EVALUATION FRAMEWORKS FOR LARGE SCALE TRANSPORT PROJECTS

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Abstract

The Goal of the European Community Treaty, Article 154, is to establish and develop Trans-European networks in the sectors of transport, telecommunications and energy which will contribute towards both the establishment of the internal market, and the economic and social cohesion.

The Maastricht Treaty included the concept of the Trans-European Network (TEN), which had as a result the decision No 1692/96/EC of the European Parliament and Council on the Community guidelines for the development of the TEN.

Trans-European (TEN) and Pan-European (PEN) Transport Networks aim at transforming national transport systems of member states into a Community-wide transport network. Thse principles of Intermodality, Multimodality and Interoperability (IMO) of the transport network are integral to the development of TEN and PEN. The rationale points that enhancements in the IMO elements lead to improved accessibility among regions, which in turn supports a more spatially balanced economic development and improved social cohesion.

A crucial issue for policy makers in this respect relates to the problems involved in the impact assessment of network developments upon area development in the EU regions. For this purpose in the context of the EUROSIL Project a Decision Support System has been developed, enabling the impact assessment of enhancements of IMO on area development.

The focus of this paper will be on the contribution of the EUROSIL Decision Support Evaluation Framework on policy making for selected large-scale transport projects in the context of TEN and PEN.

1. Introduction

During the last decades the European Union has placed great emphasis on the development of large-scale transport networks, such as **Trans-European** (TEN) and **Pan-European** (PEN) networks, as means to create a Community-wide transport network which will increase the **accessibility** of regions and reinforce the **regional development** and **social cohesion** at European level.

A key objective of these developments is the due emphasis put on **multimodal,** intermodal and interoperable transport networks and more precisely on their impacts on area development.

Since the **impact assessment** of IMO on area development in the EU regions has become a crucial issue for policy making, the need for sound instruments supporting investment decision-making processes in the context of TEN and PEN has increased. These are expected to best contribute to the achievement of the broader economic, social and environmental objectives.

The Decision Support System developed in the context of EUROSIL[1] aims at supporting decision-making processes with respect to impacts of multimodality, intermodality and interoperability on area development in the context of TEN and PEN.

The focus of this paper will be on the contribution of the EUROSIL Decision Support Evaluation Framework on policy making for selected large-scale transport projects in the context of TEN and PEN. Chapter 2 outlines the EUROSIL evaluation framework, chapter 3 presents its application on two selected cases of large-scale projects, while finally in chapter 4 conclusions are drawn.

2. The EUROSIL Evaluation Framework

Whilst many of the appraisal procedures for informing decisions on transport investments are well established, the extent to which intermodal, multimodal and interoperable transport interventions contribute to area development is less well understood and consequently decision-making tools are less well developed. Main task therefore of the EUROSIL framework has been the development of an **evaluation framework** in support of decision-making processes assessing the impacts of multimodality, intermodality and interoperability (IMO) on area development in the context of the Trans-European and Pan-European Networks.

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1. EUROSIL: European Strategic Intermodal Links, European Commission, Transport RTD Programme, 4th Framework Programme, SC-1131, 1999.

Although this framework is specifically tailored towards the requirements and the characteristics of IMO and area development, the entire approach could fit into the systematics of a more generalized evaluation process.

Therefore it is very important to design or use evaluation processes assessing the pros and cons of certain choice alternatives for separate groups or regions. It is important also that these processes are of cyclic nature, so that possible revisions of evaluation elements, due to continuous consultations among the various parties involved, are introduced in the planning process at hand. The degree of complexity of an evaluation process depends among others on the evaluation problem treated, the time and knowledge available as well as the organizational context (Voogd, 1983).

The **evaluation framework** developed in EUROSIL context provides a structured approach for the assessment of IMO impacts on area development in the context of TEN and PEN. In order to better communicate the concepts used some of the most important definitions are given below:

The term **actor** refers to "any person or body having a strong interest in a terminal and/or link". The term **property** refers "to those characteristics used to judge the location, physical characteristics, operations and/or environment of a new or refurbished terminal or link".

As **impact** is meant "the effect of change of a control variable on all the components of a system", while an **indicator** refers to a measurable property or a substitute to measure one or several properties (in measurement theory the term indicator is used for the empirical specification of concepts that cannot be (fully) operationalized on the basis of generally accepted rules). Finally as **criterion** is considered any "explicitly formulated standards of judging, i.e. a measurable aspect of judgment that refers to a dimension of the various choice possibilities under consideration" (Voogd, 1983).

In order to support the development of the "evaluation framework" and test the validity of the results, a set of illustrative case studies are used, which present decisions on large scale projects undertaken in the context of TEN. The experience from such "real world cases" shows that there are three general stages of the evaluation framework /system which need the provision of explicit guidance to the user in order to cover the IMO and area development aspects, requested for the decision process:

❑ the identification of the "relevant per case" actors, properties and impacts

- ❑ the measurement / modelling of the dynamics of the selected criteria , and
- ❑ the assessment / evaluation of the alternative schemes under investigation.

The structure of the decision support framework is composed by three main stages, namely the (Figure 1):

- ❑ Evaluation Criteria Development Process (Stage I),
- ❑ Modelling / Measuring / Estimating the Dynamics (Stage II) and
- ❑ Evaluation / Assessment Process (Stage III).

✓ STAGE I: The Evaluation Criteria Development Process (ECDP):

ECDP consists the first stage of the Decision Support framework. Within this stage the person responsible for the impact assessment of each particular project (e.g. the decision maker) should identify the properties, impacts and indicators needed for the project appraisal.

The **ECDP** – Stage I of the Evaluation Framework – combines **four steps:**

- ❑ Definition of the full range of **actors** with an interest in the project as well as the **objectives** pursued by the project,
- ❑ Identification of the **impacts** related to the determination of indicators/ criteria chosen in the evaluation process,
- ❑ Expression of indicators in terms of **precise measurement units.**

More precisely the aim of this step is the identification of **key properties** relevant to the project at hand. Depending on both the actors and the spatial scale, a set of properties can be chosen from a superset of properties The whole procedure has been based on the **KIS/KEP approach,** which is used in order to select the actual key properties from the superset of properties, using as a filter the actors view (EUROSIL, Del.2, 1997).

The last step of the process has been the expression of the **indicators,** so that any changes in *properties* or *impacts* can be measured or estimated. Finally *indicators* are turned into **criteria** when entering the evaluation process (see Figure 1).

✓ STAGE II: The Modeling/Measuring/Estimating the Dynamics (MMED)

The **MMED** stage provides estimates of the changes caused by the project for each selected criterion that should be determined (measuring, modeling or perhaps only estimating) depending on the nature of the criteria, data availability, model availability, time frame (ex-ante/ex-post) etc.

The **Modeling/Measuring/Estimating Dynamics** – Stage II – seeks to provide a quantification of the impacts per alternative in terms of changes in the indicators.

✓ **STAGE III: The Evaluation / Assessment Process (EAP)**

The **EAP** stage of the framework involves the following steps:

❑ The first step is the **selection of the appropriate evaluation method.**
❑ The selected method influences the **measurement type** (ratio, monetary, ordinal, and qualitative) that can be used in the evaluation process.
❑ A further important step of Stage III is the assignment of values and weights varying by actor and over time.
❑ The final major step is the assessment of the different alternative scenarios.

The use of appropriate evaluation methods diminishes the importance of the barriers appearing in the process of any evaluation framework and supports effectively decision-making in resolving issues of conflicting views on location options, priorities in implementation of plans, IMO enhancements options etc., so that policy makers are able to take account of all the performances of planning strategies.

3. Large-Scale Transport Projects Evaluation

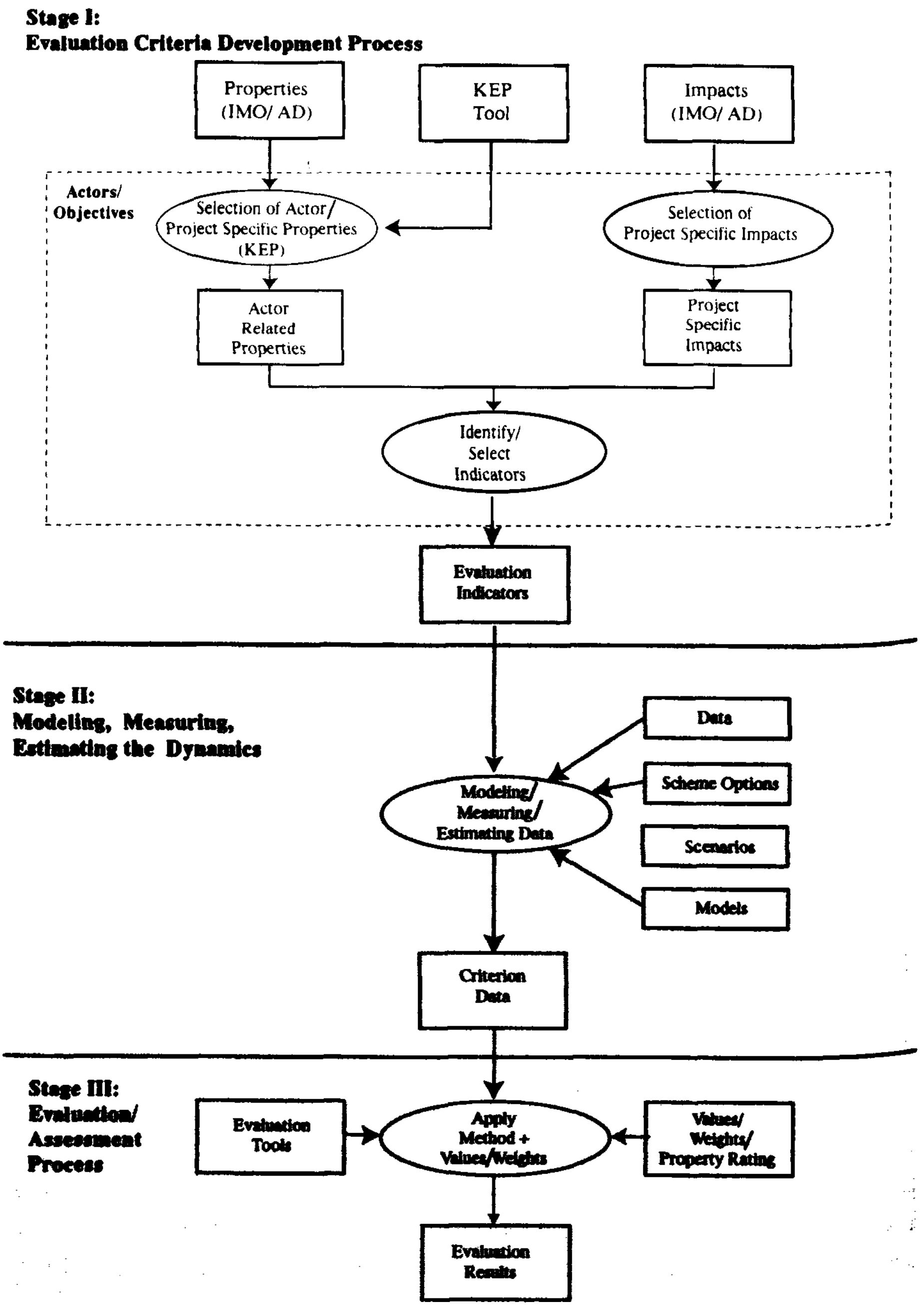
In this part of the paper will be presented the application of the above EUROSIL evaluation framework in two representative Large-Scale Transport Projects. The case studies selected exhibit two illustrative pilot applications useful for practitioners in the field. These are:

↳A Strategic Intermodal Link connecting Austria with Hungary – **SILAH** and

↳A Strategic Intermodal Link from Finland to the Independent Republics – **SILFIR.**

The above case studies are **international-interurban transport projects** which involve various transport modes. More specifically SILAH involves road, rail, inland waterway and air transport, while SILFIR involves road, rail and air transport. As to their type they both relate to link and network structures of the respective area. During the study period, SILAH was partly under construction and partly in operation, while SILFIR was at the planning stage

Figure1: The Modeling and Evaluation Framework



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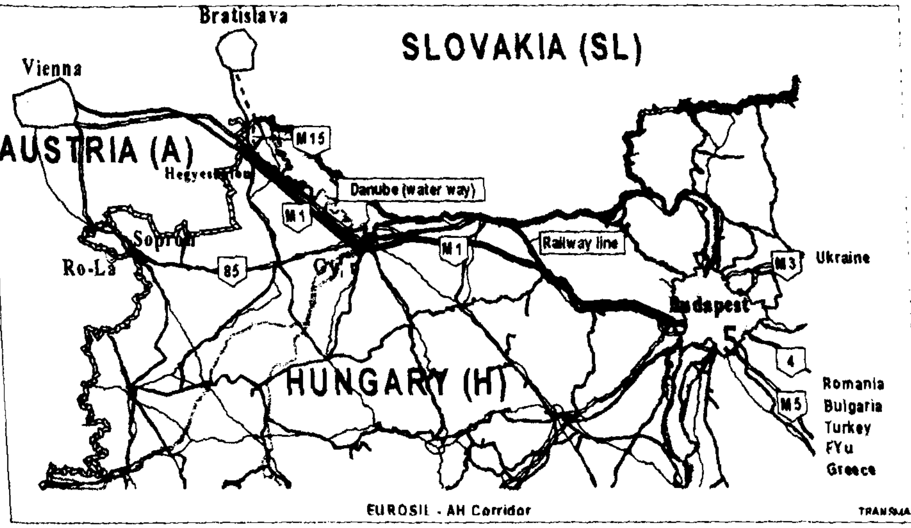
↬ SILAH – Strategic Intermodal Link Austria Hungary

3.1.1 The Study

The SILAH project deals with transport development projects that have been or will be implemented in the last/next couple of years in the Budapest-Tatabanya-Gyor-Sopron-Hegyeshalom area of the Austria (A) – Hungary (H) corridor in the north-eastern part of Hungary as follows (TRANSMAN, 1998):

- **road:** the completion of the M1 motorway between Budapest and the state frontier towards Vienna (the last 42 km as tolled motorway),
- **railway:** modernisation of the Budapest-Vienna railway line,
- **waterway:** making the Danube safely navigable,
- **air:** development of Ferihegy II for international passenger traffic and reconstruction of Ferihegy I for freight traffic,
- **combined transport:** road-railway (Sopron, Budapest) road-inland water (Gyor, Budapest) (see map 1)

Map 1: Location of the Corridor



The case study consists of the above projects and is **multimodal** in terms of both passenger and freight traffic with **intermodal** links as well. The primary goal of the SILAH transport developments is the **improvement of transport links** and **travel conditions** in the corridor to the EU. The secondary goal **is the** improvement of the conditions of **area development** in the catchment area of the corridor.

3.1.2 Application of the EUROSIL Evaluation Framework in the context of SILAH

Step 1: Identification of actors, properties and impacts

The following table presents the actors involved in the SILAH case study as well as the related properties:

Property no	Property no	Explanation	SILAH actors							
			Passenger	Infra/Super structure operators	Hungarian Commu-nity	Environ Organiza-tions	Policy Makers	Designers	Local authorities	Capital Investors
ACCESSI-BILITY										
12	Accessibility (distance /time)	Distance/ Time be-tween Ori-gin and destination	Y		Y		Y		Y	
SAFETY										
17	Accidents	Frequency and seriousness of accidents	Y				Y		Y	
NETWORK CAPACITY										
33	Modal split	Proportion of traffic per mode to total volume						Y		
51	Speed (network)	Mean speed taking in account the effects of overtaking possibilities						Y		
58	Traffic volumes	Passengers and freight				Y				
61	Travel time	Travel time between origin and destination	Y							
ADDED CAPACITY										
27	Interchange facilities	Facilities enhancing interconne-ctivity and compatibi-bility of modes	Y					Y		
29	Interchange time	Maximum transfers times	Y					Y		

ACTORS										
30	Level of service	Qualitative measure operational describing conditions within a traffic stream	Y							
49	Services, support	Type, size and number of utilities								
59	Traffic service providers per mode	Number of operators offering modal and/ or intermodal services		Y						
101	Social engagement	Attitude of employees and service providers towards the new infrastru-cture								
102	Authorities, influence of	Influence of public authorities on transport								
115	Labour regulations	Various restrictions on emplo-yment/ work force								
ADDED VALUE										
103	Cohesion	Level/inte-nsity of regional cooperation and integration	Y		Y					
107	Employment impacts	Number of newly created jobs	Y					Y	Y	
87	Land, value of remaining	Expected change in market value of land surrou-nding the terminal					Y		Y	
116	Land use	Effects on the use of land in the neigbour-hood	Y						Y	

FINANCIAL										
69	Concession duration	Period of validity of the grant to operate the infra-structure	Y							Y
70	Costs of accidents	Direct and indirect costs of accidents					Y			
73	Costs of infrastru-cture	Costs of the essential installations	Y				Y			Y
75	Costs of maintena-nce	Costs of refurbis-ment and renewal	Y							
76	Cost of operations	Direct and indirect costs of providing the transport and transfer service	Y	Y						
94	Revenues direct	Revenues from tra-nsport and /or trans port services					Y			
96	Subsidies total	Contribu-tion to invest-ment/o-peration costs by various sources					Y			
98	Tolling (road-use pricing)	Inter/intra urban road use and the percentage of the network covered by pricing schemes	Y	Y						
105	Economic stakes, private regional	The level of private financial involve-ment	Y						Y	
106	Economic stakes, public regional	The level of public financial involve-ment	Y						Y	
110	Environ ment direct, effects	Effects of infrastru-cture and operation on water, soil, air, noise and visual pollution	Y			Y	Y		Y	

Table1: Properties per actor in the SILAH case study

The above table depicts clearly the whole range of actors involved in the SILAH project as these relate to the relevant properties. In the next two tables are exhibited the relevant impacts for the project at hand (table 2) as well as the impacts per actor (table 3).

SILAH Case Study

Impacts	Description
Impact 1	Cost of implementation
Impact 2	Change in Operation Costs
Impact 3	Change in vehicle Costs
Impact 4	Change in revenue generation
Impact 5	Change in user costs
Impact 6	Change in non-user costs
Impact 7	Change in safety
Impact 8	Change in environmental conditions
Impact 9	Change in economic development
Impact 10	Change in mobility levels
Impact 11	Technological development
Impact 12	Other strategic policy planning impacts

Table 2: Type of impact

SILAH Case Study

Actors	Impacts per Actor
Passengers	Im3, Im5, Im7
Infra/superstructure operator	Im2, Im4
Hungarian community	Im212
Environmental organizations	Im8
Policy makers	Im5, Im7, Im8, Im9, Im12
Designers	Im6
Local authorities	Im8, Im9, Im10, Im12
Capital investors	Im1

Table 3: Impacts per actor in SILAH case study

The above information consists of the SILAH related pool of actors, impacts and properties which will support the evaluation process in the next stages.

Step 2: Modelling, Measuring, Estimating the Dynamics

At the second stage of the EUROSIL evaluation framework the process involves the following steps:

- Preparation of a spatial model for the study area; modeling traffic areas and networks and processing of additional information.
- Estimation of the transport demand at the reference stage (measured and modeled traffic flows).
- Identification of the impacts of transport developments on the transport network (changes in traffic characteristics).
- Identification of the impacts of transport developments on area development (aspects of premises area selection).

The impacts were calculated by an **impact model system** developed for this purpose, based on the traffic assignment results. The model incorporates the calculation of the EUROSIL specific **indicators** as time consumption, fuel consumption, air pollution, noise, accident cost, maintenance and operation costs as well as accessibility indicators.

Potential indicators were calculated such as sum of accessible attracting structural entities considering the transport costs / deterrence from the Austrian border related to the corridor, other regions and to the opposite border crossing points.

Area development impacts in the counties and the traffic zones affected by the corridor are determined by means of analyzing the **demography** and **structural economic changes** of the 1992-1996 period and the information on premises location selection and **transport usage patterns** obtained from 50 surveyed companies.

The area development impact calculations were supported by a survey and analysis of **locational choices**, which directly investigated the attitudes and reactions of companies connected to the infrastructure developments.

Step 3: Evaluation in the context of SILAH

Impacts of the SILAH transport infrastructure developments

The SILAH transport developments have increased the capacity of the existing multimodal transport system, improved the travel conditions and established new intermodal links. In general these transport developments contributed to the economic development of the North Western part of Hungary.

The passenger traffic has become more rational in respect to transport developments and to motorway tolls, while the freight traffic has become better connected to modes and was more keen to choose other routes than to choose other modes.

Impacts on area development

The most important aspect which has an impact on both transport and area development is the improvement in the *accessibility* of the area. The accessibility of North Western Hungary and Budapest both by rail and road has been considerably improved. In addition to that the combined transport terminal of Sopron with its container and piggyback facilities improved the quality of the corridor in this section. In general, transport developments motivated the international capital flow and contributed to the development of an innovating region.

♦ SILFIR – Strategic Intermodal Link between FInland and Russia

3.2.1. Introduction

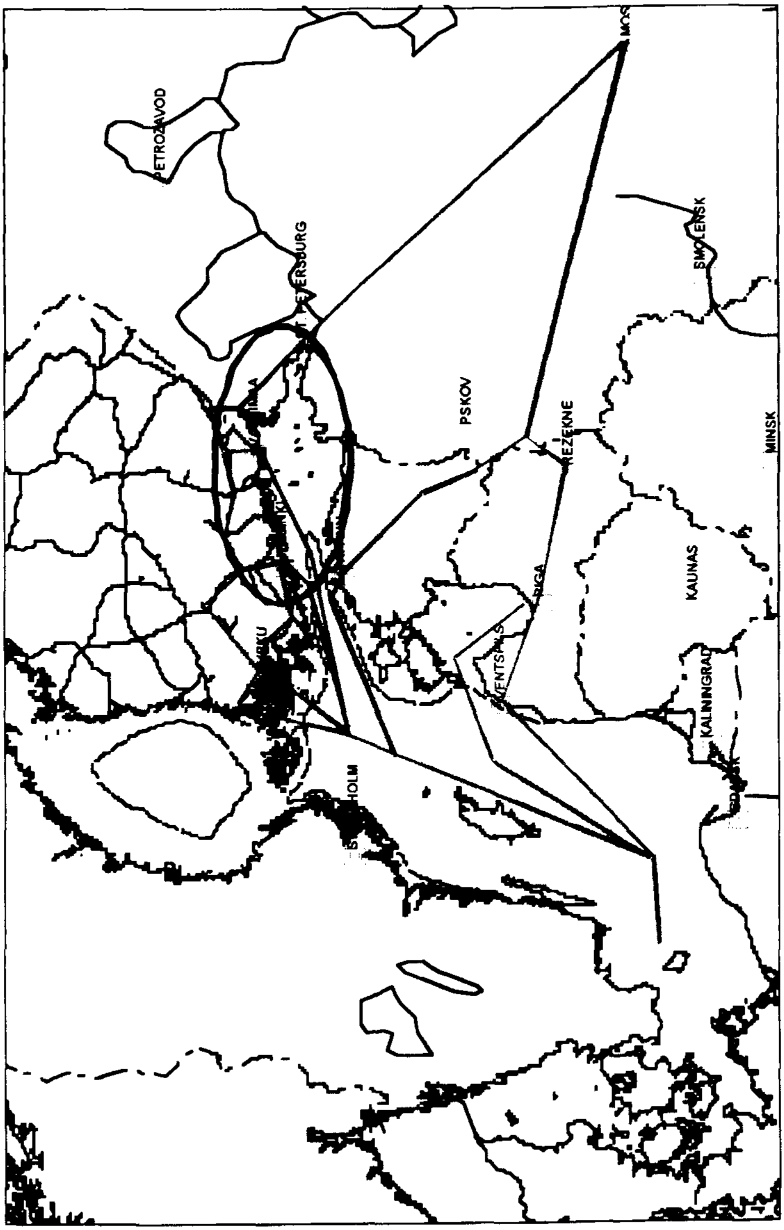
SILFIR is a corridor containing several parallel links, covering **multimodal** and **intermodal** transportation systems for both **passenger** and **freight transport.** It is a strategic link between EU and CIS in the North Eastern part of Europe. Having an effective sea bridge over Baltic from Finland to other Scandinavian countries and to the core area of EU, SILFIR is serving foreign trade cargo flows between EU and CIS on a European strategic level (VTT and SK, 1998). The statistics of transit cargo flows through Finland demonstrate the sustainable increase of transport of high value cargo and cargo which needs to be handled at a high technological level.

St. Petersburg, the second national centre of Russia and the biggest city in North Europe, is located close to the Finnish border, with good connections to Moscow and other core areas of Russia. The development in Europe has opened the borders for people from Russia and CIS. The result is that the passenger flows through Finnish - Russian border on all modes of transport are rapidly increasing.

Interoperability issues are important to SILFIR. The Russian and Finnish railways have the same gauge but different voltage, border and custom operations are developing, and even Finnish knowledge about road and winter maintenance has been transferred to Russian administrators.

SILFIR has a strong impact on area development and cohesion at the national and regional level in Finland and Russia. The operations on SILFIR have positive effects for transport operators and several business activities in the Southeastern part of Finland with high unemployment rates. The infrastructure developments are expected to improve the accessibility of peripheral regions in both Finland and Russia.

Map 2: The SILFIR case study area between Helsinki and St. Petersburg with relevant freight corridors



3.2.2 Application of the EUROSIL Evaluation Framework in the context of SILFIR

Step 1: Identification of actors properties and impacts

In Table 4 are presented the actors involved in the SILFIR case study as well as the properties chosen by each actor:

Property no	Property	Explanation	SILAH actors										
			Passenger	Infrastructure operators	Shipper	Forwarders	Mode operator	Freight Agent	Infra-Structure Owners	Stake Holders	Land Owners	Capital Investors	Employees
ACCESSIBILITY													
12	Accessibility (distance /time)	Distance/ Time between Origin and Destination	Y	Y	Y				Y				
SAFETY													
NETWORK CAPACITY													
33	Modal split	Proportion of traffic per mode to total volume	Y	Y			Y		Y				
34	Mode split of a journey	No, of modes used per journ ey	Y										
35	Modes, more than one available	Numbers of transport systems/modes connected to the terminal	Y		Y								
15	Thoughput	Actual volume of freight and/ or passengers to be calculated	Y			Y	Y						
43	Reliability (operational)	Punctuality of operations, expressed e.g. as delay time	Y		Y								

51	Speed (network)	Mean speed taking into account the effects of overtaking possibilities	Y		Y								
58	Traffic volumes	Passengers and freight											
61	Travel time	Travel time between origin and destination	Y										
ADDED CAPACITY													
27	Interchange facilities	Facilities enhancing interconne ctivity and compatibili-ty of modes	Y					Y					
ACTORS													
49	Services, support	Type, size and number of utilities		Y				Y					
86	Juridical relationships	The legal framework e.g.contacts between in vestor and owner								Y	Y		
101	Social engagement	Attitude of employees and service providers towards the new infra structure								Y			
102	Authorities, influence of	Influence of public authorities on transport					Y			Y	Y	Y	
115	Labour regulations force	Various restrictions on employ-ment/work					Y			Y			Y
ADDED VALUE													
107	Employment impacts	Number of newly created jobs								Y			
116	Land use	Effects on the use of land in the neighbour hood								Y	Y		

125	Technical harmonisation	Infrastr. loading units vehicles, documentation		Y			Y		Y				
FINANCIAL													
76	Cost of operations	Direct and indirect costs	Y		Y		Y						

Table 4: Properties per actor in SILFIR case study

The above table presents the whole range of actors involved in the SILFIR project. In the next two tables (4,5) are exhibited the relevant impacts for the SILFIR project (table 4) and the related impacts per actor (table 5).

SILFIR Case Study

Impacts	Description
Impact 1	Real Estate Acquisition Costs
Impact 2	Engineering Construction Costs
Impact 3	Equipment Costs
Impact 4	Vehicle Operation on Costs
Impact 5	Periodical Costs
Impact 6	Operating, Administrative and Monitoring Costs
Impact 7	Interest Payments on loans
Impact 8	Taxes
Impact 9	Revenues
Impact 10	User Costs
Impact 11	Safety
Impact 12	Local Environment
Impact 13	Strategic Environment
Impact 14	Strategic Economic Development
Impact 15	
Impact 16	Strategic Mobility
Impact 17	Technological Development

Table 5: Description of Impacts

SILFIR Case Study

Actors	Impacts per Actor
Passengers	
Infra/superstructure operator	Im4, Im10, Im15, Im16
Shipper	Im2, Im5, Im6, Im15, Im16
Forwarder	Im4, Im10, Im15, Im17
Mode operator	Im15, Im16
Freight Agent	Im4, Im6, Im9, Im10, Im11, Im13, Im16
Infrastructure Owners	Im15, Im16
Stakeholders	Im2, Im5, Im6, Im15, Im16
Land Owners	Im1, Im6, Im11, Im12, Im14
Capital investor	Im1, Im12
Employees	Im1, Im12

Table 6: Impacts per actor considered in the context of SILER cause study

Step 2: Modeling, Measuring, Estimating the Dynamics

For the analysis of the above mentioned development plans, the following steps were undertaken:

- ❑ Analysis of the passenger and freight flows in Helsinki - St Petersburgcorridor
- ❑ Analysis of the multimodal and intermodal aspects in passenger and freighttransport--
- ❑ Estimation of the population development, employment, Finnish and Russian GNP, passenger and freight demand
- ❑ Adjustment of the specific models of mode choice (including intermodality) for passenger and freight transport
- ❑ Estimation of the area development impacts of the high-speed rail project between Järvenpää - Lahti and international development projects betweenHelsinki and St Petersburg
- ❑ Evaluation of the model results (policy analysis)

Area development impacts were calculated in two levels:

• For Finland, on a detailed level, for the Helsinki - Lahti part of the high-speed-train connection, and,

• At the international level, more coarse evaluations were based on changes of transport times, costs and general utility between zones.

In the SILFIR case study, **three different model approaches** were used (VTT, 1998):

- In the **Finnish part** of the corridor a specific **land use / transport model,** the **IMREL,** was applied. The model deals with passenger transport, employment and residential locations. The output from the model includes the zonal distribution of population and the number of workplaces as a result of the new railway investment and more rapid rail operations for the year 2010.

- At the **international level,** an existing **transport model VR/RHK** was used to evaluate the passenger transport and accessibility effects of the changes in the transport system. Land use effects were then evaluated based on these accessibility changes.

- A **freight assignment model,** implemented on the **STAN software,** was used to evaluate changes in freight flows, modal split and transport costs. These changes are thought to have an effect on economic development and land use.

In all these models travel costs, time and level of service by mode were used as an input.

Demographic and macroeconomic data such as total population, employment, growth of GNP, scenarios for land use development at the national level, were used in passenger transport models on the Finnish side of the corridor. In the IMREL model, employment data and land use data of a basic scenario were also used as an input. Present population and employment figures were used as input for the Russian part of the corridor.

All models gave demand by mode, travel costs by mode, trip/transport time by mode and transport work by mode as output. Macroeconomic indicators may then be calculated by using these model outputs.

IMREL gave also population and employment by zone as output.

VR/RHK model and freight transport model gave data to be used for evaluating accessibility measures, which in turn were used to evaluate population and employment changes by zone.

Step 3: Evaluation in the context of SILFIR

For Finland, the transport projects evaluated would exhibit a more dense population in the Southern part of the country. This might cuase, in some municipalities surrounding growth centers, growth of suburbs with increasing car use, but on the average new population and employment patterns would benefit public transport over private car use. As the population density in Finland is quite low, changes would not cause remarkable congestion problems. On the contrary, the impacts by the SILFIR transport project in Russia are minor compared to the total population and other changes happening in the society.

Changes in the transport sector were also estimated. Railway and port sectors would gain over 500 work places, but car, bus and truck sectors would lose almost as many jobs.

Intermodality was evaluated to have significant impacts on transport improvements, on integration of TEN and PEN, but not so many on area developments. In peripheral areas with poor infrastructure it seems better to first develop one mode instead of dispersing the investments to several projects.

Multimodality exhibited impacts on transport improvement and area development, while impacts on integration of TEN and PEN was minor. Interoperability issues were seen most important for all the above three objectives.

4. Conclusions

Whilst IMO objectives are encouraged in policy terms, their added value to transport efficiency and area development is not sufficiently identified, measured or evaluated. The two large-scale project cases presented in this paper, as well as the overall experience gained in the context of the EUROSIL through the study of a range of projects involved, shows that this added value prevails. However it is evident that their study through IMO schemes needs comprehensive guidance for the selection of properties impacts and actors already at the very initial stages of the evaluation process.

The identification of parameters in the above problems is not an easy task due to the multi-actor nature of large-scale projects where conflicting goals and different scale and nature of interests are brought together; lack of information on properties relevant to a specific project; availability and quality of information related to impacts: non-uniformity of impacts in the context of a large-scale transport project emanating from the characteristics of the regions involved; institutional aspects; barriers involved in the context of indicators selection and estimation, etc.

Measurement/ modeling aspects is another important issue for discussion. A review of existing case studies reveals that only few modeling approaches in this context deal explicitly with IMO impacts on area development in a detailed manner. Most of the models used in these case studies do not explicitly address the fundamental requirements for assessing the area development impacts of multimodality let alone intermodality and interoperability. Moreover, many of the transport models used do not provide the full technical specifications to address the impacts of intermodality and interoperability on the transport system.

At the evaluation/assessment stage experience shows that despite the large number of simple and more sophisticated methods currently available for use in transportation planning and project evaluation, there is still very little information on the specific features of these methods and the conditions which guide their selection in practice. As a result, use of such methods depends mainly on how familiar an analyst is with a particular method. Such a finding limits somehow the strength of a decision tool since the human expertise has to back the decision process in parallel to an existing decision support system. In order to face the subjectivity involved in the use of systems focusing on large scale projects further research has to be carried out in this direction since selection on the basis of weak premise involves a broad range of impacts at the various spatial scales.

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