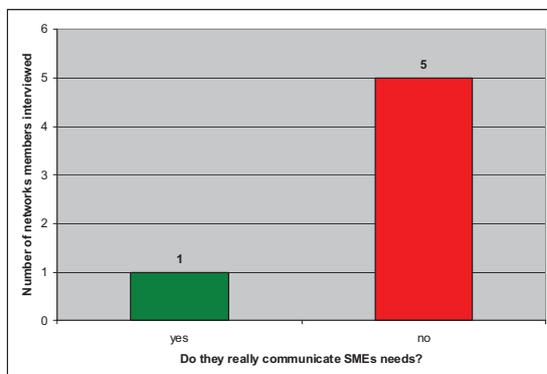
Therefore, it results extremely important for policy makers to keep networks constantly informed about new regulation proposals, and to find a way to make them participate in laws elaborations. For the same reasons as seen in the previous chapter, information on laws and regulations are mentioned among the most requested services by the interviewed companies and research institutes participating in networks.

For a network, on the other hand, difficulties are mainly related to increased costs in order to front new legislative requests and above all, to the lack of knowledge about them: here again, the necessity of an effective information activity on laws and regulations is needed.

Thus, referring to the policy making process, it is important to reflect on how networks themselves are able to influence such policies, and how much they are involved in the related decisional processes. Most networks analysed actually participate in such processes. However, a major part seems to be involved as external observer only giving inputs, while just a few of them are actively involved as writers themselves. Considering the importance of policies, laws and regulations for the innovation process, it would be essential to find a way to reach a more active participation of networks in the decisional process.

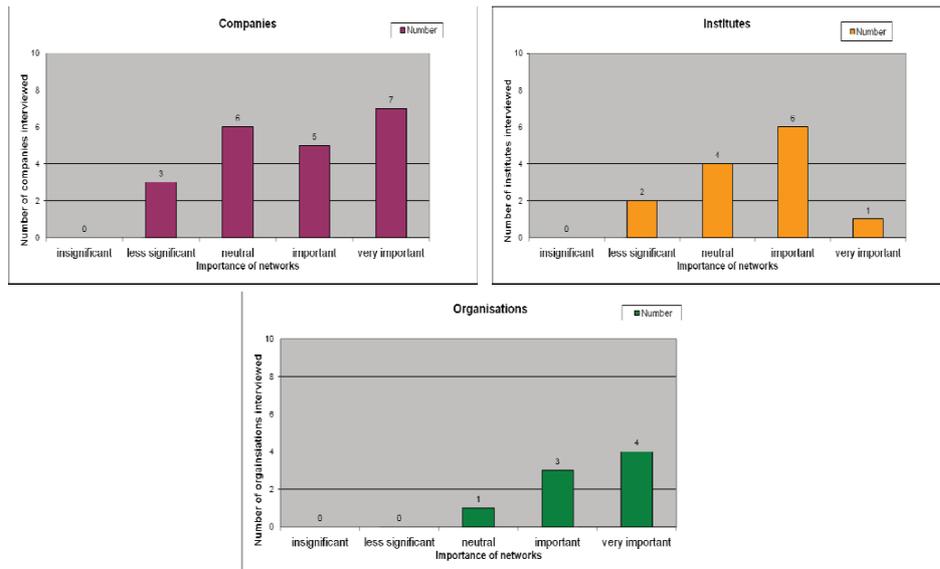
A further question is: do networks really communicate SMEs needs? The data collected on this concern, as shown in Figure 33 below, lead to the conclusion that most of the networks do not really communicate SMEs needs whilst taking part in the decisional process. That is to say that there is no necessary consent between a network's interest and their partner's. It is a crucial aspect connected with the previously highlighted lack of sense of belonging to most networks in which SMEs are involved.

Figure 33: Do networks really communicate SMEs needs?



During the POSMETRANS survey, several topics were asked on the importance of networks concerning the support for the market entry of an innovative product. In general, networks result to be considered quite important concerning this matter, but some differences may be identified referring to different kinds of facilities, as shown in Figure 34.

Figure 34: How important is market adoption of innovation considered?



In fact, there are a significant number of companies and institutes which consider the support of networks “less significant” in this purpose, and many other companies seem to consider their role “neutral”. On the other hand, networks result to be much more essential for organizations: in fact, most of them judge a network’s support for the market entry of innovative products “very important”, some others consider it “important”, and a few consider it as “neutral”, while none of them answered describing the role of networks “less significant” or “insignificant” as far as market adoption of innovation is concerned.

However that may be, another problem aroused from the conducted survey. It is related to the fact that rates concerning the adoption of SMEs innovation into the market seem to have an average of 50%, but not higher. Only one third of the interviewed SMEs stated that fewer than 20% of innovations are implemented where as two third said that between 40-60% are not implemented.

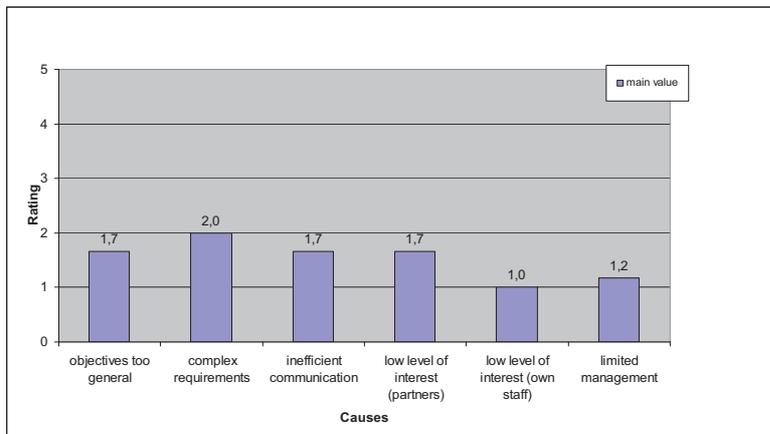
This leads to a need of reflecting the real effectiveness of technology transfer programmes promoted by many networks in introducing technologies into the market. In fact, despite the efforts done in this direction, the reported data make it obvious to think of a significant waste of resources.

Introductions of technology into the market seem not to be easy in any field. But, on the other hand, it should also be considered that it is very difficult to find the right indicators to measure the effectiveness of networks on such an issue.

As mentioned above, a crucial aspect concerns the low information provided on action plans and guidelines, despite the quite huge demand of their members. This puts a focus on the need to draw attention to the need for a major inclusion of networks in the decisional process. It would then be possible to stress the awareness of industry and research actors of the policy lobbying activities of networks, once their importance in the establishment of political initiatives will have been clearly defined. A second critical aspect is caused by the low rate concerning the adoption of SMEs innovation into the market which should lead to a revision of technology transfer strategies adopted by networks, in order to improve their effectiveness and reduce the waste of resources.

Furthermore, as a result of the POSMETRANS survey, it appears that the main critical aspects are related to the low usage of Europeans funding schemes by networks and network partners for the development of R&D projects.

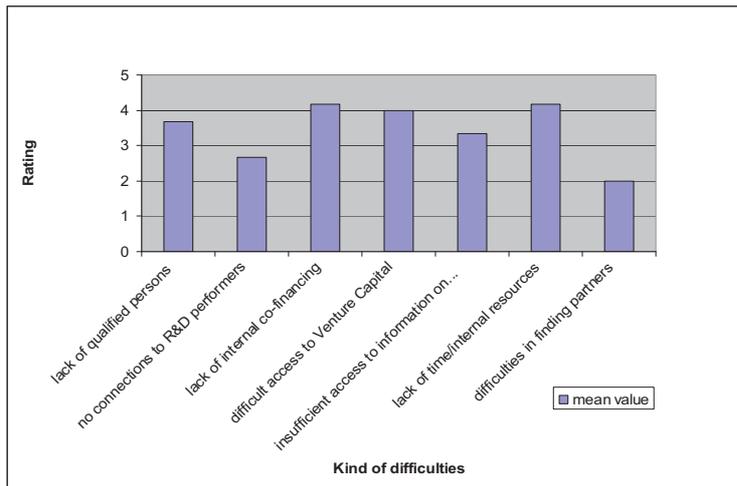
Figure 35: Negative experience concerning EU programmes



Negative experiences concerning EU-programmes seem to have discouraged networks to constantly follow this direction. Such experiences are connected, above all, to a too complex set of requirements to participate in most programmes, but also to the low interest level of partners, and to too general objectives as shown in Figure 35.

The following graph (Figure 36) provides an overview of the difficulties SMEs have in performing R&D activities

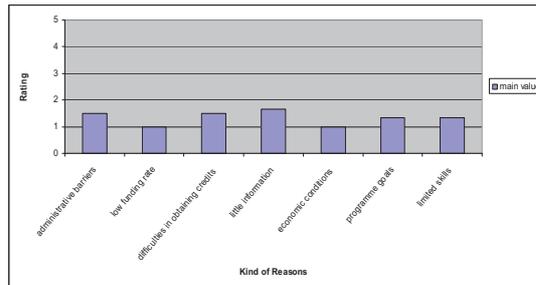
Figure 36: Difficulties performing R&D activities



Regarding the last point, it leads again to a reflection of the opportunity to enhance sector networks which could concentrate on more sectoral and specific projects, nearer to SMEs and to the specific needs of network partners. For this reason, it will be necessary to further consider this point, in order to clarify whether sector networks are actually more efficient than general ones.

The second important matter is to understand the reason for the low interest level of partners: on the one hand, it may be due to the previously highlighted insufficient communication of SMEs needs during network participation in the decisional processes resulting in a weak compatibility between the chosen programme's objectives and the actual partners' interests. It is important, on the other hand, to further explore other possible reasons, too.

Figure 37 shows on the one side that difficulties in performing R&D activities are mainly related to the lack of funds; on the other side, that various reasons can be identified for not taking part in EU funding programmes: administrative barriers, in particular, in addition to a lack of skills and information which is again an essential element to increase participation in this type of projects.

Figure 37: Reasons for not taking part in an EU funding programme

To sum it up, an increased integration and communication between networks and network partners is needed to front the reported difficulties. It is, furthermore important to reflect the need for specific funding measures for SMEs, well targeted and easy to deal with. Such measures could focus on networks as key actors through whom an effective decentralised funding process can be achieved and realised.

4.2.2 Conclusions by the experts

The expert panel stated the following on the role of networks:

The sample size of this survey is too small to evaluate the innovation services which should be boosted by public authorities properly. Network members are not always fully aware of their main motives to belong to a network. SMEs should more actively participate in networks. Another problem for SMEs is that they often feel misunderstood in their needs and rejected by networks. SMEs mainly focus on short term issues and often think innovation can only be applied by large companies.

Networks have a very important role to play in the establishment of political initiatives. They hold an intermediate position between the industry, research organisations and public bodies and ministries. Conversely politics decide which network will be funded. There are political interests involved. Sustainability was also identified as a main success factor for networks.

The experts also gave some recommendations concerning networks:

- Networks should apply an improved strategy for communicating information in order to raise the SMEs' awareness of the benefits they could get through a membership and involve them more in decisional processes.
- Networks offer broad services whereas the focus should be on a specific service in response to a specific need.

Findings and conclusions related to the role of networks

- Networks should apply an improved strategy for dissemination of the results after the end of a project in order to motivate new stakeholders to invest in innovation (by the diffusion of best practices cases).
- The partnership should make efforts to collect further impressions on this item to further complete the survey and make it significant.

5 Findings and conclusions related to the impact of European and national policy measures

5.1 Key findings

In the following section key findings are described and differentiated in three groups: data collection, survey and expert validation.

5.1.1 Findings on data collection

This data collection was divided into two levels - in a European and a national level. The findings on both are described in the following.

On the European level, the findings show that 12% of all law and regulation policies concern all transport modes (Rail, Road, and Water); this equals 5 out of the 42 collected policies. Moreover, 44% of the total 36 EU action plans collected by POSMETRANS, concern all transport modes. Lastly, 92% of all EU funding programmes collected by POSMETRANS partners concern all transport modes, this corresponds to 11 out of 12 gathered policies. The results of the data collection on EU level can be summarized as follows:

EU laws and regulations have the highest value with respect to their mandatory level and their high concern about environmental issues, but they are not very consumer oriented.

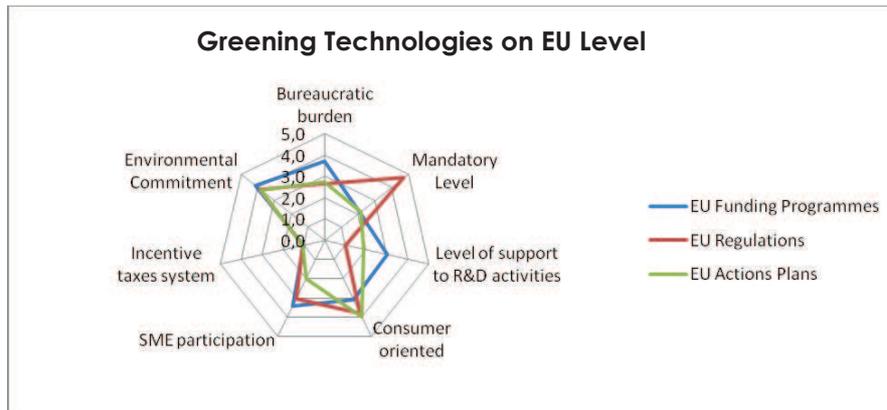
Similarly, EU action plans have the highest value in terms of their simplicity of implementation and their deep concerns about environmental issues. But they lack consumer orientation.

Furthermore, EU funding programmes are highly concerned with environmental issues and the level of support of R&D activities. On average, the participation of SMEs (percentage of funding programmes allocated to SMEs) in EU funding programmes is low.

For the rest of the analysis, it has to be mentioned that only results of the list with three or more examples of funding programmes, laws and regulations, and action plans were considered for each analysis. Therefore, the average was calculated in each category regarding EU laws and regulations, EU action plans and EU funding programmes for each technology.

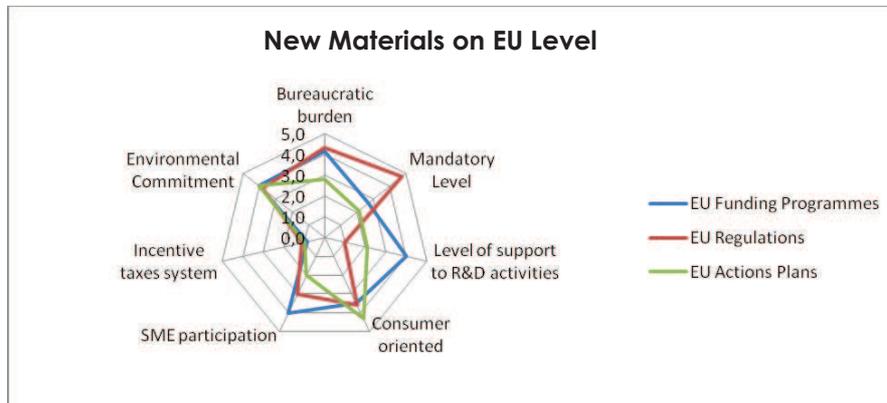
Regarding greening technologies, as shown in the graph (Figure 38) below policies consider consumer orientation and environmental commitment. R&D activities are supported by EU Funding programmes while EU regulations have low support. In all supportive policies "SME Participation" is high.

Figure 38: Greening Technologies on EU Level



New material technologies (Figure 39) are especially emphasized on in policies with “Environmental commitment”. In all categories, an incentive tax system is not a focus point. Bureaucratic Burden is high on both Funding programmes and EU Regulations. Action plans focus on environmental impacts and consumer orientation.

Figure 39: New Materials on EU Level



SME Participation is high in EU funding programmes and EU regulations regarding ICT technologies in vehicles (Figure 40). R&D support in funding programmes is low when compared with other technologies.

Figure 40: ICT Vehicle Technology on EU Level

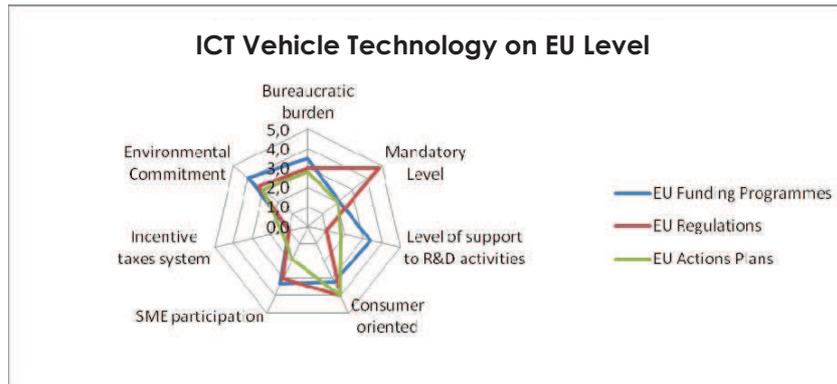
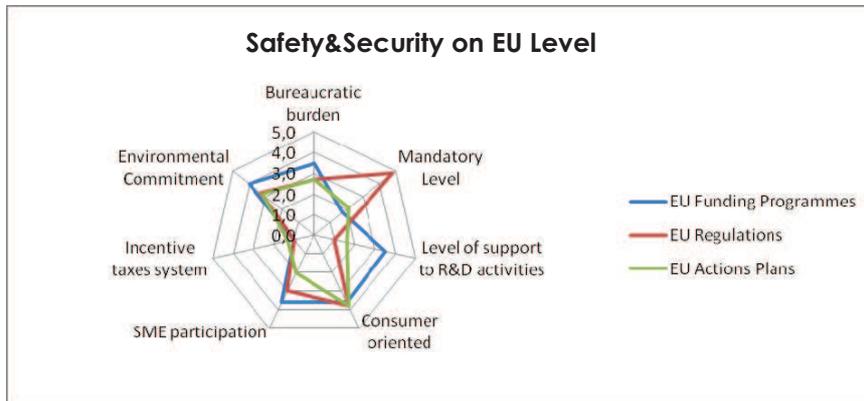


Figure 41 below shows a high value of Safety & Security technologies in all supportive policies regarding “Environmental commitment”, and the high mandatory level in EU regulations.

Figure 41: Safety & Security on EU Level



Environmental commitment is high in all three categories. SME participation has a similar tendency in all supportive policies as well as in consumer orientation. In Figure 42 the situation concerning co-modality on EU Level is presented.

Figure 42: Co-Modality on EU Level

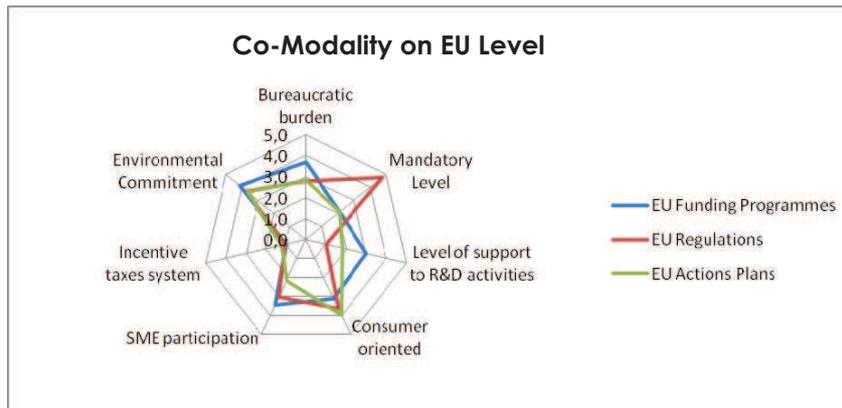
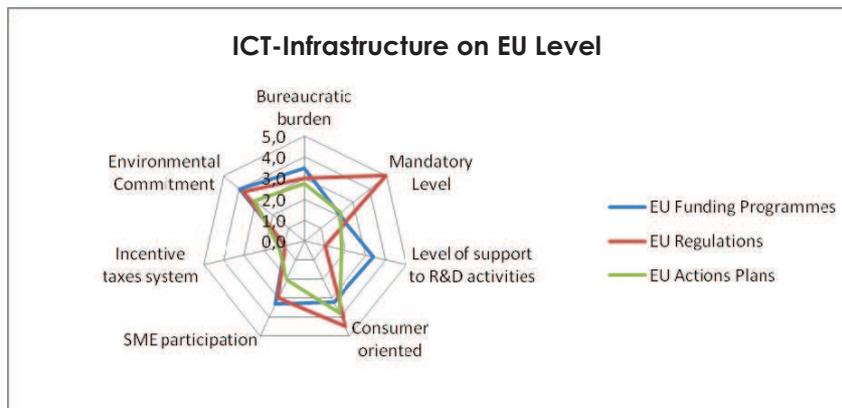


Figure 43: ICT-Infrastructure on EU Level



EU regulations have a high value especially in “Consumer orientation” which is also supported by action plans. SME participation is low in EU action plans. Environmental commitment is supported by all categories.

In general, all analyzed technologies have a similar tendency. High bureaucratic burden and a high mandatory level in EU regulations exists in all categories. Environmental impact is also considered in every policy relevant for all technologies. SME participation is another important point for all categories.

The findings on national level policies include all transport modes and are divided in three groups:

- laws and regulations
- action plans
- funding programmes

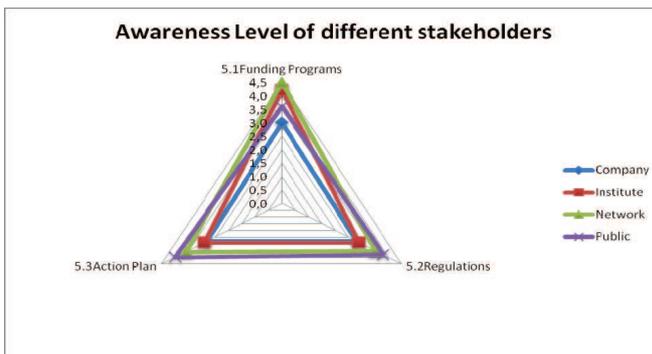
The main results on national level policies show that National laws and regulations have the highest value with respect to their mandatory level. National action plans and guidelines are seemingly easy to implement, but they are not very consumer oriented.

Looking at National funding programmes, they have a strong impact on SME participation, level of support of R&D activities, are seemingly easy to implement, but not very consumer oriented.

5.1.2 Findings on the survey

Every partner assessed stakeholders according to the prepared questionnaires. One of the questions asked concerned the awareness level on policy measures. Positive and negative experiences on participation in funding programmes were also examined to determine problems and solutions for related issues. The results for the level of awareness of stakeholders are shown in Figure 44.

Figure 44: Awareness Level of different stakeholders



The awareness level of networks on funding programmes is high while companies have less knowledge on funding programmes. Public bodies have a high awareness level on action plans and regulations.

The reason for not taking part in a EU funding programme are shown in Figure 45. Administrative barriers and a lack of information about R&D programmes are the main reasons for not partaking in EU funding programmes.

Figure 45: Reasons for not taking part in EU Funding Programmes

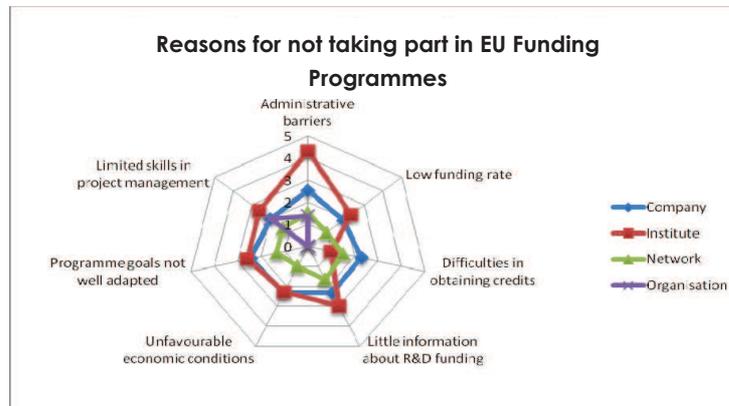
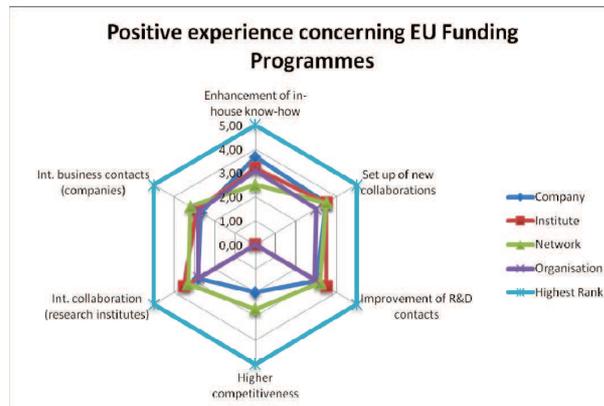


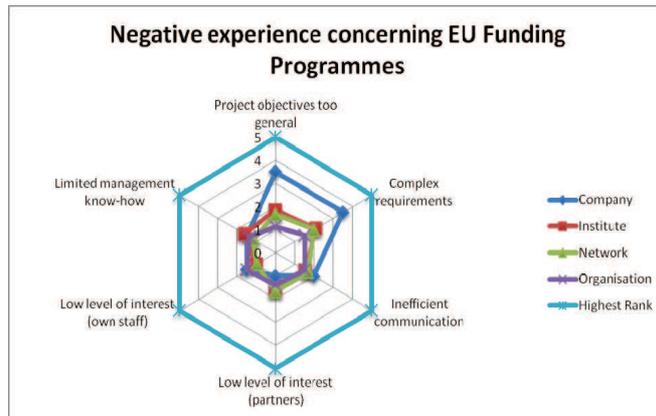
Figure 46: Positive experience concerning EU Funding Programmes



Companies made a highly positive experience in particular on the enhancement of in-house know-how. All stakeholders made similar positive experiences concerning the improvement of their business skills by participating in EU funding programmes and fostering collaborations with other stakeholders. The findings are shown in Figure 47. Funding programmes whose objectives are too general are determined as negative experiences. The complexity while participat-

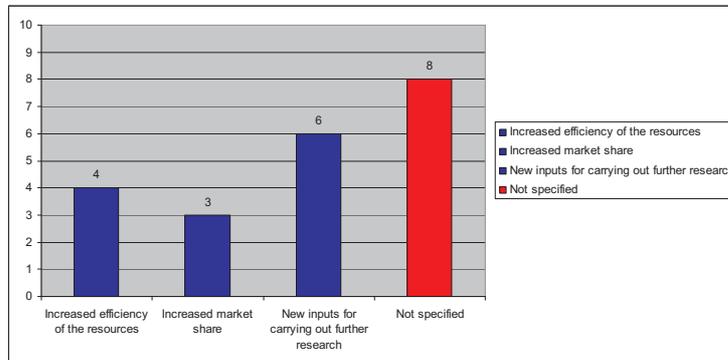
ing in funding programmes is another issue that companies come across within their submissions.

Figure 47: Negative experience concerning EU Funding Programmes



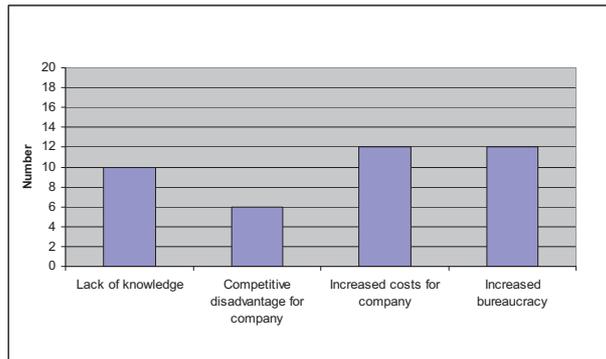
The following Figure 48 shows the findings concerning the benefits complying with regulations:

Figure 48: Benefits complying with regulations: Companies



Regulations provide new inputs to carry out further research. Increased efficiency of the resources is the second impact on different stakeholders. Regulations also support stakeholders to increase the market share. The next Figure 49 shows the difficulties complying with regulations:

Figure 49: Difficulties complying with regulations: Companies



When we examine companies, one can easily see that companies have some difficulties complying with regulations. Increased bureaucracy and cost issues are the main issues for companies. In Figure 50 the request for better a implementation of law/regulation concerning companies is shown:

Figure 50: Requests for a better implementation of law and regulations: Companies

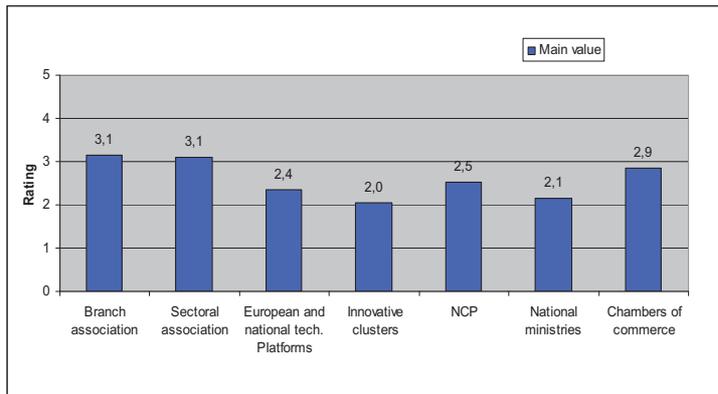


Companies require more coaching services and Training measures in order to facilitate the implementation of law and regulations.

The relevant information channels concerning different stakeholders are shown below. The relevant channels for companies are branch associations and sectoral associations. Innovative

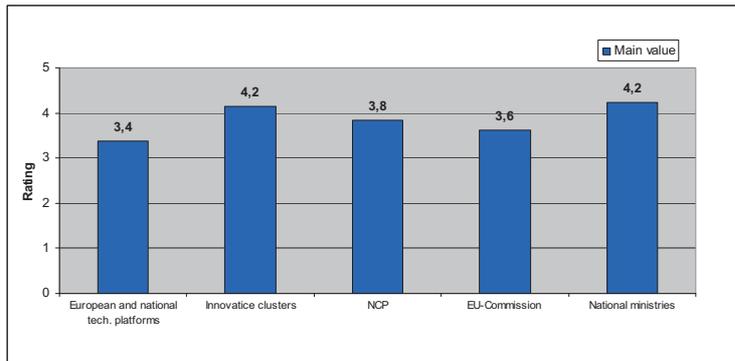
clusters and national ministries do not have a high priority for companies. The results are shown in the following Figure 51:

Figure 51: Relevant channel concerning information: Companies



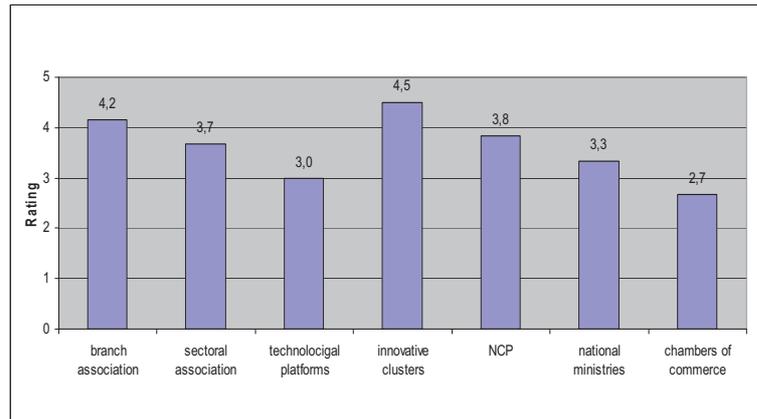
The relevant channels for Institutes are innovative clusters and national ministries. National Contact Points (NCP) are interesting for institutes, too. The results are shown in Figure 52.

Figure 52: Relevant channel concerning information: Institutes



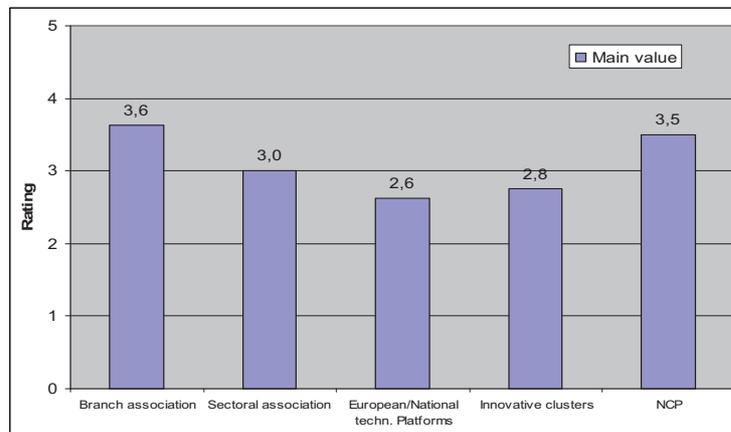
Innovative clusters and branch associations are, as shown in Figure 53 the main information channels for *Networks*. Chambers of commerce and technological platforms are not highly classified as an information channel by networks.

Figure 53: Relevant channel concerning information: Networks



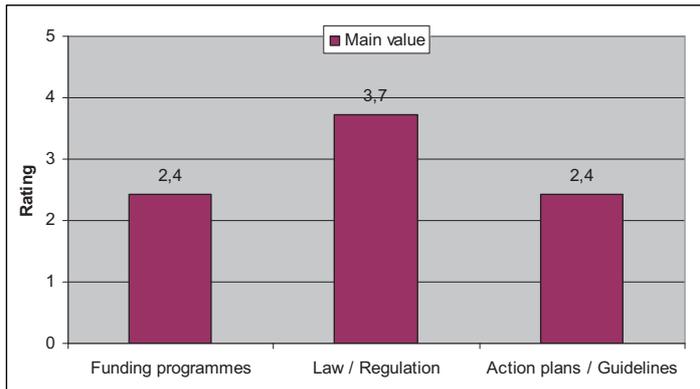
For *Public Bodies*, the relevant information channels are branch associations and National Contact Points (NCP). European and national technological platforms are not very relevant for *Public Bodies*. These results are presented in Figure 54.

Figure 54: Relevant channel concerning information: Public Bodies



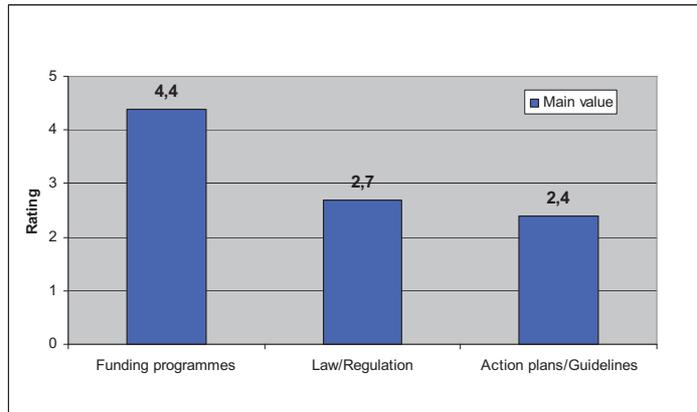
The results concerning the impact of policy on daily business and innovation are shown in the following figures (Figure 55, Figure 56 and Figure 57). For *Companies*, Law/ Regulation has the most relevant impact on their daily business and innovation.

Figure 55: Impact of policy on daily business and innovation: Companies



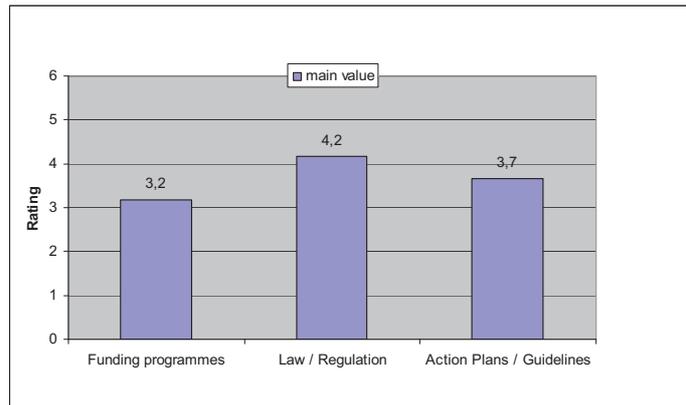
Concerning *Institutes*, Funding Programmes have the most relevant impact on them. The findings are shown in the following Figure 56:

Figure 56: Impact of policy on daily business and innovation: Institutes



Law and regulation have the most relevant impact for *Networks* as the results of the POS-METRANS survey presented in Figure 57 show.

Figure 57: Impact of policy on daily business and innovation: Networks



5.1.3 Findings of expert validation

In the third expert panel there have been different questions related to the impact of European and national policy measures discussed.

Concerning the information channels and the improvement of their accessibility the experts mentioned that in all other EU countries many information changes and information nodes (web, telecom etc.) exist → services towards companies. On the other hand, there is a lack of certified quality and a problem of coordinating public authorities to give some kind of quality certification.

As a result, other solutions may be introduced for example in collaboration with actors such as EEN. These information events are highly needed, but there has to be a certain caution not to create confusion caused by too much information provided through too many information events.

The main barriers for not partaking in EU funding programmes are for example:

In Italy, there are too many actors for some services → the user doesn't know which information is the most reliable. Other barriers are:

- Insufficiency of Governance / Government rules.
- Lack of financial resources to cover not funded parts of a project
- Difficulty in finding / defining subject
- Lack of coordination of projects

For instance: The contact with SMEs should already exist before the EC diffuse the funding programme. Directives must have precise roadmaps with a date on which a government must implement it. SMEs should focus more on national funding programmes first, rather than on EU funding programmes.

Regarding law/regulations to encourage stakeholders and greening activities the experts recommended the following:

In Turkey, there are not many incentives for greening. Anyway, many changes occurred over the last 5 years. Universities and companies are willing to do something for greening (e.g. solar boat constructed with hydrogen use at universities). However, problems persist with: funds, the coordination of activities and framework is not really clear for the public bodies. Funding is not focussed enough.

One must distinguish between the interventions. Customer – market adoption → market analysis should be made compulsory; risk management (life cycle management). There are tenders for which the price is the sole criteria to choose the offer → wouldn't this be an idea to encourage SME participation?

To increase the participation in greening policies subsidies or taxes are considered the two solutions. Subsidies are the correct solution, taxes the wrong one. This is a political choice. "Greening action plans" may be an alternative.

A company is optimising for profit, if there are no financial advantages, the company will not invest in greening. Logistics platforms are a good start. SMEs are keen on using this kind of platforms; this would be good in Turkey. As for other technologies, which need investments, incentives are needed.

5.2 Conclusions

5.2.1 Conclusions from the project analysis

Law/regulation has the highest impact on the daily business of networks and companies whereas the funding programmes are the ones having the highest impact on the daily business of research institutes.

The POSMETRANS project aims at analysing policy measures in the surface transport sector both on EU and national level, in order to find out how these measures can influence the market take-up of innovative technologies and processes.

Survey results show us that networks have a high awareness level on funding programmes. Networks are trying to increase their knowledge about funding programmes in order to inform companies and other stakeholders. This mission forces networks to act as an information

source on funding programmes. The same behaviour is observed in public bodies regarding action plans and regulations. Supportive activities such as awareness activities, info days and brokerage events need to be organised to increase efficiency in stakeholder's collaboration.

EU funding programmes are important sources and it is necessary to remove obstacles in order to participate in it. Administrative barriers, lack of information about R&D programmes are the main reasons for not taking part in EU funding programmes. An increase of technology and know-how transfer from research institutes would be highly beneficial for SMEs. Networks and public bodies have to support SMEs to enhance their limited skills on open innovation and international collaboration capability in order to increase SME's participation.

The fact that 75% of the companies interviewed were SMEs, shows that the EU funding programmes provide benefits to foster companies to increase their limited skills. The answers from SMEs and large companies were analyzed together but the fact that 75% of the companies interviewed were SMEs, can be a reference towards a general approach. Enhancement of in-house know-how is the prior benefit for SMEs as it provides new approaches for the R&D activities and increase their innovation capability. International collaboration and new contacts will integrate an open innovation model which enables SMEs to follow new technologies and trends to companies.

All stakeholders signified some difficulties especially on needed complex requirements during participation procedures. Another difficulty is to find a place in projects considering their specialities. Companies mostly focus on specific research and application areas although EU funding programmes cover more general objectives. Insufficient communication is another problem which all stakeholders need to consider. Language problems could be a reason for problems regarding information transfer which could prevent the creation of concrete results.

Regulations provide new inputs for carrying out further research. An increased efficiency of resources makes the second impact on different stakeholders. Regulations also support stakeholders to increase market share.

When we examine companies, it is easily seen that companies have some difficulties in complying with regulations. Increased bureaucracy and cost issues have high impact on companies. Companies are looking for more coaching services in order to get a better implementation of Law/Regulations.

Information channels are the main sources for technology and know-how transfer for all stakeholders. Stakeholders choose their information channels considering their close relationships with outer organisations. This is why Branch associations, chamber of commerce and national contact points are used as a primary information channel. Regarding all stakeholders, Law/regulation has the highest impact on the daily business of networks and

companies whereas the funding programmes are the ones having the highest impact on the daily business of research institutes.

The focus lies on the popular drivers of change in the transportation sector which are greening technologies and co-modality. These drivers have been discussed in the panel meeting as prior discussion topics.

As a general conclusion for both drivers, all categories (Funding programmes, law/regulations and action plans) are affected by consumer orientation and environmental commitment.

Especially in greening related law/regulation and action plans, environmental commitment, SME participation and consumer orientation have a similar positive tendency. The mandatory level in EU policies is very high when we compare it with other countries. The EU shows great importance on environmental issues, as reflected in the attribution of funding, and tries to implement that commitment with a high mandatory level.

Co-modality has an ability to reduce carbon emission, and SME participation in a EU funding programme has the highest impact in all countries in this area. SME participation is supported to increase environmental commitment by increasing level of support to R&D activities. Action plans show us that EU members and other partner countries are aware of consumer orientation especially on environmental commitment and that they prepare their strategies by considering these requirements.

Environmental technologies are a particularly significant target for policy makers and transport is one of the major areas. Greening and co-modality are the main drivers and most of the policies consider these drivers in order to reach the environmental requirements. To do so, innovation policies need to consider both demand and supply sides in the major market to provide reliable opportunities by focusing on SMEs.

Policy instruments are mostly used as an encouragement indicator for technological change by reducing the uncertainty in investment and implementation process of new technologies. Both national and European policies include incentives, which will encourage especially SMEs to make long-term investments in innovative technologies.

A successful policy framework will trigger the implementation of projects and actions. Comprehensive policy approaches also have to include other elements such as additional funding for research and development. Over time, the various national policy approaches should complement each other. A supranational policy needs to be supported by national policies. In this stage, it is important to see how well the EU policy does match up with the existing national policy. The EU has to agree on policies that can be downsized to the member state level.

This shows us that the EU and other partner countries are aware of consumer orientation especially on environmental commitment and that they prepare their strategies by considering these

requirements. A special focus needs to be put on SMEs to enhance their capability. Accessibility to information channels and applicability of law/regulations need to be improved. On the other hand, it is obvious that the European Union has had a very significant impact upon the policies of member states and non - member state countries. Member states need to integrate and support the EU's supranational policies while contributing the EU with its good practice implementations. Additionally, adaptation to EU policies is also important for Non-EU member states. The EU provides a reference for their national policies which result as low deviation between EU and Non-EU countries' national policies.

5.2.2 Conclusions by the experts

Concerning the impact of European and national policy measures the experts analysed the following:

The sample size of the survey is too small for an evaluation. But each partner shows deep knowledge, experience and accessibility in their country with respect to the transport and logistics sector.

Greening and co-modality are the main drivers in the transport sector. The main administrative barriers in each country regarding reasons for not taking part in EU funding programmes are mostly common. All experts emphasized on the importance to show these countries the advantages regarding the adoption of EU level policies. The importance of greening technologies needs to be supported by adequate funding programmes, law/regulations and action plans. In general, it was stated that SMEs have a lack of knowledge regarding the use of an incentive system concerning bureaucracy. Mainly, there are some reliability problems and a lack of precise roadmaps to reach information channels concerning EU funding programmes. There are a lot of information channels in each country. But experts stressed on the quality of the information which is not under control in most of the cases. For the experts lobbying is very important to be successful in Greening and co-modality in the transport sector. Communication and co-operation between SMEs is very important as well, but there are often realisation barriers.

The experts also gave the following recommendations:

- Precise roadmaps and guidelines need to be published by the European Commission for funding programmes, especially directives and regulations.
- Comprehensive policy approaches needs to be added for a successful policy framework.
- For funding programmes, leading subjects and a lack of coordination problems in the projects should be resolved.
- The idea of having a broadcast which companies can share their researches and products is recommended.

Findings and conclusions related to the impact of European and national policy measures

- EU and national policies should complement each other in the most effective possible way in order to find out how these measures can influence the market take-up of innovative technologies and processes.

6 Recommendations for SST related innovation policy strategies

In the following chapter recommendations for SST related innovation policy strategies are described. The recommendations are based on data collection, survey and expert panels concerning the question how innovation spread into the market, the role of networks and the impact of European and national policy measures. In addition further research activities during the project have been done. The results of these activities will also be integrated in the recommendations.

To structure the recommendations they are divided as follows; first all recommendations that affect the whole transport sector are described. Following those only concerning the public transport sector and only concerning the freight and logistics sector are presented in separate chapters. All recommendations on vehicle technologies are described together again for both sectors since the technological aspects correlate. The recommendations related to infrastructure technologies are discussed together since they affect the public transport as well as the freight and logistics sector. In a second step, recommendations especially focused on SMEs are presented. To summarize these results, all recommendations especially concerning the EU Commission are presented together.

6.1 Recommendations focused on the whole transport sector

The POSMETRANS activities led to several conclusions concerning the current state in the transport sector. Out of these conclusions it is possible to make the following recommendations:

One important instrument is the improvement of training sessions for the employees in the public transport as well as in the freight and logistics sector. Training could for example contain e-learning or m-learning activities and a good risk management to minimize problems. For example special trainings on the subjects of innovation transfer, innovation management and innovation mix. In order to support companies as good as possible a kind of coaching services should be implemented. Furthermore, the organization of special trainings for staff concerning intermodal transport would lead to a higher participation and acceptance in public transport as well as in the freight and logistics sector.

Considering the customers demand in general should be more important than the research activities itself. Often research activities are conducted without the actual use of it in focus. Regarding R&D projects in particular, the project partners should more disseminate the results in order to promote innovation and motivate new stakeholders to build new cooperation. A market study at the beginning or before the start of an R&D project would be helpful as well in order to

detect the market potential and the potential use of the research results. Considering two stepped R&D applications, in the first step a mandatory market study could be required.

Regarding networks, there are several recommendations as well that affect the whole transport sector.

First of all, a more active participation of networks in the decisional process regarding law & regulations, guidelines and funding programmes is recommended. Active participation of the praxis in the decision making process is also very important. Here, the use of an MCDA-analysis is recommended to get the opinion of stakeholders to include the needs of SMEs as well.

Another advice regarding the whole transport sector is the optimization of the use of technology platforms, as they are a useful instrument in order to provide a feedback from the industry to the EC. A better involvement of SMEs in ETPs (European Technology Platforms) is highly recommended to prevent lobbyism and reach acceptance and sustainability, for example. A quota for SMEs could be implemented to be labelled as ETP. The implementation of sectoral networks should have a higher priority, because of their stronger effectiveness compared to general ones. In the future, networks should rather be installed from a real existing need.

Networks should also apply a better dissemination strategy of the results after a project. The proposal of a project should therefore include a formal mention that defines the exact role of networks in disseminating the results.

Concerning information (e.g. in regard of EU- funding programmes) a cross-sectoral communication with actors and stakeholders should be promoted. Networks like EEN with partners on a regional level can contribute to good communication. To draw the attention towards SMEs, good practice and success stories should be more disseminated. Precise guidelines need to be published by the European Commission for these kinds of activities.

One of the main indicators to consider measuring the success of a network is its sustainability. Policy makers should consider the importance of self-sustainability, either of networks or projects after start-up phases, as this often results to be another critical point.

Bureaucracy and cost issues should be kept on a level as low as possible, as they have a high impact on companies. Fragmented funding schemes, for example, are a problem for the participation of SMEs, and they should be reduced. In the different research programmes are too many overlappings with other thematic areas, for example between the Energy programme, transport and NMP and different funding schemes like Marco Polo and Interreg.

6.1.1 Recommendations focused on public transport

In addition to the recommendations concerning the whole transport sector, there are some recommendations that are only relevant for the public transport sector. One important advice concerns the improvement of cross-border cooperation between neighbouring countries and their linked transport systems and as well as between the different railway companies. One example of best practice for such cross-border cooperation is the cooperation between the "Tarifverbund Nord-West Schweiz" and "Region Verkehrsverbund Lörrach". In this case the operators of the two regions and two countries work closely together. They provide for example the possibility to buy one monthly or weekly ticket for both regions together, which is not usually possible for two different linked transport systems.¹

In comparison to different European countries, it is also obvious that passenger information systems and the ticketing are very different and complex. It is, for example, not possible to buy one train ticket from Italy to Germany and the other way round at a ticket machine. It is also not possible to buy a ticket for all connections online. Starting from Germany, for example, only tickets for direct trains into foreign countries can be bought online. If one has to change the train in a foreign country during the journey, it is not possible to buy the ticket online in advance. This leads to the conclusion that a harmonisation of passenger information systems regarding rail and bus and of course easier ticketing in border regions for example should be promoted to increase innovation in this field.

The framework conditions for multi modal travelling have to be improved. Co-modality is more and more important for a sustainable transport. The combined use of different transport modes, like train, bus, bikes, pedelecs should be easier. To influence people in their way of behaviour towards public transport a Mobility Management (MM) is useful. Mobility Management is a concept to promote sustainable transport and manage the demand for car use by changing travellers' attitudes and behaviour. At the core of Mobility Management are "soft" measures like information and communication, organising services and coordinating activities of different partners. "Soft" measures most often enhance the effectiveness of "hard" measures within urban transport (e.g., new tram lines, new roads and new bike lanes). Mobility Management measures (in comparison to "hard" measures) do not necessarily require large financial investments and may have a high benefit-cost ratio.²

Examples of "soft" instruments in the frame of a Mobility Management are:

¹ www.tnw.ch und www.rvl-online.de

² www.epomm.org, Leaflet: Mobility Management, p. 3

- Information and consulting - Information can be offered through leaflets, brochures, websites including travel planners and data about travelling in a sustainable way.
- Activities related with creation and sale of transport products – these activities include offering mobility products like: tickets, public transport maps, bike paths maps in specific locations for example in special mobility points placed in the city centre or in points for tourists
- Activities related with transport services organisation, reservation and coordination – instruments concerning organisation and coordination of new ways of travelling (e.g. Car pooling or car sharing systems), additional public transport services (e.g. organisation of shuttle service between selected areas and exchange points), coordination of mobility services for the handicapped, reservation of free places in vehicles for car pooling or car sharing users as well as coordination and improvements in existing services like an increase in the frequency of selected lines.
- Activities related with usage of telecommunication technology – in order to replace commuting, for example employers allow certain employees to work at home or at a local workstation. Communication between them is realized by telecommunication technologies
- Educational activities – mean all measures focusing on users' travel awareness raising that present the possibility of an individual person to make a choice in the travel planning process and indicate the more sustainable mobility options.
- Promotional activities – include different marketing campaigns consisting of special events, leaflets, brochures, posters, gadgets which encourage people to travel by tram, bus, bike, foot or in car pooling and car sharing systems.

The mentioned instruments positively concern SMEs, since ICT solutions can be especially well be adapted by SMEs.

One especially useful task for a better use of public transport is the establishment of local mobility centres. A Mobility Centre provides information and services on mobility, such as ticket sales, usually for several public transport modes (bus, metro, tram, rail) as well as for other modes (car parking, car sharing, car pooling). Sometimes a Mobility Centre also prepares mobility plans for traffic generating sites like schools, companies etc. When a Mobility Centre is located in a large company, it is sometimes called a mobility office.³

³ www.epomm.org, Leaflet: Mobility Management, p. 8

These centres could provide all kinds of information for travellers and also help to coordinate the public transport. They could, for example, help with the use of ticket machines and the combination of different modes of transport for one journey.

Moreover, the demographic change has to be considered, like the increasing number of elderly people. Hence, there will be more and more people travelling which have a handicap whilst doing so. Considering this, an extension of barrier free access to busses and trains will be necessary.

Furthermore, the development of guidelines for the stakeholders in public transport to install a user platform for feedback is advisable concerning, for example, the time table, the train quality, waste in the train, delay and connection problems.

In general, the installation of a kind of intermodal network all over Europe is recommended to improve the attractiveness of public transport as a whole.

Political decisions are necessary in regarding the financial aspect of possible projects. Integrated ticketing demands significant investments in technical equipment (and not only transport vehicles but also IT systems have to be developed). Public transport in the majority of countries is subject of governmental (central or local) care. Therefore, financial burden of new integrated connectivity will certainly be placed on the state.

A good example for the founding of a sustainable public transport is The CIVITAS Initiative ("City-Vitality-Sustainability", or "Cleaner and Better Transport in Cities"). It was launched in 2002 and its aim is to support cities to introduce ambitious transport measures and policies towards sustainable urban mobility. The goal of CIVITAS is to achieve a significant shift in the modal split towards sustainable transport, an objective reached through encouraging both innovative technology and policy-based strategies. At first 19 cities participated in four research and demonstration projects.

The initiative is currently in its third phase, CIVITAS Plus (2008 to 2013), and 25 cities are now working together on five collaborative projects. In total, almost 60 European cities have been co-funded by the European Commission to implement innovative measures in clean urban transport.

6.1.2 Recommendations focused on freight and logistics

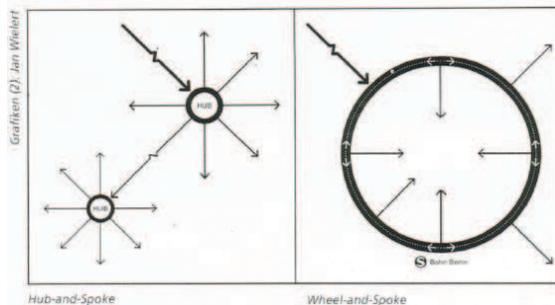
Specially focused on the freight and logistics sector there are also some recommendations. One curtail point in the European freight transport is the connection of the ports with the hinterland. Often there are many containers at a port for a long time and can't be delivered because of infrastructural limitations. The situation implies that the routes and channels from the ports to the hinterland have to be improved. This concerns the hinterland waterways as well as the rail infrastructure. For the main routes special freight tracks, for example, would provide a faster and

more secure connection. As an example of best practice the so called BETUWE-route in the Netherlands can be mentioned. This route from the port of Rotterdam to Zevenaar with a direct connection via Oberhausen to the multimodal port of Duisburg in Germany is a good example for such a special freight track. Consequently, freight trains can get faster from the port of Rotterdam to the hinterland without crossing any urban districts.

Establishing a clearing platform for the customers of freight and logistics services is also recommended. In regard of a sustainable transport such a clearing platform would provide the customer with the possibility to choose the best mode of transport for its needs.

For urban areas, innovation could be stimulated for a more environment friendly transport. The installation of a wheel and spoke systems in urban areas can contribute to this effort. Especially bigger cities like Berlin could profit from this system. Up to now the existing hub and spoke system only allows a road transport into inner cities. Considering the existing infrastructure, it is obvious that many cities exhibit a kind of train ring of tracks, which is used for the inner city passenger transport around them. The idea of a wheel-and-spoke system is to use this existing infrastructure for the freight transport as well. The central transshipment stations get decentralised and goods can be loaded or unloaded at different stops. The graphic below shows the example for the S-Bahnring around Berlin.

Figure 58: Hub-and-Spoke & Wheel-and-Spoke



Considering the inner city transport, local authorities should support alternative drives as well. Especially the adaption of electro mobility could be encouraged by special instruments. For example, all electric vehicles could get special conditions like longer delivery times for the inner city. In this scenario all kinds of vehicles would for example be allowed to deliver from 9 to 10 o'clock and electric vehicles would be allowed to deliver from 9 to 12 o'clock. Such positive enforcement as a "soft" measure is expected to lead to an increased use of environmental friendly trucks. To solve this problem the existing instruments are very limited (e.g. EFR, Interreg) and a higher funding volume is recommended.

Concerning innovate transport and logistics systems, there exists a similar innovative idea in the city of Dresden. For the deliveries between the “Gläsernen Manufaktur”, a car factory of VW in the middle of the city Dresden, the thought of a cargotram was considered and realized. The prefabricated parts first arrive in the Dresden-Friedrichstadt logistics centre either via road or rail. Further transport is done in a way which is both friendly to traffic and the environment: Two freight railroad trains, painted in Volkswagen’s blue, commute back and forth along the already existing railroad network. The trains, which can be loaded from either side, hold up to 60 tonnes and take three trucks off the streets with every journey. This blue cargo tram is commuting several times a day to deliver the parts at the factory “just in time”. It uses the already existing tram tracks in the city, only the last tracks to logistic centre in Friedrichstadt and the factory itself had to be built. The cargotram is running since March 2010. In the following the model and a picture of the cargotram are shown⁴.

Figure 59: CarGoTram



Source: www.glaesernemanufaktur.de

Another crucial point is the parking situation along the truck roads of Europe. To reduce the traffic of trucks searching for a parking space,, the granting of a sufficient amount of parking spaces is recommended. In this scope it would be helpful to introduce a kind of reservation system for truck parking spaces along the main truck routes of Europe. For this purpose there was for example an application developed by the University of Applied Sciences in Furtwangen. With this application it will be possible for drivers to reserve a parking space and some further extras like electricity or cooling. Developments like this could help truck drivers finding a parking space in advance.

Co-modality technologies receive a middle level valuation from public bodies. Intermodality is seen as a great challenge within transport strategies and many barriers must be overcome. Regarding freight and logistics, the objectives of co-modality technologies are to enhance freight intermodal transport, reduce congestion, and improve the environmental performance of the European freight transport system. The spread of these technologies is slowly decreasing due to the poor economical conditions and lower transport demand attributed to the overall downturn of the economy. Therefore, the role of public bodies is essential for improving the support through financial programmes, such as the Marco Polo programme. New schemata based on internalization of external costs in order to support traffic shift from road to other surface modes,

⁴ <http://www.glaesernemanufaktur.de>, <http://www.dvb.de>

and new initiatives to enhance the accessibility of hauliers to a more efficient transport chains are recommended.

Another curtail point are compensation measures that apply due to increasing fuel costs. In this case for example special materials, like coating for vessels are of interest.

A good example for this is the low friction coatings for vessels, used by the company Maersk.

Vessels have lower friction and are able to reduce fuel costs when their hulls are clean and smooth, free from fouling organisms, such as barnacles, algae or molluscs. Low friction coatings are applied on hulls to limit the growth of such organisms thus increasing speed and reducing fuel consumption. Low friction coatings are a key area for research in the maritime materials field. The faster and larger the ship is, the more noticeable is the fuel consumption reduction, ergo big shipping companies are the target of hull coating manufacturers.

The use of new materials for developing low friction coatings should take the environmental impact of their appliance into account. After a first trial period, it soon became clear there was a price to pay for the efficient anti-fouling paints containing TBT - tributyltin. Environmental studies provided evidence that TBT is toxic and act as a hormone disrupter. This prompted many countries to act and enforce some restrictions on the use of TBT in anti-fouling paints. Due to these regulations, the actual trends and the investment area are non-sticking coats, which impede the marine flora and fauna to adhere the ship due to the smoothness of the surface, rather than adding any toxic compound to the painting.

This topic of low friction coatings as a new material is an especially good topic for sectoral networks in the field of New Materials and Nanomaterials. The POSMETRANS survey also showed the positive use of sectoral networks in this field. Information on new trends and technologies are spread through these networks to companies like SMEs in particular.

According to an IMO regulation, which entered into force in September 2008, TBT paint is to be phased out. Maersk decided to start a phase out of TBT in 2000 and has applied TBT-free coatings since then, and will thus comply with the IMO Antifouling convention well ahead of time. As of early 2007, all of Maersk vessels are TBT-free.

As an additional step, Maersk started the application of biocide-free silicone based paint in 2003, which is applied whenever feasible. Today, more than 50 container vessels have been applied with environmentally friendly silicone-based foul release coating.

As part of the ship owners' effort to improve the environmental performance and reduce fuel consumption, they constantly strive to substitute these products with more environmentally friendly ones without losing efficiency or an increase of cost. Studies show an on average increase of the amount of chemicals used per vessel from 2005 to 2007. It increased by approxi-

mately 15%. This is mainly due to the fact that the average size of vessels has increased; hence did the average amount of chemicals and coatings used.

6.2 Recommendations focused on vehicle technologies and infrastructure

In the following all recommendations for vehicle and infrastructure technologies are described. Since those technologies affect the public transport as well as the freight and logistics sector the technologies are described for both together.

6.2.1 Recommendations related to vehicle technologies

Concerning vehicle technologies there are several technologies that focus on the public transport sector as well as the freight and logistics sector.

Since driver assistance systems, like lane guard systems, adaptive cruise control and electronic stabilization programmes are very important for the security of the passengers on the one hand and for on time delivery of freight on the other hand, they should be mandatory all over Europe for the public and freight and logistics sector.

Concerning the environmental aspect there are several different approaches, for example different measurement instruments for emissions. To reach a comparable standard, the creation of a common carbon footprint platform is advisable to get a possibility to compare the emissions all over Europe.

Electric vehicles could be part of the solution for a sustainable urban mobility, but not for long distant routes. For this, all other propulsion technologies should be considered, either alternative fuels or renewable sources. Alternative fuels should be considered as a viable technology to increase fuel efficiency in vehicles.

With the integrated strategy promoting electro mobility ("Estrategia Integral para el Impulso del Vehículo Eléctrico") from April 2010 and the related action plan ("Plan de Acción") from November 2010 the Spanish government has defined its priority for the electro mobility in the near future (the overall programme name is Movele). The aim of the strategy is to have about 250,000 electro and plug in hybrid vehicles on Spanish roads until 2014 (until 2012 about 70,000); 85% in large public or company fleets and about 15% in private individual ownership. It is planned that about 145 Spanish cities with more than 50,000 inhabitants will create an e-mobility environment ("Ciudades con Movilidad eléctrica, CME"). The action plan converted the overall strategically aims in concrete policy measures. The overall budget for realising the strategy was fixed with 2.9 billion EUR between 2011 and 2015. This kind of plan is recommended as a good example on how concrete policy measures can be made.

Another scope worth focusing on is the development of intelligent vehicles. Such vehicles could, for example, solve the current parking situation problem for trucks, by exactly calculating the distance to drive and the parking space situation. Safety and security would also be improved and congestion foresight could lead to a more fluent traffic.

Some of the above mentioned tasks could also be realized by the extension of the digital tachograph to an on-board unit.

In order to achieve proper development and deployment of ITS in Europe in the future, it is necessary that many actors come together like local authorities, transport infrastructures, vehicle developers, information networks and telecommunication providers.

Moreover, a better cross sectoral cooperation in the vehicle construction sector is recommended to bring together the different industrial actors to improve the quality of the results. Researchers from different fields of ICT, Energy, vehicle construction and design have to work together to find suitable solutions in the field of electric mobility. Since the development in this field is not fast enough, the establishment of joint-research-centers is recommended.

6.2.2 Recommendations related to infrastructure technologies

Concerning infrastructure technologies increasing the standard concerning safety and security in road and rail infrastructure is highly recommended.

For the rail sector there are some specific problems; the different electricity systems for instance should be standardized over Europe. Also a standardization of security systems (INDUSI in Germany) would benefit an easier European wide traffic. The situation of normal track and wide track also needs to be solved.

Another recommendation is an easier access to the rail infrastructure in different European countries, like for example for single wagon transport would benefit the European transport sector.

The optimization of interfaces is also regarded as an important task for the future. In this frame a trans-European logistic network could for example be installed.

One of the easiest ways to reduce infrastructural problems is to reduce bottlenecks. For this reason it would not be very useful to have long new stretches of tracks but to make a targeted upgrading of existing routes. This could be realized by the use of flying junctions and new signals for example. Shorter inter-block-gaps would reduce shortages and increase the traffic without the construction of new routes.

The variety of toll systems in Europe is leading to limitations and complications in the transport sector. The establishment of an EU-wide clearing platform concerning toll would solve that prob-

lem. Such a platform would provide an overview of the different systems and solutions for the user.

6.2.3 Examples of good practices related to policy measures

Laws and regulations:

In order to make technological or organizational innovations really effective, it is essential to have the previous support of policy measures aimed at making them more acceptable and therefore adopted, considering their impact on the travel demand.

Thus, on this purpose the Swedish example of the Stockholm congestion charging scheme can be mentioned as a best practice. It is a congestion pricing system implemented as a tax levied on most vehicles entering and exiting central Stockholm (Sweden). The congestion tax was implemented on a permanent basis on August 1, 2007, after a seven-month trial period between January 3, 2006 and July 31, 2006.⁵

It is a best practice not only because of the benefits that it brought to the road transport system (decreased congestion and emission of pollutants, better travel times at peak hours...) but moreover for its "multimodal vision" (contemporarily having implemented a better public transport service offer) and its capacity to manage the consensus and the citizen participation to the process: as a consequence, a slight majority of Stockholm inhabitants was in favour of keeping the tax in the 2006 referendum, quite a remarkable result given the kind of question to which they were asked to agree.

Action plans and guidelines:

An interesting case to highlight concerning the prior topic of co-modality is the work to improve urban mobility of people in Turin (Italy) performed by the consortium 5T.

5T (Telematic Technologies for Transport and Traffic in Turin) is a consortium aimed at implementing telematic technologies to help achieving a better mobility in Turin. The 5T project was launched as a pilot project in 1992 in order to help citizens to move round the city more quickly, encourage use of public transport and reduce pollution. The exceptional results of this pilot project, verified by international organizations, have demonstrated the effective contribution of integrated telematic systems to improve mobility.

It can be seen as a best practice since, beyond standard sectoral implementations of ICT technologies in specific ambits (traffic lights management, priority to public transport, VMS, pollution

⁵ http://en.wikipedia.org/wiki/Stockholm_congestion_tax-cite_note-roadadm-congestion-tax-english-0#cite_note-roadadm-congestion-tax-english-0

monitoring...) that are nowadays diffused in most European cities, it has an integrated and holistic vision that allows for the coordination of a wide range of telematic devices to work together for a common goal.

Furthermore, it is a good example of practical cooperation among research actors and public actors, which will be directly involved in the elaboration of public policies concerning urban transport and mobility management.

Funding programmes:

A good example for a funding programme especially tailored at SMEs is Eurostars. The Eurostars Programme is a European Joint Programme dedicated to the R&D performing SMEs, and co-funded by the European Communities and 33 EUREKA member countries. Eurostars aims to stimulate these SMEs to lead international collaborative research and innovation projects by easing access to support and funding. It is fine-tuned to focus on the needs of SMEs, and specifically targets the development of new products, processes and services and the access to transnational and international markets. It aims to combine a bottom-up approach, a central submission and evaluation process, and synchronized national funding in 33 countries.

6.3 Recommendations focused on SMEs

The POSMETRANS survey and research activities all together made it obvious that in the passenger transport as well as in the freight and logistics sector a higher focus should lay on SMEs needs. It is a fact that the major driver for an economic development of countries is sustainable and effective innovation integration in SMEs. Cooperation and converting knowledge into a product with the help of an innovation culture is essential for SMEs. That's why SME participation in EU and national level is supported as a priority.

6.3.1 Financial barriers and bureaucracy

Companies, R&D institutes and networks coincide in financial barriers and funding programmes related barriers as main limitations to innovate.

As increased bureaucracy and cost issues have high impact on companies, their level should be kept as low as possible. An easier access to funding programmes and lower bureaucracy would improve that situation and enable a higher innovation rate. Especially regarding R&D projects, the project partners should more disseminate the results in order to promote innovation and motivate new stakeholders to build new cooperation. A good example for lower bureaucratic in the participation of SMEs are the KICs founded by the EIT (European Institute of Innovation and Energy). A KIC is a partnership which brings together the fields of education, technology, research, business and entrepreneurship, in order to produce new innovations and new innovation models that inspire others to emulate it. KICs bring together different people

working together across the innovation web. Key actors include: businesses (including SMEs); entrepreneurs; research and technology organisations; higher education institutions; investment communities (private investors and venture capital); research funders, including charities and foundations; local, regional and national governments. Concerning the structure the KICs, like KIC Inno Energy for example, are divided into co-locations, which operate on a more regional level. The co-locations are divided in different thematic fields and publish calls twice a year. The participation of SMEs in such calls is much easier, than the participation in other EU founded programmes.

6.3.2 Networks

It is also regarded necessary that Networks apply a better strategy for dissemination of the results after the end of the project in order to motivate new stakeholders to invest in innovation. This could for example be realized by the diffusion of best practices cases and information days. Supportive activities such as awareness activities, info days or brokerage events need to be organized to increase efficiency in stakeholder's collaboration.

Networks are usually a good possibility for SMEs to be involved in innovation activities and get information. To better support the SMEs the coincidence between networks and their SME partner should be optimized. The integration of SMEs into networks could be improved, for example by more active participation of SMEs in the network. On the other hand, networks should apply a better strategy for information in order to make SMEs more aware of the benefits they can get through a membership and get them more involved. There is a need for a major communication of what networks actually do, in order to make their work better known by SMEs. Here also the promotion of success stories could be used to convince SMEs to be a member of networks concerning new projects and of the corresponding benefits for them.

Networks and public bodies have to support SMEs to enhance their limited skills on open innovation and international collaboration capability in order to increase SMEs' participation. International collaboration and new contacts will integrate an open innovation model that will enable SMEs to follow new technologies and trends. SMEs should also not be forgotten in international cooperation, as they also may offer an essential help to achieve high levels of excellence and innovation.

An example to increase the participation of SMEs in international collaboration is the offer of exploratory awards. Exploratory awards cover 75% of the cost of preparing a research proposal, up to a maximum of 22,500 euro. At least two SMEs must be involved, either from two different member states or from one member state and an associated state. An award may be for the

preparation of a proposal for a collaborative research, demonstration or Innovation project (in response to a call for proposals), or for a co-operative research project.⁶

One main difficulty for SMEs is the lack of pre-funding to innovate. SMEs generally are limited in achieving financial resources for innovation by access to venture capital as well as participation in funding programmes. R&D support programmes can be an opportunity and can be the only widely accessible source of funding.

Another way of supporting SMEs is to increase the technology and to transfer know-how from research institutes to them. Such collaboration would be highly beneficial for SMEs. As experts stated, transport networks are not very technology driven, to close this gap a programme able to connect the global strategy with the industry should be developed, with particular attention to SMEs. Here also an increased dissemination of best practice could help easing the participation of SMEs.

Sectoral networks are more effective for SMEs than general ones. A good model on this purpose is the Polish situation in the aeronautic sector. In fact, South-Eastern Poland is famous for its aerospace industry and pilot training centres, which have been a solid base for the creation of the AERONET - Aviation Valley. It is one of Polish Centre of Advanced Technologies, which consists of scientific entities leading in research and development on top-level as well as of other entities involved in research and development works, and implementation of innovation. The main objectives of these centres are the commercialization of new (mostly national) technologies, products and services in the priority fields of Polish economy.

The AERONET – Aviation Valley was founded in 2003, in a region with a structured background in the aerospace sector, in order to realize interdisciplinary, collective and long-term research and training programmes, as well as the effective implementation and commercialization of new technologies aimed at the aerospace industry. Thus, it is effectively operating with the main goals to improve the existing manufacturing base, to create a strong and reliable network of subcontractors and a low-cost supply chain, to attract foreign investment, to develop a relationship with other European centres of the aerospace industry, to promote joint cooperation of the industry with universities of technology, and research centres.

Another good example in the logistics sector is the European Logistics Network, Open ENLoCC (European Network of Logistics Competence Centres). This network was established as a follow up of the “EnLoCC”-project and is an open network of regional logistics competence centres in the field of logistics, run by public authorities or similar bodies. The main task of the network is the international exchange of experience and knowledge between its participants and the

⁶ <http://ec.europa.eu/research/sme/leaflets/en/02a.html>

promotion of a higher level of cooperation with European institutions. The members of Open ENLoCC work together on common projects with the aim to develop the regional economy by solving infrastructural, organizational and technological problems of logistics and transport. The dissemination of the results of the network activities and the best practices take place on a wide scale, involving all the key bodies at EU level.

Membership of Open ENLoCC is open to all regions, local public authorities, associations, public or semi-public bodies with related interests to Open ENLoCC and with a special and explicit interest in founding a Logistics Competence Centre. The topics of the network are described as follows:

There is a logistics knowledge base. The Open ENLoCC member institutions each hold a huge amount of regional logistics knowledge. Furthermore, typically each is a specialist in one or more topics, with a reputation across Europe. Therefore, the network as a whole probably is one of the most in-depth sources of logistics knowledge across Europe. Also logistics training is offered. The network members offer logistics training and education or in any case have close ties to the relevant logistics training and education institutions in their area. Moreover, the European transport corridors are considered. The main European transport corridors are an important issue in European as well as in regional politics. For several such corridors network members cooperate on exchanging regional knowledge regarding these corridors with an emphasis on freight transport. This has not only increased their knowledge, but also helped to establish formalized support projects for the improvement of these axes.

6.3.3 Policy measures

The results from the POSMETRANS survey show that laws and regulations result to be the measures, which mostly influence the innovation processes. In fact, from the need to comply with regulations, important advantages and particular difficulties come out for networks and their members, included SMEs.

From this, the importance for SMEs is to be consulted and involved in the legislative process. Thus, experts were asked on how the participation of SMEs can be improved. On this concern, they stated that the current state of the art reveals limited means for SMEs. However, they drew the attention to the fact that there are many national SMEs programmes that should be opened if necessary: such a fact shall be guided by many efforts particularly on a national basis. For this purpose, experts highlighted that networks have a larger influence than single actors and may bring key benefits.

One of the main differences between SMEs and large companies is that in SMEs decisions often are made by the board of management, whose priorities are more related to the business model and not to innovation, so innovation is not often the focal point. On the other hand, big

companies have innovation managers and trend scouts who are in charge of decisions concerning innovation and have capacity to participate in R&D programmes and get funds.

Funding programmes:

In most cases SMEs should rather be involved in smaller projects that are focused on their special field of operation. This is also obvious because of their short-term thinking, which better correlates with shorter projects.

Shorter projects are also better retained on their way of thinking, to enhance their awareness on the benefits coming from the participation in EU projects. They are also nearer to their specificities and to their traditional way of thinking, which is mainly dealing with operational issues. These kinds of projects are for example the ones funded in the Eurostars programme. A good example from Germany regarding the funding of SMEs is the ZIM program. ZIM is the basic programme by the Federal Ministry of Economics and Technology (BMWi) for market-oriented technology funding of innovative SMEs in Germany. The programme offers SMEs a funding opportunity with coordinated uniform funding conditions until the end of 2013. Funding is provided for cooperation projects between SMEs or SMEs and research institutions. R&D projects are to deal with the development of innovative products, procedures or technological services and are not restricted to specific technologies or sectors.

Project forms are:

- **EP** Individual R&D projects by SMEs
- **KU** cooperation projects for at least two companies
- **KF** cooperation projects for at least one SME and one research institution including as a special mode **VP**, which is a cross-technology collaboration projects for at least four SMEs and two research institutions,
- **KA** projects of SMEs with the allocation of an R&D project to a research partner,

The advantages of this programme are that the applications can be submitted at any time and the project start is shortly after the application is submitted. Also the decision on funding is made fast in only one to two month. Further the possibility of a flexible handling is an advantage. For example during the financial crisis, until 31 of December 2010, also companies of all legal forms with business operations in Germany and up to 1000 employees were eligible to apply.

In general it can be stated that EU funding should be more targeted at SMEs. For example they could be more oriented at practical aspects, which SMEs can relate to. Also very crucial is the improvement of the insufficient communication of SMEs needs in funding programmes and related projects. A lower co-funding rate for example is regarded as one opportunity to better involve SMEs in different research activities and increase innovation.

EU Funding programmes are important sources for innovation and it is needed to remove obstacles on their participation. Beside administrative barriers, a general lack of information about R&D programmes is the main reasons for not taking part in EU funding programmes. To help overcome this obstacle an easier way to get information and better informational channels would help. One possibility is the combination of different activities, like EUROSTARS, Research for SMEs and CIP EcoInnovation to provide an easier overview for SMEs.

Action plans and guidelines:

SMEs are well focused on action plans to boost their innovation capacity and introduce opportunities about environmental solutions. New market opportunities are presented in action plans, especially in the fields of greening and co-modality which have a great connection with energy and environmental issues. Europe is addressing key energy challenges in the EU and helping to change systems and habits by providing foresight for SMEs in action plans and guidelines.

Policy makers need to strive in order to ensure all action plans and guidelines are as SME friendly as possible. Easier legislative rules would give SMEs a chance to be better involved. As mentioned above the KIC structure is regarded more SME friendly.

Laws and regulations:

Lower barriers would not only benefit SMEs but also have a positive effect on consumer orientation. Especially in greening related laws/regulations and action plans, environmental commitment, SME participation and consumer orientation have similar positive tendency. EU shows great importance on environmental issues, as reflected in the attribution of funding, and tries to implement that commitment with a high mandatory level.

Concerning laws and regulations, it would be highly beneficial for SMEs to be involved in the legislative process. The POSMETRANS survey remarked the problem related to the low information provided on action plans and guidelines, despite of the quite huge demand from the members, as well as the need for a major inclusion of networks in the decisional process, and for them to be more representative of SMEs needs in their lobbying activity.

Best practice:

As best practices for the public transport, the CIVITAS programme from Krakow can be considered a good example to promote technology transfer and give SMEs the possibility to work first with a small consortium and then implement the technology in another country. The goal of CIVITAS is to support cities to introduce ambitious transport measures and policies towards sustainable urban mobility. It is a good example about how smaller projects are better focused on SMEs.

6.3.4 Transport Sector

For example concerning the maritime transport sector the involvement of SMEs in the market is on a low level and should be improved in the next years. Factors like the increased fuel costs imply compensation measures, such as the use of new technologies. Here SMEs are very active in niche markets for new materials. One example is a special coating for ships to reduce the water resistance that leads to lower fuel consumption.

Concerning SMEs in the freight and logistics sector training measures for truck drivers will become more and more necessary. Considering the demographic change on the one hand, in the next few years a lot of truck drivers will finish their jobs and go into retirement. On the other hand, young truck drivers to fill the gap are missing. Therefore several actions need to be undertaken to improve the image of truck driving. For example an EU-wide image campaign is recommended to reduce the upcoming lack of drivers. Also inducements for SMEs to finance the truck drivers' license for young employees would be helpful.

Also the image of the whole transport sector should be promoted in order to sustainably improve the importance of the sector in different European countries. A better health protection and industrial safety would also benefit the carrying business and especially the SMEs.

Another recommendation is the establishment of a competence centre especially for SMEs, after the German example of "HOLM – house for logistics and mobility" in Frankfurt. HOLM is neutral platform for interdisciplinary and practical project work, research and training around logistic and mobility issues. It combines different disciplines under one roof and is supported by economy, science and society.

Considering the rail transport the participation of SMEs can as well be improved. The excess to rail tracks for SMEs in general is very complicated and should be simplified over the next years.

6.3.5 Very small companies/spin-offs/start-ups

Startups in the transport sector can for example be supported like the ones oriented at the KIC Inno project founded by the EIT, which is explained above. The product that turns out after the promoted innovative research should therefore be used in a startup. This kind of support is recommended to help startups in the transport sector as well. In general a bottom up approach is highly beneficial for very small companies, spinoffs and startups.

Concerning research the market take up often presents a problem. In this case the founding of spin-offs is important. Support or creation of spinoffs can be an instrument to improve the market take up and create new jobs. For this case the KIC structure is very good. Here a special highway provides a way with activities from a technology to a new spin-off. To be founded several steps have to be undertaken. Until the new spin-off is ready it will be supported along a highway of activities containing activities like a market analysis, events, trainings and the defini-

tion of a business model. Another solution for an easier founding of spinoffs or startups in the transport sector would be any kind of special financing options. This could for example be a European Award especially for new companies in the transport sector.

For micro SMEs the situation of increased bureaucracy and cost issues is an even bigger problem than for bigger SMEs. To take part in funding programmes and innovate successfully they rely on help from outside. For them lower burdens are necessary to have a chance of being involved in funding programmes.

Another recommendation concerning very small SMEs could be the implementation of innovation vouchers for border crossing activities. On national level there already exist such vouchers that support small companies. Like the example from Germany, where in Baden Württemberg the companies can apply for "Innovationsgutscheine" with for example 2500 to 7500 Euro to help them finance smaller activities in their company, like a technology research for innovation or research and development activities regarding innovative products. These innovation vouchers have been a very successful instrument during the financial crisis in 2009 and could work in a similar way on European level.

6.4 Summary of recommendations focused at the EU Commission

In following chapter the above mentioned recommendations concerning the activities of the EU Commission are summarized. The most important recommendations made in the previous chapters are:

- A more active participation of **networks** in the decisional process regarding law & regulation, guidelines and funding programmes is recommended. Active participation of the praxis in the decision making process is also very important. The POSMETRANS survey remarked the problem related to the low information provided on action plans and guidelines, despite of the quite huge demand from the members, as well as the need for a major inclusion of networks in the decisional process, and for them to be more representative of SMEs needs in their lobbying activity.
- To draw the attention of SMEs, the **dissemination** of good practices and success stories as mentioned above is recommended.
- As increased **bureaucracy** and cost issues have a high impact on companies and especially on small SMEs, their level should be kept as low as possible. As described for the whole transport sector earlier fragmented funding schemes, overlapping in different thematic areas in research programmes and overlapping in different funding schemes are problematic and should be reduced.

- **Existing funding programmes** that are concerned with the problem of intermodal transport (e.g. the programme Marco Polo) and especially a shift from road transport to other modes, have to be organized in a way that SMEs are able to participate in. Due to the required volume of transport it is currently not possible for SMEs to participate in the Marco Polo programme.
- A better cross sectoral **cooperation**, also mentioned above for the whole transport sector, for example with the establishment of joint-research-centres, is recommended.
- The programme Eurostars aims to stimulate **SMEs** to lead international collaborative research and innovation projects by easing access to support and funding. This bottom-up approach is regarded as the best way to support SMEs in founding. To better support SMEs the EU Commission could bring out other programmes following this example.
- Startups in the transport sector can for example be supported like in the KIC Inno projects funded by the EIT, which is explained above.
- Concerning research the market take up often presents a problem. In this case the founding of spin-offs is important. Support or creation of spinoffs can be an instrument to improve the market take up and create new jobs. For this case the KIC structure, as mentioned earlier, is very good.
- Another solution for an easier founding of spinoffs or startups in the transport sector are special financing options, like an European Award.
- Concerning very small SMEs innovation vouchers for smaller border crossing activities in their companies, like the example from Germany with the "Innovationsgutscheine" could be a helpful tool.
- A funding following the best practice example of ZIM on EU level is recommended.

6.5 Example of a successful technology development at the promotion of a network considering an existing funding programme

A good example regarding a new technology that is pushed by an existing network, also involving SMEs is the MobyPost project, which is funded by the EU Commission. MobyPost is a consortium of 9 partners from 4 European countries of which four are industrial partners. Two of the industrial partners are SMEs. In total three of the partners are SMEs.

The vision of MobyPost is to develop a novel sustainable mobility concept. MobyPost proposes to meet the challenge of developing a whole system combining a carbon neutral vehicle with a novel technology based on a solar hydrogen fuel cell system. This technology is called the so-

lar-to-wheel solution. Moby Post is financed by the 7th Framework Programme and co-financed by the European funds from the Fuel Cells and Hydrogen Joint Undertaking.

Here it is the French competitiveness cluster Pôle Véhicule du Futur that organises the particular competencies of its geographical remit and missions around solutions for future vehicles and mobility. It was established in 2005 and has been awarded "competitiveness cluster" status by the French State. Pôle Véhicule du Futur is working together with clusters in other countries, like for example Clusterinitiative Automotive Engineering Network Südwest e. V. that is located in Karlsruhe, Germany. The cluster has five international and four national partners in addition to several regional partners in eastern France. In total there are 88 projects funded to a total budget of €220M involving 183 companies including 50 % SMEs, 119 public research laboratories and 17 European projects. Pôle Véhicule du Futur also supports one centre for Air Loop Testing and Modeling: CEMBA and a platform project for urban mobility tests: PVF ITS. PVF ITS is a platform for intelligent transport solutions testing. It supports a sustainable mobility in the fields of intelligent transport systems and smart roads and streets.⁷

Moby Post is a good example because the advantages of the innovative solution of the used technology are manifold. Energy will be produced completely autonomously thanks to the construction of an infrastructure integrating a photovoltaic generator connected to an electrolyser which will allow for hydrogen production. Since those two are installed at the same place energy production will be local. The "fuel" produced itself, i.e. hydrogen are environmentally friendly and a big advantage is the availability of energy on demand, since the hydrogen produced but not immediately required will be stored.

It provides complementary knowledge and congregates a balanced group of competencies, which comprehends the whole value chain to take into account for MobyPost system's conception and building. Hence, specialists of vehicle's engineering and construction, experts of hydrogen storage with low pressure solutions, designers of systems to produce electricity from commercial photovoltaic solar cells modules as well as designers of systems able to produce hydrogen and engineers for monitoring and system control will be committed to attaining the ambitious project's objectives.

⁷ <http://www.vehiculedefutur.com/>

7 Synopsis

The POSMETRANS activities have shown that several factors influence innovation in the transport sector concerning SMEs in public transport and freight and logistics. Very important for success and sustainability of innovations are policy measures, e.g. law and regulation, guidelines. The results from the POSMETRANS survey show that laws and regulations result to be the measures, which mostly influence the innovation processes.

The results of the project give a good overview over the whole transport sector and provided an insight into the problems SMEs have concerning for example EU funding programmes, networks and policy measures. A lot of the SMEs which supported the project activities were afraid on the high level requested regarding the application in EU funding programmes. Especially increased bureaucracy and cost issues are problematic for SMEs. R&D institutes as well as networks are important players for spreading innovation into the market. In many cases networks have a very profound influence on the stimulation of the innovation process, but the success also depends on the actors inside relevant network. To accelerate the progress and innovation in SMEs RTD institutes and networks are essential. This is mostly because both groups have good contacts to and Information on different funding programmes on EU level and are able to involve SMEs.

Considering the results of the whole POSMETRANS activities several recommendations have been elaborated and presented in chapter six of this handbook. The partners of the POSMETRANS project expect that the recommendations will be helpful for policy makers to improve the capability of SMEs in the whole transport sector.

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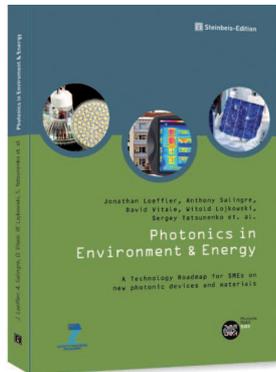
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8 Bibliography and references

- Brans J., Mareschal B., Vincke P.: PROMETHEE - A New Family of Outranking Methods in Multicriteria Analysis, Brans J. (Ed.) Operations Research '84, North-Holland, Amsterdam, 1984.
- Geoffrion A., Dyer J., Feinberg A.: An Interactive Approach for Multi-Criterion Optimization, with an Application to the Operation of an Academic Department' Management Science, 1972.
- Haimes Y. Y., Hall W. A.: Multiobjectives in Water Resources Systems Analysis: The SWT Method. Water Resources Research, Vol. 10, 1975.
- Jacquet-Lagrange E., Siskos, J.: Assessing a Set of Additive Utility Functions for Multicriteria Decision Making: the UTA Method' European Journal of Operational Research, 1982.
- Keeney R., Raiffa H.: Decisions with Multiple Objectives. Preferences and Value Tradeoffs, Cambridge University Press, Cambridge, 1993.
- Kram M, Mstowski R.: Projekt Ścieżki Rowerowej Łączącej Kampus Politechniki Krakowskiej z Akademią w Czyżynach. Politechnika Krakowska, Praca magisterska, Kraków, 2007.
- Pastijn H., Leysen J.: Constructing an Outranking Relation with ORESTE. Mathemat. Comput. Modeling, Vol. 12, No 10/11, 1989.
- Roy B.: The outranking Approach and the Foundations of Electre methods. IN: Readings in Multiple Criteria Decision Aid. Bana e Costa C. (Ed.), Springer-Verlag, Berlin, 1990.
- Roy B.: Wielokryterialne wspomaganie decyzji. Wydawnictwo Naukowe – Techniczne, Warszawa, 1990.
- Rudnicki A. z zespołem: Koncepcja Programowo - Przestrzenna dla Przebiegu Trasy Balickiej (drogi głównej KT/G 2/2) na Odcinku od ul. Armii Krajowej do Granic Miejscowego Planu Zagospodarowania Przestrzennego Obszaru Otoczenia Portu Lotniczego Kraków-Balice, Kraków, 2006.
- Saaty, T.: The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation, McGraw-Hill, New York, 1980.
- Sawicki P.: Metody Rozwiązywania Problemów Decyzyjnych, Politechnika Poznańska, www.put.poznan.pl/~piotr
- Sawicki P.: Wielokryterialny Wybór Operatora Usług Logistycznych. Logistyka 4/2001.
- Sawicki P., Żak J., Redmer A.: The Comparison of Electre, Oreste and Mappac Methods Applied to the Evaluation of Transportation Systems. W: Proceedings of the International Conference: Modeling and Management in Transportation. Poznan - Cracow 1999.
- Solecka K., Żak J.: Wielokryterialna Ocena Polskich Systemów Transportu Miejskiego. W: Kaczmarek M., Krych A. (red.): Skuteczne zmniejszanie zatłoczenia miast. Wydawnictwo Uni-Druk, Poznań-Rosnówko, 2009.
- Solecka K., Żak J.: Wielokryterialna Ocena Rozwiązań Transportowych dla Systemu Transportu Miejskiego, Współczesne wyzwania transportu w logistyce, prace naukowe z. 64, Politechnika Warszawska, 2008.
- Steuer R.: An Interactive Multiple Objective Linear Programming Procedure' TIMS Studies in the Management Sciences, 1977.
- Vincke P.: Multicriteria decision-Aid. John Wiley&Sons, Chichester, 1992.
- Żak J., Fierek S.: Design and evaluation of alternative solutions for integrated urban transportation system. CD - Proceedings of the World Conference on Transport Research, Berkeley 2007.
- Żak J., Fierek S.: Konstruowanie i Ocena Wielokryterialna Zintegrowanego Systemu Transportu Miejskiego, Poznań, 2007.
- Żak J., Thiel T.: Multiple Criteria Evaluation of the Development Scenarios of the Mass Transit System. W: Park C. – H., Cho J., Oh J., Hayashi Y., Viegas J. (red.): CD – Selected Proceedings of the 9th World Conference on Transport Research, Seoul, 2001.
- Gercek H., Karpak B., Kilincaslan T.: A multiple Criteria Approach for the Evaluation of the Rail Transit Networks In Istanbul. Presentation of the 8th World Conference on Transport Research, Working paper, Antwerp 1998.
- Ergun M., Iyınam S., Iyınam A.: An Assessment of Transportation Alternatives for Istanbul Metropolitan City for Year 2000. Proceedings of the 8th Meeting of the Euro Working Group Transportation, Rome 2000.
- Roy B., Huggonard J.: Ranking of Suburban Line Extension Projects on the Paris Metro System by a Multicriteria Method. Transportation Research, 16A(4), 1982.
- Gomes L.: Multicriteria Ranking of Urban Transportation System Alternatives. Journal of Advanced Transportation, Vol. 23, No. 1, 1989.
- Saaty, T.: Transport Planning with Multiple Criteria: The Analytic Hierarchy Process Applications and Progress Review. Journal of Advanced Transportation. 29(1), 1995.

-
- Chang Y.-H., Shyu T.-H: A Fuzzy Multicriteria Model to Evaluate the Privatization of the Public Bus Operations. *Journal of Advanced Transportation*, Vol.29, No.1, 1995
 - Hsu T.H. Public Transportation System Project Evaluation: A Fuzzy Delphi AHP. Presentation of the 8th World Conference on Transportation Research, 1998
 - Macharis C, Verbeke A. and K. De Brucker: THE STRATEGIC EVALUATION OF NEW TECHNOLOGIES THROUGH MULTICRITERIA ANALYSIS: THE ADVISORS CASE - Research in Transportation Economics. *Economic Impacts of Intelligent Transportation Systems: Innovations and Case Studies*, vol 8, 2004.
 - Caliskan N. A DECISION SUPPORT APPROACH FOR THE EVALUATION OF TRANSPORT INVESTMENT ALTERNATIVES — *European Journal of Operational Research*. 175 (3)
 - Hanaoka Shinya, Kunadhamraks Pichet: Multiple Criteria and Fuzzy Based Evaluation of Logistics Performance for Intermodal Transportation. *Journal of Advanced Transportation*, vol.43, 2009
 - Cathy Macharis, Astrid De Witte, Laurence Turcksin, The Multi-Actor Multi-Criteria Analysis (MAMCA) application in the Flemish long-term decision making process on mobility and logistics. *Transport Policy*, vol. 17, 2010.
 - EU Transport Policy – Innovation, integration and 21st century infrastructure, Centre for European Policy Studies (CEPS), 2011.
 - EU transport figures 2011, EC, 2011.
 - Transport White Paper, EC, 2011.
 - Report on the public consultation the Strategic Transport Technology Plan. EC. 2011
 - Low Carbon Transport Innovation Strategy Submission. Roadmap for Low Carbon Vehicles in UK. 2007
 - Advantages and Disadvantages of Anti-Lock Brakes. CarsDirect. 2011
 - Lightweight Truck Specification Generates Savings for MEMS. Department of Transport (UK). 2010
 - Save Fuel with Lower Rolling Resistance Tyres. Department of Transport (UK). 2010
 - New technical cargo handling solutions Transitecs Mid-Term Conference Transalpine Transport Architects. 2011
 - Port Technologies - Skema project. 2009
 - Transport Economics, Environment, Appraisal and Research team (TEAR) in Transport Scotland - Smart & Integrated Ticketing Report for Scotland. 2011
 - Short Sea XML project financing by "Marco Polo Common Learning" 2008.
 - Integrated Fare Systems in Barcelona. Autoritat del Transport Metropolità. Report 2010
 - Der Fahrgast 4/2011
 - Banister D., *Unsustainable transport. City transport in the new century*, Routledge, 2005.
 - Definition and Categorization of Mobility Management Measures, Materialy projektu MAX "Successful Travel Awareness Campaigns and Mobility Management Strategies", 2007, www.epomm.org/docs/MAX_Defn_catgsn_MM_measures_Final.doc.
 - Gronau W., Kagermeier A., Mobility management outside metropolitan areas: case study from north Rhine Westphalia, "Journal of transport geography", 2004, no 12.
 - Litman T., A Sourcebook for Policy-makers in Developing Cities Module 2b: Mobility Management, 2003, http://www.vtpi.org/gtz_module.pdf
 - Litman T., Mobility management. Sustainable transport. A sourcebook for policy-makers in developing cities, GTZ, 2002.
 - Litman T., Potential Transportation Demand Management Strategies, 1999, www.vtpi.org/tdm.
 - Mobility management and travel awareness, Portal – transport teaching material, 2003, http://www.eu-portal.net/material/downloadarea/kt7_wm_en.pdf.
 - Mobility management. Research for sustainable mobility, European Commission Brussels, 1999.
 - MOMENTUM – Mobility management for the urban environment, Deliverable 1 – State of the Art and Deliverable 2 – Blueprint for Mobility Centers, Final report, 2000.
 - O. Mc Nerney: Strategic Guide to Successful Use and Dissemination of the Results of Research and Development Projects. Steinbeis-Edition Stuttgart 2010.
 - www.wikipedia.de – Betuweroute
 - <http://www.glaesernemanufaktur.de>
 - <http://www.dvb.de>
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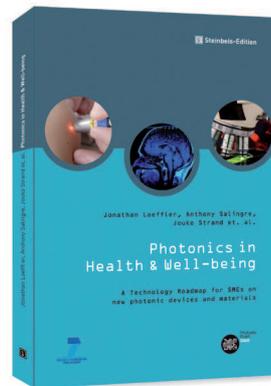
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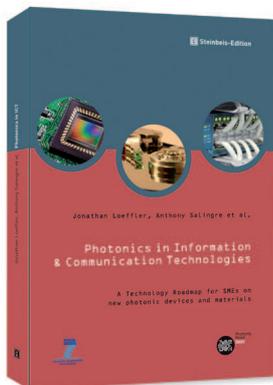


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