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Doctoral Thesis

TRANSFERABILITY ASSESSMENT OF RAIL INFRASTRUCTURE CHARGES: CONTRIBUTION TO A CONCEPTUAL FRAMEWORK

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ABSTRACT

A preliminary evaluation of the results obtained so far by the European Railway Reform shows a slow evolution in its implementation and a number of shortcomes as regards the degree of competition introduced in the market and its expected economic effects. One of the causes behind this poor success is found in the failure to harmonize the regulatory aspects of the reform across the Member States, together with the increased complexity derived from the reform itself. This consideration is particularly appropriate in relation to the current diversity of railway infrastructure charges and has recently fostered the debate on whether they should be further standardized. The preliminary outcome of the ongoing discussion suggests the convenience of promoting a greater harmonization of track access charges, opening the door to the concept of transferability (i.e. whether one policy or practice can be transferred from one to another reality).

In line with this background, this thesis has been aimed at proposing a conceptual framework for the assessment of transferability in the field of railway infrastructure charging. To achieve this goal, the thesis has first characterized the more relevant economic and political aspects intervening in the formulation of track access charges and reviewed the notion of transferability as developed in other disciplines, notably in comparative politics and management science. Building on these bases the thesis has then proposed a multilevel analytical structure and four transferability criteria (indifference to contextual variations, indifference to external influences, horizontal compatibility and vertical compatibility) and particularized them for their use in the field of railway infrastructure charging.

Additionally, the framework has been tested through the development of six case studies involving the current practice of European Member States. The case studies, based on a detailed and comparable characterization, have shown the validity of the conceptual structure proposed as a methodological tool able to organize the analysis and formulate effective transferability criteria at an early stage of the transfer process. Moreover, the experience obtained through the case studies has pointed out some aspects of the framework that could be further refined but that do not contest in any case its ability to establish necessary conditions (though not sufficient) on the objects transferred.

TRANSFERABILITY ASSESSMENT OF RAIL INFRASTRUCTURE CHARGES: CONTRIBUTION TO A CONCEPTUAL FRAMEWORK

RESUMEN

La evaluación preliminar de los resultados de la Reforma Ferroviaria Europea muestra la lentitud de su implementación y la existencia de insuficiencias en el nivel de competencia introducido en el mercado y en la consecución de los efectos económicos esperados. Una de las causas de este escaso éxito radica en la falta de harmonización de las regulaciones introducidas por la reforma en los diferentes Estados Miembros, así como en la mayor complejidad del sistema derivada de la propia reforma. Esta reflexión, especialmente apropiada para la diversidad actual de las tarifas por uso de infraestructura ferroviaria, ha contribuido a alimentar el debate sobre su posible homogeneización. El resultado preliminar de esta discusión todavía abierta sugiere la conveniencia de promover una mayor harmonización de los cánones de acceso a la red ferroviaria, lo que abre la puerta al concepto de transferibilidad (es decir, en qué medida una política o una práctica pueden ser transferidas de una a otra realidad).

De acuerdo con estos antecedentes, esta tesis se ha planteado como objetivo el desarrollo de un marco conceptual para la evaluación de la transferibilidad en el ámbito de la tarifación por uso de la infraestructura ferroviaria. Para alcanzar esta meta, primero se han caracterizado los aspectos económicos y políticos más relevantes para la formulación de los cánones de acceso a la red ferroviaria y se ha revisado el concepto de transferibilidad desarrolado por otras disciplinas como la política comparada o la gestión. A continuación se han propuesto un marco de análisis multinivel y cuatro criterios de transferibilidad (indiferencia a las variaciones de contexto, indiferencia a las influencias externas, compatibilidad horizontal y compatibilidad vertical) y se han particularizado para el ámbito de las tarifas por uso de infraestructura ferroviaria.

Además, el marco propuesto ha sido puesto a prueba mediante el desarrollo de seis casos de estudio apoyados en la práctica acual de algunos Estados Miembros. Los casos de estudio han evidenciado su validez como herramienta metodológica para organizar el análisis y formular criterios de transferibilidad efectivos en una fase temprana del proceso de transferencia. Asimismo, la experiencia conseguida a través de ellos ha señalado algunos aspectos del marco que podrían ser ulteriormente afinados, pero que no ponen en duda en ningún caso su habilidad para establecer condiciones necesarias (aunque no suficientes) sobre los objetos transferidos.

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Prudent counsel is to scan globally for best practices but to test them locally since local adaptation often amounts to reinventing the "best practice"

(Joe Stiglitz)

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INTRODUCTION

1.1 Motivation

Since its origins, the aim of the European Union has been the establishment of a common market so that goods and factors of production can freely travel across all Member States included within its boundaries. The transport field is not apart from this objective and has deserved a special focus from the EU through the Common Transport Policy, whose principles were already embedded in the foundational Treaty of Rome, signed in 1957 (Treaty establishing the European Economic Community, Art. 74-84).

In spite of this early inclusion in the political agenda, for years the Common Transport Policy remained paralyzed by the rigidity of many decision-making procedures, which at that moment required unanimity of the Council of Ministers. It was only in the second half of the '80s that the Common Transport Policy could effectively begin, after some relevant court decisions and the enforcement of the Single European Act introduced relevant changes in the decision-making procedures.

The starting policy had to face a highly regulated transport sector that was controlled in each Member State by a national intervention system aimed to accomplish specific transport and societal objectives generally divergent from those of its neighboring countries. To address this situation, priority was given to the deregulation of transport markets and the liberalization of the provision of transport services, an experience that had already been successfully implemented in other sectors of the economy.

Today, the process of liberalization and opening up of national markets to competition is to a large degree completed at a normative level, with the two exceptions of rail passenger transport and port services in maritime transport. Still its practical implementation is not homogeneous across modes and Member States. In the case of railways, the reform has progressed slowly in comparison with other transport modes. The causes of this delay may be found in a combination of factors such as the strong differences among national operating conditions, the existence of physical, administrative and organizational barriers to the development of services on a European scale, the accumulation of indebtedness of the national railway companies or their strong links to the State (Izquierdo, 1994, pp.877-895). However, relevant milestones have been already reached.

Today, formal separation of the infrastructure and the operation businesses is a fact in all the Member States and competition is taking off at national level in the rail freight sector. The reform is progressing as well in the definition of the steps leading to the opening to competition of the passenger sector, the achievement and implementation of common technical standards or the construction of a trans-European railway network. But there are also some important concerns about the implementation of the railway reform, particularly as regards the development of international freight traffic, the potential discrimination of new entrants in the market or the competition conditions with other transport modes.

In order to solve some of these critical points, the EU has strongly directed its attention to infrastructure pricing policies, as a powerful tool able to guide the behaviors of the rail market agents and the decisions of the final consumers.

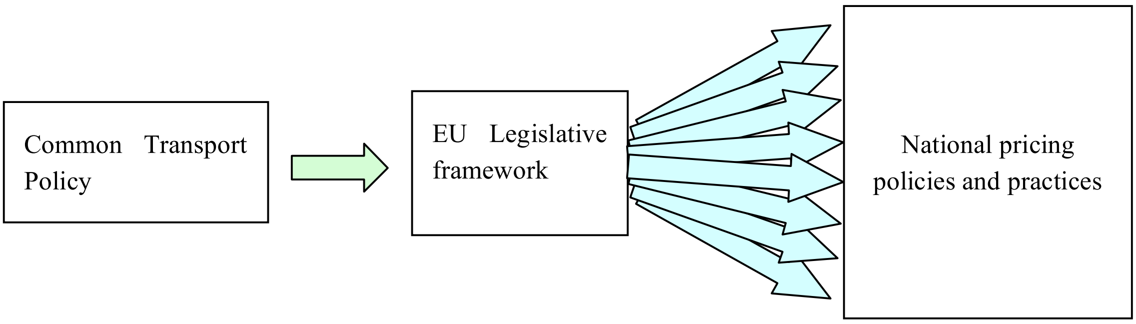
The 1996 White Paper on railways already stated the need of defining common pricing principles at European level in order to ensure that no distortions of intermodal competition occur (EC, 1996a, p.13). Two years later, the White Paper on pricing of infrastructure use concluded that "*different current charging principles distort competition, while common charging principles would create a level playing field and correct intra and intermodal imbalances*" (EC, 1998, p.4) and remarked the urgent need of addressing the question of harmonizing charging frameworks in the context of progressively liberalized transport markets (EC, 1998, p.5).

The 2001 White Paper on the European transport policy identified the lack of fiscal and social harmonization as a source of distortions of competition hindering the development and completion of the internal market (EC, 2001a, p.11). This perception was extended to the infrastructure pricing policies applied at that moment in the EU. According to the White Paper the policies in place had been conceived individually for each mode of transport and for each country, leading to some anomalous situations able to hamper international transport and even discriminate between operators and modes of transport. Consequently, the European Commission remarked the need for a Community framework in this domain, and proposed the development of a framework directive to establish the principles of infrastructure charging and a pricing structure for all modes of transport (EC 2001a, pp.73-74).

As regards rail, the framework for setting infrastructure charges was provided by Directive 2001/14/EC, which set common principles in order to avoid discrimination in the access to rail infrastructure and to reduce variations in the structure and level of charges applied in the Member States (European Parliament and Council, 2001a, rec. 4-5).

In spite of these aims, tending towards increasing integration and harmonization, the comprehensive scope and complexity of the current legal framework has allowed a high level of choice to the Member States as regards its interpretation and enforcement (Fig. 1). This relative freedom, together with national diversity in institutional arrangements, market conditions, infrastructure characteristics and legislation, has favoured the implementation of different pricing principles and schemes across the EU.

Fig. 1: Differentiation dynamics in the implementation of the Common Transport Policy



Source: own elaboration

According to the main associations of infrastructure managers at European level, "*The situation today relating to charging systems in Europe can be characterised by the variety of charging systems in application*" (EIM et al. 2008, p.3).

This scenario risks inducing an additional fragmentation of the European railway market and therefore hindering the achievement of some of the declared objectives of the Common Transport Policy. This lack of homogeneity may in fact lead to inconsistent incentives for international traffic, barriers to international transport, financial risk and lack of competition for railways (ECMT, 2005, p.11).

To overcome such unwanted effects, the European Commission has undertaken a series of measures aimed at achieving a greater convergence in the pricing practice. The actions started include the reformulation of the current legislation (recast of Directive 2001/14/EC), greater pressure on Member States as regards its implementation (opening of infringement procedures) and the promotion of research on harmonization (establishment of a common approach for cost calculation methodologies, for performance regimes, for charges along international corridors, etc.).

Aware of the issues at stake, the industry has promoted as well research and initiatives aimed at achieving a greater coordination among the different national railway administrations at the time of defining and applying their charging schemes. An example of this interest is the RailNetEurope platform, which has successfully launched projects as a common format for the network statements, a database of rail infrastructure charges at European level (EICIS) or a One Stop Shop (OSS) for the acquisition of international train paths.

However, the whole of the initiatives and measures promoted to achieve a greater convergence of tariffs has reported lower success than initially expected and, at the end of the day, the harmonization of track access charges seems still far to become a reality in the EU.

Some reasons have been suggested for this shortcomings, like the remaining signs of protection of incumbent and domestic suppliers (PETS Consortium, 2000, p.23); the contested nature of the ongoing debate about pricing principles in the fields of academic teaching, official doctrines and practical implementation (Quinet, 2001, p.21); the difficulties in deriving an appropriate pricing system or the existence of numerous barriers to implementation (Nash et al. 2002, p.8).

Other authors have explained the lack of harmonization as the result of "*significant differences between the market structures and the nature of the rail network in each Member State, and also clear differences between government policies in relation to public transport and the availability of public funds*" (NERA et al. 1998, p.3).

Broadly speaking, the literature provides a series of arguments related to the process of *definition of charges*, like complexity or difficulties in cost measurement, but also a number of reasons related to *national specificities*: acceptability on behalf of railway operators, presence of different systems of infrastructure financing, variety in the size and equipment of the network, dissimilar resistance to change of national railway administrations, diversity of institutional arrangements and competitive structures, etc.

The first type of arguments has been extensively treated through relevant European research projects and actions aimed at defining pricing principles, cost calculation procedures or charge setting methodologies[1].

The second type of considerations has been transversally present through this research effort, in the form of implications for government taxation and spending decisions (NERA et al. 1998, p.61); in the form of differences in national costs and accounting standards (ECORYS et al. 2005, pp.55-56), particular problems of certain Member

[1] CAPRI - Concerted action on transport pricing research integration (1998); PETS - Pricing European Transport Systems (2000); UNITE - Unification of accounts and marginal costs for transport efficiency (2003); MC-ICAM - Implementation of Marginal Cost Pricing in Transport – Integrated Conceptual and Applied Model Análisis (2004); IMPRINT-EUROPE - Implementing Pricing Reform in Transport – Effective Use of Research on Pricing (2004); GRACE - Generalisation of Research on Accounts and Cost Estimation (2008); or IMPRINT-NET - Implementing pricing reforms in Transport – Networking (2008).

States or impacts of greater harmonization of charging regimes (IMPRINT-NET Consortium, 2006, p.111). It has also been present in the analysis and proposition of charging schemes for East European or new candidate countries (GRACE Consortium, 2005, pp.39-46).

The progress of the pricing reform able to overcome the actual hindrances to international traffic and market unification requires a further understanding of the role played by national specificities, the difficulties that may arise from them and the solutions available to go further. In words of the railway associations EIM and CER (2008, p.3): "*Even though a higher degree of harmonisation can be helpful under certain conditions, the differences in operating conditions of the Infrastructure Managers should not be forgotten. National access charge regimes should be related to the complexity and intensity of the use of their rail network and should respect specific market conditions within their environment*".

This conflicting relation between harmonization and national specificities has driven attention on the concept of transferability (i.e. whether one policy or practice can be transferred from one to another reality). In fact, it is very likely that any process aimed at attaining a higher level of convergence and consistency among the pricing policies of several Member States will involve a transfer at some point in time.

Furthermore, the search for the most effective measures to deal with the problems derived from the heterogeneity of charging structures has resorted to the notion of *best practices*[2]. The basic idea is the identification of policies that can solve the problem effectively, and then apply these policies to other contexts. Although this idea is meaningful, it requires the detailed evaluation of the transferability conditions.

The notion of transfer is also present in the improvements of the charging schemes undertaken at national level, which may take advantage of the experience already gained in other Member States, not to say in their introduction in newcomers or candidate countries.

Some references to this approach already exist in the railway infrastructure pricing literature particularly as regards the transfer of cost models and charging schemes.

The UNITE project (2003, p.6), in its search for reliable marginal costs estimates already remarked the importance of providing guidance on whether and how the case study evidence could be transferred for use in different contexts. The MC-ICAM project (2004, p.2) sought to identify and understand possible barriers to

[2] See for instance the project *RAILCALC – Calculation of charges for rail infrastructure* (2008), directed by Prof. López Pita and Dr. Fonseca Teixeira.

implementation and to define optimal and feasible implementation paths for marginal cost pricing. Continuing their task, among the objectives of the GRACE project (2005, p.12) it is possible to find the review and estimation of methods to transfer cost figures from one country to another.

The IMPRINT-EUROPE coordination action noted the following as a key requirement for pricing reform: "*Understanding complexity and transferability – do we really need in depth studies of every mode in every location in order to implement pricing reform, or can we find ways of transferring results from one context to another*" (IMPRINT-EUROPE Consortium, 2002, p.2).

The ECMT (2005, p.86) recommended the development of "*better guidance on the transferability of results, in all the above areas, from one context or country to another, and on adjustments that might be necessary to ensure coherent outcomes*". The areas concerned are the variability of rail infrastructure costs with traffic levels, the best way of dealing with scarcity and congestion in rail infrastructure charges, the impact of various forms of mark-up on train operating companies and the quantification and valuation of the environmental costs of rail transport.

However, the major part of these considerations remains in a very specific domain (the transfer of marginal cost estimations from one Member State to another), avoiding a wider reflection on the transferability of railway infrastructure pricing policies. This first impression is supported as well by the absence of comprehensive approaches to transferability in the railway infrastructure pricing literature.

This view is shared by Geerlings and Stead (2003, p.191), who after reviewing a number of policy documents and research programmes in the areas of land use planning, transport and environmental policy, concluded that "*although the issue of policy transferability is mentioned in a number of the research projects, few of them consider the issue in great detail. Furthermore, little attention is given to the wider social sciences literature on lesson drawing or comparative policy analysis from the social sciences area. Clearly, these limitations of the existing research provide some clues for promising new areas of research.*"

Since then, there has been an increasing attention to transferability issues in the field of urban transport policies (e.g. the CIVITAS initiative and its accompanying project METEOR) or in the field of integration between urban transport and land use (e.g. the research projects TRANSLAND and LEDA), but not in the field of railway infrastructure pricing.

It is from this evidence that the present thesis takes origin, as an attempt to progress in the analysis and application of the transferability concept to the field of railway infrastructure pricing policies from a wide perspective.

Indeed it is believed that advances in such a direction have the potential to improve the understanding and treatment of national specificities, allowing for a better conception and design of harmonization policies. This, in turn, will provide a larger basis to improve the quality of national practices, helping to overcome some of the present shortfalls of international rail traffic attributable to the heterogeneity of railway infrastructure charges.

1.2 Objectives

The definition of the main objective of the thesis took advantage from two different circumstances. The first one regards the *increasing interest* shown by researchers and practitioners about the role played by national specificities in the transfer and implementation of railway infrastructure charging practices. The second one is the relatively *low degree of development* found in the scientific literature as regards the specific question of when and whether a railway infrastructure charging policy or practice may be deemed transferable to a network different from the one where it was initially implemented.

The coincidence in time of both aspects, an increasing interest for transfer and a low degree of development, rapidly suggested the convenience of investigating the conceptual basis of transfer and, more specifically, the notion of transferability. Moreover, the investigation of these primary aspects is perceived as a prerequisite for the development of any operational application of the transfer concept. Accordingly, the main objective of this thesis should be understood as an effort to contribute to the understanding of the transferability concept and its potential operationalization in the field of railway infrastructure charging.

The main objective of the thesis can be stated as:

> ***"To propose a conceptual framework for the assessment of transferability in the field of railway infrastructure charging"***

In this expression a *conceptual framework* stands for a set of ideas and principles that provides the basis for the analysis of a given matter. It is a conceptual structure that lies between the theoretical foundations of the subject treated and a more detailed model of it, able to be implemented in the real world. Consequently, the thesis will treat the key elements of transferability, but it will not arrive to the detailed specifications of a model. The term *transferability* refers to the condition of being transferable from one to another reality (e.g. railway infrastructures in the field of railway infrastructure charging). The thesis will further define this notion in the search of the exact meaning and implications of such condition. Finally, *field of railway infrastructure charging* applies to the whole of elements related to the charges levied on railway operators for the use of the infrastructure (e.g. pricing principles, charging structures, charging levels, etc.).

Another point that should be noted is that though the main objective is general in its scope, i.e. it looks forward to be valid for the field of railway infrastructure charging with independence of the geographical scope considered, it is clearly focused on the European Union. In fact, the motivation behind the thesis arises from the particular analysis of the situation in the EU, where the diversity of railway infrastructure charging schemes is extremely relevant[3]. In addition, the access to information has determined the selection of case studies among EU Member States, somehow *biasing* the validation of the framework proposed. This focus should not be understood as a renounce to the generalization of the ideas proposed, but as the first step of their corroboration.

In order to ease the consecution of the main objective stated for the thesis, four partial objectives have been identified:

- To identify and characterize the more relevant economic and political aspects intervening in the formulation of charges for the use of railway infrastructure.
- To explore and review the notion of transferability as developed in other disciplines, notably in comparative politics and management science.
- To formulate a theoretical framework for the assessment of transferability in the field of railway infrastructure charging.
- To develop a set of case studies in order to validate / refute the main assumptions of the proposed framework and refine it where necessary.

Each of them is intended to drive the attention on a particular element intervening in the problem posed, but is worthless for the solution without the appropriate links to the others. Hence, these partial objectives should not be conceived as independent parts summing up the overall goal, but as different steps in the path to the solution that should be put together.

Indeed, the basic methodology proposed for this research is organized around these four partial objectives. The formulation of the framework for the assessment of transferability (third objective) is first done building on the notion of transferability

[3] A similar scenario may be found as well in Australia, where every State developed its own railway system in both its technical and regulatory aspects.

already existing in other disciplines (second objective) and on the characterization of railway infrastructure charging (first objective), then is validated through a number of case studies (fourth objective).

1.3 Methodological approach

Transport research has deserved increasing attention in recent years, both at national and European levels, particularly as regards the formulation, design and assessment of transport policies.

The ever-increasing mobility, the acute unbalance and inadequacies perceived in current transportation systems or the consolidation of the sustainability paradigm are unparalleled challenges for the research community, which strains to put in place comprehensive methodologies and tools able to guide strategic decisions and investments in the sector. Additionally, the growing importance of supranational political actors has enlarged the scope and consequences of political decisions related to transport, leading to higher levels of interaction and complexity. This new dimension of the policy setting activity has expanded both the scale and relevance of the defy, driving attention on concepts and issues previously neglected.

In practical terms, the research on transport policy seeks to develop and solve problems that are adequately motivated to deal with important aspects of the design, analysis and assessment of policies related to transportation systems. To address them, researchers are confronted to pronouncedly interdependent political, societal, environmental, economic and technical features, which have favored the increasing adoption of multidisciplinary approaches.

The main objective stated for this dissertation, the design of a transferability assessment framework in the field of railway infrastructure charging, may be certainly included within the *transport policy research field*, of which it shares the main characteristics. First, this research is aimed at developing methodologies with a final impact on transport policies. Second, it is focused on the notion of transferability, probably one of the more promising concepts for the handling of the recently acquired supranational dimension. Third, it is confronted with the complexity of decision-making in different political settings. Fourth, it involves both political and economic considerations. Finally, it requires the adoption of a multidisciplinary approach able to bridge the gap between different backgrounds and levels of analysis.

On a more practical ground, the nature of the selected objective conditions the methodological approach followed in this thesis.

The formulation of a conceptual framework, an intermediate stage between the basic theoretical developments and the design of specific models suitable to support decisions in the real world, defines a particular relation between the methodological approach and both aspects, theoretical knowledge and real practice. In fact, the framework will be successful only in the measure in which it will be able to link theory to practice, providing an adequate support to more detailed developments.

In this research, the theory is represented by the concepts and methodological procedures defined by other scientific disciplines that have already studied transfer processes but fall outside the domain of transport research. The practice is the specific information available on the reality of railway infrastructure charges levied in a number of networks, as well as the considerations and procedures effectively taken into account to design and implement them.

Accordingly, the methodology adopted has defined as a priority the conciliation of the theoretical and practical dimensions of the framework. To ensure the achievement of this goal, a *top-down procedure* involving two steps has been selected. The first step builds on the theoretical knowledge available on policy transfer to propose a general framework for the assessment of transferability and then contrasts it with the practical knowledge available on railway infrastructure charging. The result of this phase is a framework particularized for the assessment of transferability. The second step challenges the particular framework through the development of specific case studies rooted in the information accessible on the real world practice. This way of proceeding enables a double interaction between "theory" and "practice", ensuring a high degree of consistency for the framework proposed.

Moreover, the interaction achieved in every step provides different inputs to the framework definition process. The first step is aimed at adapting the theoretical concepts found in the literature to the specific considerations of railway infrastructure charging. It allows as well to complement the existing theoretical background through the formulation of new concepts and procedures able to improve the framework. The second step is directed at refining the methodology proposed, through the adjustment of some of its elements. It is also used to identify the validity of the framework, eventually pointing out its limitations as observed through the case studies.

The overall procedure reproduces the scientific approach, as far as it tests the methodological hypotheses formulated (theoretical considerations) against the conditions prevailing in the real world (information available on real practice). In this research, as it is characteristic in the domain of transport policy, the verification relies on the development of *case studies*.

Case studies are based on the collection and presentation of detailed information about particular entities or situations. They are developed according to mixed methodologies, including both quantitative and qualitative aspects, as the more effective way to provide a wide perspective on reality, including the presence of uncontrolled elements. Each case study looks intensely at the individual case, drawing conclusions only about that particular entity or situation and in that specific context. Its objective is not to provide universal and generalizable truth, but to partially test the framework proposed. The overall degree of validation will depend on the number and selection of case studies.

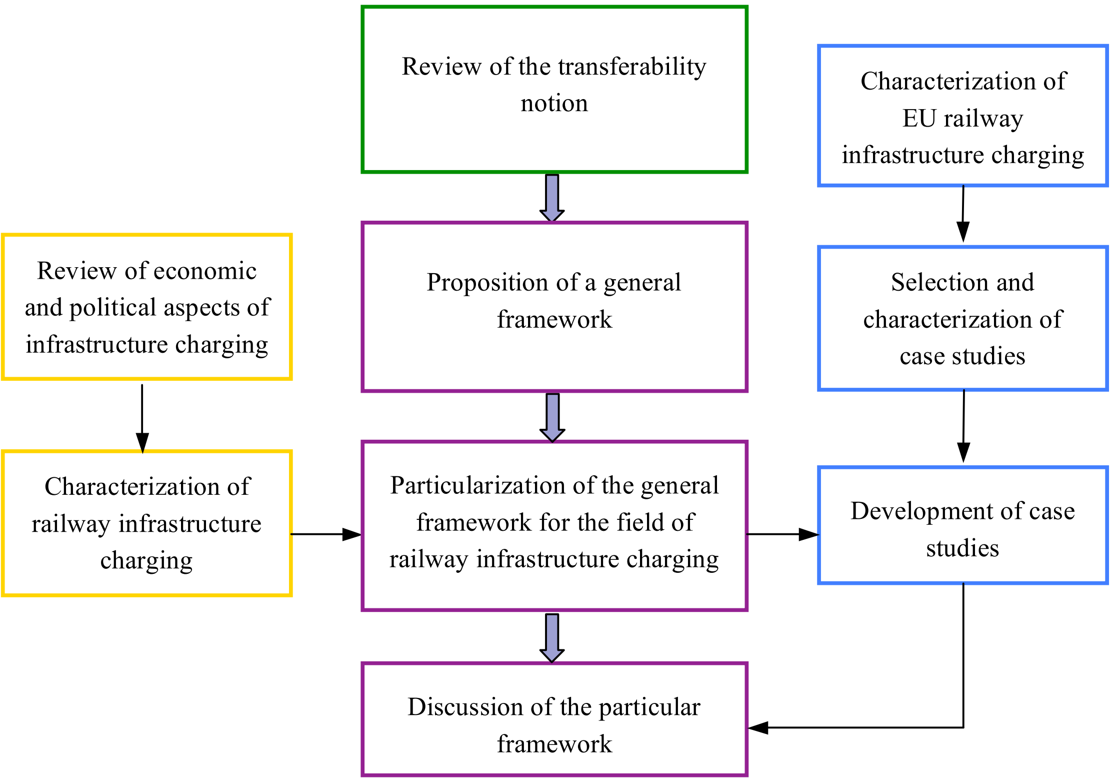
The selection and definition of case studies in this thesis presents some particularities as a consequence of its interest in transfer procedures. Indeed, the consulted literature on railway infrastructure charging does not provide any documented case of transfer of policies or practices between different railway administrations. Thus, the research has been forced to build its own case studies on the information available on national practices. First, importer and exporter jurisdictions have been selected and characterized. Then, the case studies have been defined as the transfer of a pricing policy or practice between an importer and an exporter jurisdiction.

Though the characteristics of the practice and the jurisdictions have been described with recourse to detailed information on reality, the transfers represented in the case studies have never occurred in practice. This fact has forced a double analysis of the transfer represented in each case: a first analysis studies the transfer between both jurisdictions without any formal constraint, while the second applies the framework proposed. The comparison of both approaches is used to explore the eventual limitations of the framework.

The selection of case studies in this research has been performed with the aim of obtaining an adequate representation of the current railway infrastructure pricing policies and practices in the European railway sector and being realistic as regards the eventuality of transfers in the European scene (through the selection of the importer and exporter jurisdictions). Furthermore, the formulation of case studies has sought to reflect the different levels of analysis proposed in the framework (through the selection of the policies and practices being transferred).

The final and partial objectives proposed for this research, as well as the methodological considerations exposed so far, have been reflected in the *work structure* adopted (Fig. 2). The structure is made of a main work stream reproducing the top-down approach from the more general levels (close to theory) to the more particularized (close to the practice of rail infrastructure charging) and two secondary streams, designed to provide the "reality inputs" required by the two-step procedure.

Fig. 2: Work structure followed in this research



Note: The color code refers to the fulfilment of the partial objectives indicated in section 1.2: Green – To explore and review the transferability as developed in other disciplines; Purple – To formulate a theoretical framework for the assessment of transferability in the field of railway infrastructure charging; Yellow – To identify and characterize the more relevant economic and political aspects intervening in the formulation of charges for the use of railway infrastructure; Blue – To develop a set of case studies.
Source: own elaboration

The main stream is formed by the tasks *Review of the transferability notion*, *Proposition of a general framework*, *Particularization of the general framework for the field of railway infrastructure charging* and *Discussion of the particular framework*. The first of the secondary streams includes the tasks *Review of economic and political aspects of infrastructure charging* and *Characterization of railway infrastructure charging*. It facilitates the basic input for the particularization of the framework, closing the first interaction between theory and practice. The other secondary stream gathers the tasks *Characterization of EU railway infrastructure charging*, *Selection and characterization of case studies* and *Development of case studies*. It provides the second interaction between theory and reality, exploring the limits of the proposed framework. Every stream is linked as well to the fulfillment of the partial objectives set for this research. This fact has been highlighted in Fig. 2 through the color code used to depict each task.

The more remarkable methodological characteristics of the tasks developed in this research are referred next:

- *Review of the transferability notion* – the review has been performed on the literature produced by the comparative politics and the management science. The main source of information at this stage has been handbooks, reports from supranational organizations (UN, OECD, EC) and scientific publications (e.g. *Journal of European Public Policy*, *Governance*, *Political Studies*, *Public Administration Review*, *The Review of Policy Research*, *ASQC Quality Press*, *Benchmarking: An International Journal*, *International Journal of Public Sector Management*, etc.). The information gathered has been processed and presented according to two different analyses: an "horizontal analysis" dedicated to the concept definition and a "vertical analysis" dedicated to the concept implementation.
- *Proposition of a general framework* – the proposition of the general framework has formulated the basic methodology to assess the transferability of policies and/or practices between different jurisdictions. Previously to its formulation, this task has clarified the basic hypotheses and assumptions done on the basis of the review of the transfer concept. These assumptions basically regard the conceptualization of the policy definition process and the conceptualization of the transfer process.
- *Review of economic and political aspects of infrastructure charging* – the review has been based on a number of research projects promoted by a wide range of institutions (World Bank, UN, ECMT, EC, UIC, EIM, CER, BTRE), complemented with handbooks, academic literature (*Transport Policy*, *Utilities Policy*, *Journals of Industry, Competition and Trade*, etc.) and a number of selected conferences and workshops (e.g. VATT -Helsinki, 2000; Rafael del Pino Foundation - Madrid, 2004; University of Bath 2004). Contrarily to the review of the transferability notion, this task has had an instrumental function and it is not reflected in a specific section in the document. Its outputs have been the basis for the development of the characterization of railway infrastructure charging.
- *Characterization of railway infrastructure charging* – the information gathered through the previous task *"Review of economic and political aspects of railway infrastructure charging*" has been analyzed and used to characterize the basic concepts and elements influencing the determination and implementation of railway infrastructure charges. The characterization has been performed

according to a top-down approach that goes from the structure of railway infrastructure markets to the operationalization of railway infrastructure charges.

- *Particularization of the general framework* – this task has merged the general framework with the characterization of railway infrastructure charging. The approach adopted has maintained the formal structure of the general framework and particularized each of its elements and criteria for the field of infrastructure charging.
- *Characterization of EU railway infrastructure charging* – this task has provided an overview of the EU railway reform and a synthetic description of the European practice as regards the concepts and elements pointed out in the task "*Characterization of railway infrastructure charging*". The documentation used in this task consisted of EU legislation and policy documents (EC Communications, White Papers, etc.), complemented by some research projects and statistics from international organizations (EC, ECMT, UIC) and sparse scientific contributions.
- *Selection and characterization of case studies* – in order to reflect the more likely informational conditions at the time of undertaking a transferability assessment process, the importer jurisdiction selected for the six cases developed has been the Spanish railway network managed by ADIF. The exporter jurisdictions have been chosen according to a threefold criterion integrating maturity, market size and geographical proximity. The characterization of rail infrastructure pricing in the selected jurisdictions has been performed in the more accurate way as possible from the diversity of sources publicly available (network statements, financial annual reports of infrastructure managers and operators, national legislation, decisions from regulatory bodies, presentations at conferences and workshops, press releases, etc.). In every case, the thorough description of the national practice has been accompanied by a qualitative - quantitative analysis of the structure and levels of the charging scheme. The presentation of the information and analysis performed for every jurisdiction has been done according to a normalized structure so as to ease the development of the case studies.
- *Development of case studies* – each case study has been developed according to the same structure, providing first the description of the transfer and a set of preliminary considerations on its feasibility, and then the contents of the particular framework for the transferability assessment.
- *Discussion of the particular framework* – this task has discussed the validity of the particular framework proposed in the light of the conclusions obtained from

the six case studies developed. Its outcomes have been directly incorporated to the final conclusions of the thesis.

1.4 Plan of the thesis

The structure of this document has been designed to reflect the objectives and the tasks developed in the research. Accordingly, every chapter fully presents the outcomes of at least one relevant task of the research, with the only exception of Chapter 2 *European railway reform*, which is intended to provide a synthetic overview of the broad context surrounding railway infrastructure charging in the EU. Additionally, every chapter has been conceived as a self-standing entity, obviously within the logical limits imposed by its participation in the general workflow.

The document contains eight chapters, now shortly described:

- The present chapter, *Introduction*, exposes the motivation and objectives of the research undertaken in this thesis, as well as the methodological approach adopted.
- Chapter 2, *European railway reform*, presents the background of the research through the examination of the motivations, basic principles, actual results and harmonization dynamics of the European railway reform.
- Chapter 3, *Railway infrastructure charging*, illustrates the specificities of the railway infrastructure charging activity, particularly in relation to the regulation and the pricing theory. This chapter presents as well the conceptualization of pricing policies and proposes a scheme for the decision-making process involved in the definition of railway infrastructure charges.
- Chapter 4, *The notion of transferability*, explores and reviews the notion of transfer as it has been developed in other disciplines, notably in comparative politics and management science, in order to provide a sound theoretical foundation for the proposition of the conceptual framework. The chapter explores as well the conceptual relation between the two literatures reviewed.
- Chapter 5, *A conceptual framework for the assessment of transferability*, proposes a general framework to assess the transferability of policies and/or practices from one jurisdiction to another. In the second part of the chapter, the general framework is particularized for the specific analysis of railway infrastructure pricing policies and practices.

- Chapter 6, *Characterization of case studies*, selects and documents a number of case studies that will be used in Chapter 7 to provide further validation to the assumptions of the transferability assessment framework.
- Chapter 7, *Development of case studies*, presents the results of six case studies, differentiating the preliminary considerations (performed outside the proposed framework) from the basic elements, analysis levels and transferability criteria stated in the framework.
- Chapter 8, *Conclusions*, resumes the conclusions of the research and suggests future lines of work related to it.

Chapter

2

EUROPEAN RAILWAY REFORM

2.1 Introduction

The field of interest of this thesis, the transferability of railway infrastructure charges, achieves its full signification within the deep political and economic reform undertaken by the European Union to stop the continuous decline of the railway mode.

First of all, because the reform enforced the vertical separation of the railway business, giving way to the setting of infrastructure charges in all the national rail networks of the Union. Second, because the European railway reform has revealed in all their strength the opposed dynamics of integration and differentiation affecting the economic regulation of the access to the network. It is in the EU where it is possible to find a supranational legislation setting common principles for track access charges and twenty-three different charging systems. Third, because in spite of the preliminary results achieved so far by the reform, there is the perception that the lack of harmonization may potentially hinder the consecution of its final goals. Finally, because its ongoing status leaves open the door to new initiatives and changes.

Accordingly, this chapter aims to introduce the background of this research through the examination of the motivations, basic principles, actual results and harmonization dynamics of the European railway reform. Logically, this will be done keeping a particular focus on the charges for the use of railway infrastructure.

Section 2.2 presents the evidence of the decline of railways in the European context and reviews some of its fundamental causes; Section 2.3 refers the basic principles of the EU railway reform; Section 2.4 examines the current state of implementation and success achieved by the reform; Section 2.5 elaborates on the role attributed to harmonization by the ongoing reform; Finally, section 2.6 presents a synthesis of the chapter.

2.2 The decline of railways

Over the last thirty years, Europe has witnessed a steady decline of railway transport performance, both in the freight and passenger market segments. This negative evolution seems even more significant when compared to the trends observed in other countries, like US or Japan, who have been able to preserve a greater participation of railways in the transport scene (EC, 2006b, 3.4.13 and 3.4.14).

Aware of the extreme importance of the issues at stake, the European institutions and the national States carried out a wide number of detailed analysis of the phenomenon, that finished up in the identification of a bundle of structural characteristics hindering the potential evolution of the railway sector, both at national and European level. It is based on these facts, the evidence of the decline and the diagnostic of its causes, that the EU launched, in the early nineties, an intensive railway reform involving the whole of its Member States.

2.2.1 Evolution of the railway market share

For the last decades the overall transportation activity has significantly increased in the EU-15, with annual rates around 4% in the freight market and between 2,5% and 3% in the passenger market between 1970 and 2000 (EC, 2003, p.88). However, in spite of this significant growth in the whole volume of transport, rail has faced a continuous reduction of its share in both markets. During the period 1970–2000, rail's market share for freight dropped from 20,0% to 8,0% (Table 1), while in the passenger market decreased from 10,4% to 6,4% (Table 2).

Table 1: Modal share for freight transport market in the EU-15. 1970-2001

	Road	Rail	Inland waterways	Pipelines	Sea
1970	34,7	20	7,3	4,5	33,5
1980	36,3	14,6	5,3	4,3	39,4
1990	41,9	11	4,6	3	39,6
2000	44,3	8	4	2,7	40,9
2001	45	7,8	4	2,8	40,4

Note: % over ton-km performed by all transport modes included. Source: EC, 2003, 3.4.2

Table 2: Modal share for passenger transport market in the EU-15. 1970-2001

	Passenger cars	Buses & Coaches	Tram & Metro	Railway	Air
1970	73,8	12,7	1,6	10,4	1,6
1980	76,1	11,8	1,2	8,4	2,5
1990	79	9,3	1	6,7	4
2000	78,1	8,6	1	6,4	5,9
2001	78,2	8,6	1	6,4	5,9

Note: % over pax-km performed by all transport modes included. Source: EC, 2003, 3.5.2

This situation has little changed during the last years in spite of the enlargement from the EU-15 to the EU-25 that brought into the Union countries were rail traditionally hold a relevant market share. Calculated over this enlarged basis, railway share evolved from 10,2% to 10,0% in the freight transport market in the period 2001-2005 (Table 3) and from 6,1% to 5,8% in the passenger transport market in the period 2001-2004 (Table 4).

Table 3: Modal share for freight transport market in the EU-25. 2001-2005

	Road	Rail	Inland waterways	Pipelines	Sea	Air
2001	43,1	10,2	3,6	3,6	39,4	0,1
2002	43,6	10,0	3,6	3,6	39,2	0,1
2003	43,4	10,1	3,3	3,3	39,6	0,1
2004	44,1	10,3	3,4	3,4	38,9	0,1
2005	44,2	10,0	3,3	3,4	39,1	0,1

Note: % over ton-km performed by all transport modes included
Source: EC, 2006a, 3.2.2

Table 4: Modal share for passenger transport market in the EU-25. 2001-2004.

	Passenger cars	Motored 2 wheels	Bus & Coach	Railway	Tram & Metro	Air	Sea
2001	73,4	2,3	8,5	6,1	1,2	7,6	0,9
2002	74,0	2,3	8,3	5,9	1,2	7,4	0,8
2003	73,9	2,4	8,3	5,8	1,2	7,6	0,8
2004	73,5	2,4	8,3	5,8	1,2	8,0	0,8

Note: % over pax-km performed by all transport modes included
Source: EC, 2006a, 3.3.2

The situation is particularly challenging when it comes to international traffic, especially freight. An appropriate example is provided by the evolution of road and rail freight transport across the Pyrenees (Table 5). According to the European Commission (2007, p.83), in 2005 the international rail freight volumes in Portugal and Spain were equivalent to just 3% and 6% respectively of these countries' international road freight volumes.

Table 5: Evolution of rail and road freight transport across the Pyrenees. 1997-2004

	Road (daily trucks)	Evolution (basis 1997)	Rail (thousand ton-km/year)	Evolution (basis 1997)
1997	13.266	100,0	4.795	100,0
1998	14.765	111,3	4.442	92,6
1999	15.845	119,4	4.241	88,4
2000	17.943	135,3	4.583	95,6
2001	18.028	135,9	4.188	87,3
2002	18.904	142,5	4.161	86,8
2003	19.954	150,4	4.284	89,3
2004	21.832	164,6	4.563	95,2

Source: EC, 2006a, 3.4.12

2.2.2 Causes of the decline

During the last twenty years, academicians, practitioners and policy-makers have sought to understand the root causes of this negative trend, and have proposed a large number of them. This section shortly reviews some of the more relevant ones, which clearly illustrate the grounds on which the railway reform took off.

According to Stehmann and Zelhoffer (2004, p.328), one of the main reasons for the decline of railways must be found in the organization of the national railway sectors in very rigid monopolistic structures under the direct control of Member States. Such circumstance provoked the submission of the national railway companies to a wide range of political objectives, mainly in the form of imposed investment and employment policies or forced public service obligations. Over time, the situation led to a huge indebtedness on the part of railway companies and to a day-to-day political interference incompatible with a business oriented approach. The visible result of this arrangement has been the increase of the financial support for rail services and the application of compensation systems for social obligations that are not clear in their objectives and retributions. At the same time, as noted by Nash and Rivera (2004, p.4), the national transport enterprises frequently had unrealistic balance sheets burdened with inherited debts and with low relation to the value of their assets.

But this is of course not the only reason. Sthemann and Zelhoffer (2004, p.329) pointed out the fragmentation of the European market, as it prevents railways from competing with other transport modes in markets where they could be particularly effective (e.g. freight international services running over long distances). Fragmentation has arisen from the protective nature of national legislation and the market power exerted by national railway undertakings, but also from the size of most Member States and the lack of technical interoperability due to different national standards and operating rules. The consequences of market segmentation are illustrated by Olivier Silla (2002, p.1) in a single but very relevant question: “*whilst some 20% of domestic traffic in Germany and France goes by rail, how is it that traffic between the two countries is as little as 6%?*”

Di Pietrantonio and Pelkmans (2004, p.3) remarked that a third cause explaining the current position of railways could be found in its technological characteristics, which had made it suitable for the transportation of heavy weights over long distances or for the transportation of passengers in high demand corridors. On the reverse, these same characteristics had led to a lower flexibility than its competing modes as regards the satisfaction of demand in its current spatial and temporal requirements. Within a context of transformation from an industrial economy to a service-based one and adaptation of the industrial activity to just-in-time production processes this particularity has become a disadvantage for railways. Furthermore, the guided nature of the railway transport and the different speeds of the services offered make it very vulnerable to operational incidents, thus affecting to its reliability.

Other reasons that are also found in the literature regard the historical lack of investment on railway infrastructure because of a political preference for road infrastructure, the limited attention of national railway companies to customer care, the lack of service integrators for optimized logistical chains, the traffic priorities allocated to passengers, the non transparent cost structure of services running on international corridors (Di Pietrantonio et al. 2004, p.3) and the inadequacy in the capacity and quality of infrastructure, which limits the ability to operate high speed passenger and combined transport freight services on international routes (Nash et al. 2004, p.4).

The described problem of railway decline in Europe and its potential effects on the whole transportation system has been, and it is still being, a core issue in the Common Transport Policy applied by the EU, and has been the basis for the railway reform started in the first nineties.

The European Commission (1992, pp.24-25) already described the negative trend of railway's market share in its White Paper on the Common Transport Policy and suggested a number of reasons strongly linked to *intermodal competition* (e.g. the increasing penetration of road haulage, the constant reductions in road costs charged to users or the fact that external costs are not fully internalized by the road mode).

Two years later the EC (1996a, pp.9-10) enlarged the list of causes including several aspects related to the *conditions prevailing in the railway sector*, namely: 1) the variety of physical characteristics (e.g. gauge, signalling, electrification, etc.) of the national infrastructures, leading to interoperability problems; 2) the incorrect management of railways, as Member States have traditionally denied railway companies to carry out a commercial business; 3) the inadequate investments in infrastructure, which have led to infrastructure backwardness; and 4) the low flexibility of the railway sector.

When in 1998 the Commission delivered its White Paper on the payment for infrastructure use (EC, 1998, p.3), it emphasized the role of *distortions of competition* in the unbalanced modal distribution observed in the EU (both between Member States and between modes). It also referred to the failure to consider social and environmental aspects of transport and the difficulties in funding infrastructure investments.

Almost all of the previously mentioned reasons are found as well in the later White Paper on the European Transport Policy (EC, 2001a, p.27), notably the lack of infrastructure suitable for modern railway transport, the lack of interoperability between networks and systems, the non-transparency of costs, the low productivity and reliability of the service, the absence of real competition within the rail sector or the strong competition from the road.

It is on the top of this analysis that the EU decided to launch, more than fifteen years ago, a deep reform of the European railway sector.

2.3 The railway reform

Accordingly to the evidence of the railway decline and in line with the diagnostic of its causes, the EU set the political goal of revitalizing the railway mode in Europe and, as the way to achieve it, selected the integration and opening of the national railway markets to competition.

However, the path started has revealed to be far from easy. In fact, in order to achieve a common market open to competition it is necessary to address institutional, organizational, technical and economic issues of the greatest complexity. Examples are the creation of adequate regulatory bodies, the vertical separation of infrastructure and operation activities, the search for interoperability or the setting of track access charges. The European institutions have launched initiatives regarding all these aspects, backing them with a large legislative production regulating their core aspects in the territory of the Union. They are known as the European Railway Reform.

The following sections will briefly describe the rationale, major legislation and principles of the reform, with a particular focus on its economic and regulatory aspects, field of interest of this dissertation.

2.3.1 Rationale

As previously said, in order to stop and invert the decline of the part of railways in the modal distribution, the EU has promoted a set of legal actions with the aim of reaching a step by step market opening in the railway sector leading to the revitalization of this transport mode. But before going ahead with this topic a question arises: what is the interest of reversing the current trend for railway transportation? Or otherwise, what reasons justify the European Railway Reform?

The main answer to these questions is that the present trend would inevitably lead to economic and environmental problems. Firstly, the reduced market shares would imply financial difficulties for the public monopolies, faced to a high amount of fixed costs and a reduced ability to generate incomes over time. Secondly, the growing share of road transport is likely to increase the overall environmental costs of transportation given the level of externalities created by this mode (Holvald, 2006, p.2). This view is also shared by Stehman et al. (2004), who remarked that the present trend is not only to the detriment of the rail sector but of the entire transport sector in the EU, as the traffic displaced into other transport modes places a greater burden on their infrastructure. A complementary argument is provided by Pittman (2003, p.9), who suggests political integration as another key reason for the railway reform.

To address all or part of these effects, in the early nineties the European Union pointed at market opening as the key objective to be reached and started its railway reform, which is still ongoing.

2.3.2 Major legislation

The first step of the European Railway Reform consisted on the publishing of Directive 91/440/EEC on the development of the Community's railways. This directive established the basic framework for the separation of accounts between infrastructure management and transport operation, imposing the vertical separation of the sector. Accordingly, it required the infrastructure manager to charge a fee to the operator for the access to the railway network.

In 1995, the European Parliament and the Council authorized the entry of private capital in the rail sector through the Directive 95/18/EC on the licensing of railway undertakings. This Directive permitted the private finance of new infrastructures and the private operation of services. It was approved together with Directive 95/19/EC on the allocation of railway infrastructure and the charging of infrastructure fees, which gave legal force to the concept of financial stability of the infrastructure manager and required governments to lay down rules for establishing fees for the use of the infrastructure, to publish the capacity allocation procedures and to appoint an independent body for appeals on capacity allocation decisions.

Six years later, the European Parliament and the Council issued the First Railway Package consisting of Directives 2001/12/EC, 2001/13/EC and 2001/14/EC which substituted or amended the abovementioned Directives 91/440/CEE, 95/18/EC and 95/19/EC.

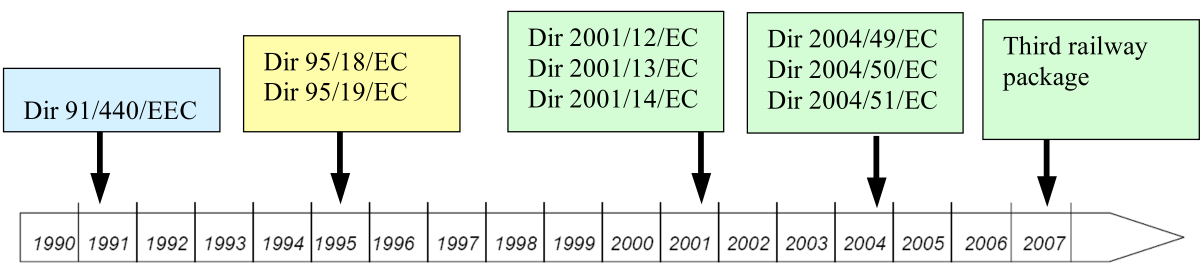
Directive 2001/12/EC amending Council Directive 91/440/EC was aimed at progressing in the core aspects of the structural reform: it increased the independence of the railway undertakings and the infrastructure manager from the budgetary accounting of national government; required the separation of accounts between passenger and freight services in order to avoid cross-subsidies from a socially significant service to another service operated in competition with unsupported suppliers; defined the Trans-European Rail Freight Network, on which railway freight undertakings were to be granted open access after March 2008. Directive 2001/13/EC amending Council Directive 95/18/EC was focused on the provision of operating licenses valid across the European Union. Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification set the basic framework for the levying of charges and the allocation of capacity.

In 2004, the European Parliament and the Council adopted a Second Railway Package, based on the measures established in the 2001 White Paper (EC, 2001a) and consisting of Directive 2004/49/EC on safety on the Community's railways, Directive 2004/50/EC amending Council Directive 96/48/EC and Directive 2001/16/EC and Directive 2004/51/EC amending Council Directive 91/440/EEC. This legislative package proposed the complete opening of the rail freight markets, including cabotage, and focused on railway safety and on the establishment of a European Railway Agency aimed at providing technical support for interoperability and safety work.

Finally, in March 2004, the European Commission presented the Third Railway Package in order to complete some aspects of the previous legislation. The package consists of a Communication, four legislative measures and a working document on the extended impact assessment for the gradual opening up of the market for international passenger services. These legal texts continue the railways reform focusing on the opening to competition of the international passenger services across the European Union, the integration of the European railways and the revitalization of this mode of transport. The Third Railway Package, after a long discussion between the European Commission and the European Parliament has been finally passed to the Council in June 2007.

The distribution over time of the main legislative steps described in the previous paragraphs is synthesised in Fig. 3.

Fig. 3: Milestones of the European Railway Reform



Source: own elaboration

2.3.3 Principles

The European Railway Reform looks for a step-by-step liberalization of the railway sector aimed to improve the efficiency and competitiveness of railway undertakings. This objective has been pursued on the basis of three complementary policies (UN, 2003, p.84):

- A clearer separation of the State and the railway undertakings.
- An improvement in the financing of railways through greater transparency.
- A progressive opening, through the provision of non-discriminatory rights of access, to rail infrastructure for specified categories of service.

These developments have been facilitated notably by the separation of infrastructure and operation activities and the establishment of specific access conditions to the market. The following analysis will focus on three aspects closely linked to the scope of this proposal: the vertical separation of infrastructure and operations, the introduction of infrastructure charges and the possibilities available for railway competition.

2.3.3.1 Vertical separation of the railway sector

Vertical separation of infrastructure and operation activities is one of the distinctive characteristics of the European Railway Reform, and constitutes the cornerstone of the legislative actions undertaken by the EU.

Traditionally, railway transport markets have been integrated national monopolies under the control of Member States, who were responsible for the definition of prices and services offered to the final consumers. The main justification for this organization was found in the fact that railway transport presents the characteristics attributed to *natural monopolies*[4], given its strong *economies of scale*[5] and its high ratio of fixed and sunk costs imposed by the construction, maintenance and renewal of the infrastructure.

However, this situation did not protected railways from *intermodal competition*. The intermediate role of transport and the highly substitutive nature of rail transport in the majority of market segments favoured the loss of rail's market share with respect to road or air transport, imposing an increasing burden on national finances.

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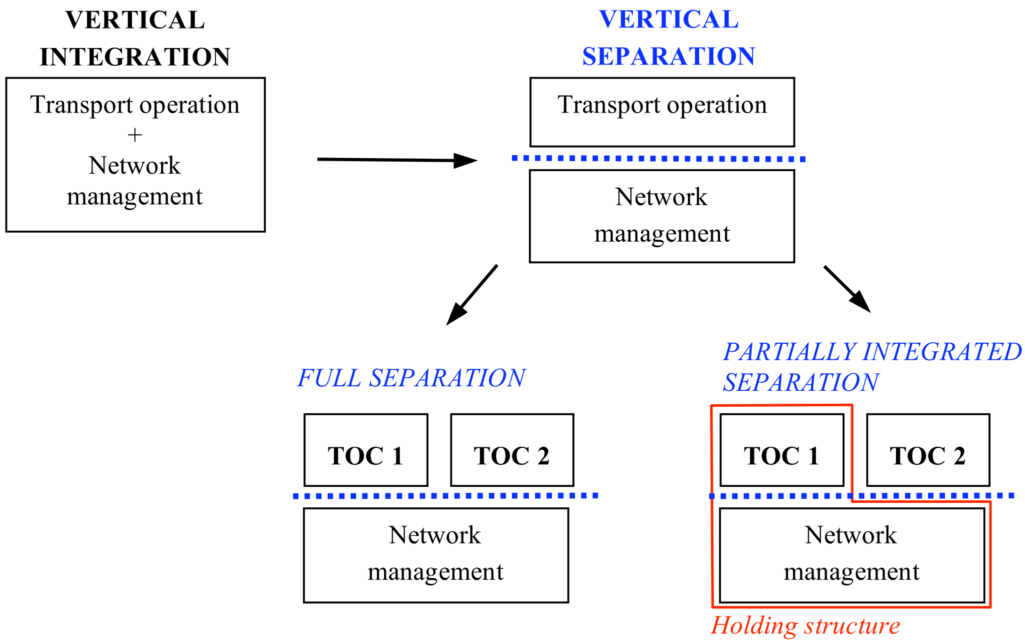
[4] Such a monopoly is said to occur when production technology leads to economies of scale relative to the existing demand for the industry's product.

[5] Economies of scale imply that average costs per unit decrease with the quantity of the good produced, which makes a single producer to reach a level of output at a lower cost than it would be jointly reached by two or more producers.

To invert this negative trend, the EU promoted a structural change aimed at introducing competition forces in the railway sector. The reform has sought to separate two parts of the business, infrastructure management and transport operation, based on the rationale that the latter presents reduced natural monopoly characteristics and therefore is likely to be opened to *intramodal competition*. Competition for services is then assumed to result in lower prices and higher quality product than when there is only a single producer. The potential for competition in railway transport has been estimated by Gómez-Ibáñez (1999, p.71) around 50 to 60 per cent of total railway costs[6].

Fig. 4: Vertical separation options under EU legislation



Note: TOC - Transport Operating Company.
Source: own elaboration.

From the three possible levels of vertical separation[7], the EU imposed to its Member States the less restrictive, demanding the division of infrastructure management and transport operation activities on an accounting basis and giving freedom to them for organizational and institutional separation (Directive 91/440/EEC, Art. 6).

[6] Calculated as a the proportion of above-rail costs to total costs.

[7] According to the literature (Pittman, 2003; Goujon, 2004a), three different levels of vertical separation may be distinguished: 1) *Accounting separation*: the railway infrastructure is owned and operated by a single institution that keeps separate accounts for infrastructure and operation activities; 2) *Organizational separation*: the infrastructure and the operation activities are carried on by different business units within a larger holding. These business units are more or less autonomous from a functional point of view, but they are not legally independent; and 3) *Institutional separation*: the infrastructure and the operation activities are done by two different entities that are independent from an accounting, organizational and legal point of view.

Under these framework two different arrangements have been adopted in the EU, *a full separation* resulting from the institutional separation of infrastructure and operation activities and a *partially integrated separation* where the infrastructure management and the incumbent operator belong to the same holding (Fig. 4).

The literature on railway reform has provided a thorough review of the advantages and disadvantages of vertical separation. Among its benefits, the opening to competition of the operation business and the encouragement of technical and dynamic efficiency are mentioned. As well, it is widely accepted that vertical separation leads to a reduction of the costs produced by increases in traffic resulting from on track competition (because of the economies of density of infrastructure[8]), to the independent development of train operations previously constrained by the restricted framework of national infrastructure, and to the predictable enhancement of transportation policies.

On the cost side, vertical separation implies the loss of economies of density in the operation business (as the incumbent operator is likely to lose market share), the increase of transaction and coordination costs, a reduced effectiveness of infrastructure capacity utilization (which has to be allocated to different actors now with different objectives), asymmetrical incentives for the wheel-rail interface and increasing safety costs (BTRE, 2003, pp.11-21).

There is much elaborated as well on the advantages and disadvantages of the two different arrangements that can be adopted within vertical separation and to which extent one should be preferred to the other. Some of the main statements supporting one or the other approaches are presented in Table 6.

Table 6: Full separation versus partially integrated separation

	Advantages	Disadvantages
Full separation	Ensures non discriminatory treatment of TOC Creation of internal competition Increased focus on services Clarification of public policy Less regulatory requirements	More difficult coordination Loss of economies of scope [9]
Partially integrated separation	Benefits from economies of scope Greater incentives for investment in the network	Greater need for regulation

Note: TOC – Transport Operating Companies.
Source: own elaboration with data from (UN, 2003, pp.15-16) and (Pittman, 2003, pp.10-11)

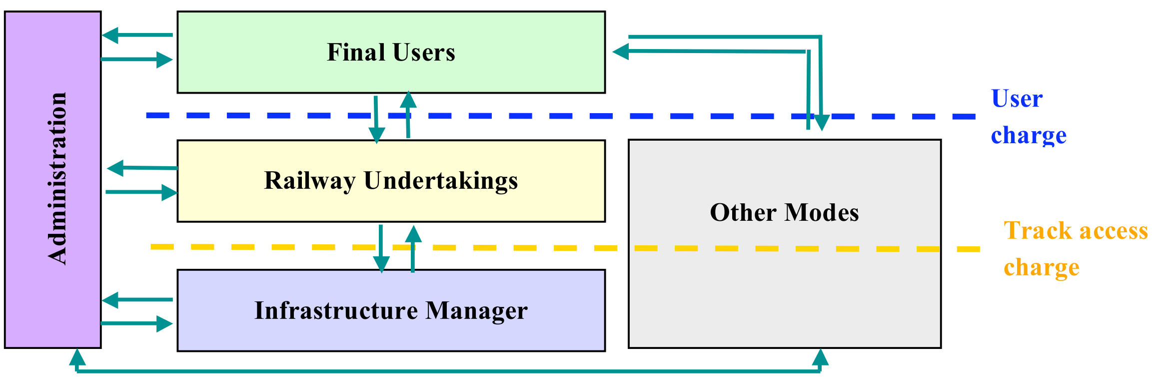
[8] With economies of density, incremental costs decline as usage increases (without extension of the network).

[9] With economies of scope, incremental costs decline when two or more goods or services are produced collectively, or jointly, instead than individually.

2.3.3.2 Introduction of infrastructure charges

The vertical separation of the railway sector implied the appearance of a new interface in the production system between infrastructure and operation. In this interface the *infrastructure manager* provides access to railway network facilities to the operating companies against the payment of an access charge. In turn, the *railway operating companies* internalize the payment of track access charges as a cost in their production process and set the charges for the different services offered. The *final users* receive the operator charges as inputs for their transportation decision, in which other substitutive transport modes will also be considered. In order to completely describe the economic system it is necessary to introduce the role of the *Public Administration*, which may provide subsidies and grants to the other actors (e.g. investments in infrastructure to the infrastructure manager, subsidies for the improvement of rolling stock to the operating companies, subsidies on the ticket fare for commuters, etc.) and receives back taxes. The overall system is synthesised in Fig. 5.

Fig. 5: Basic economic relations in the reformed railway sector



Source: own elaboration

The arrows in the proposed scheme can be interpreted as cash flows between the actors involved, and they are double sided in order to explain other secondary relations (e.g. the infrastructure manager might contract out some of its tasks to the incumbent railway undertaking, the railway undertaking might set some discounts on the final user charges, etc.).

From the detailed observation of the proposed scheme it appears clear the central role of infrastructure charges in the system and their multiple implications:

- Track access charges constitute the natural source of incomes for the infrastructure manager. It has to be balanced with other commercial incomes and the subsidies and grants provided by the State in order to assure the financial stability of the IM.

- Track access charges are a basic input for the railway undertakings performing operation activities. Depending on their level and structure they may influence the number of operation companies and the nature of the railway services offered in the final market.
- Furthermore, they constitute an additional cost that must be taken into account by the railway undertakings in their business planning, their commercial strategy and, in the end, in the final user charge.
- As they contribute to the definition of the supply of railway services and to the formation of the final user charge, they are a key factor in the competition of railway services against other transportation modes (road, air, etc.).

The basic provisions to be respected when charging for railway infrastructure are contained in Directive 2001/14/EC, which reflects the conclusions of previous works as the Green Paper on fair and efficient pricing in transport (EC, 1995), the final report of the High Level Group on Infrastructure Charging (HLG, 1998) or the White Paper on fair payment for infrastructure use (EC, 1998).

First, the institutional responsibilities for the setting of track access charges are regulated:

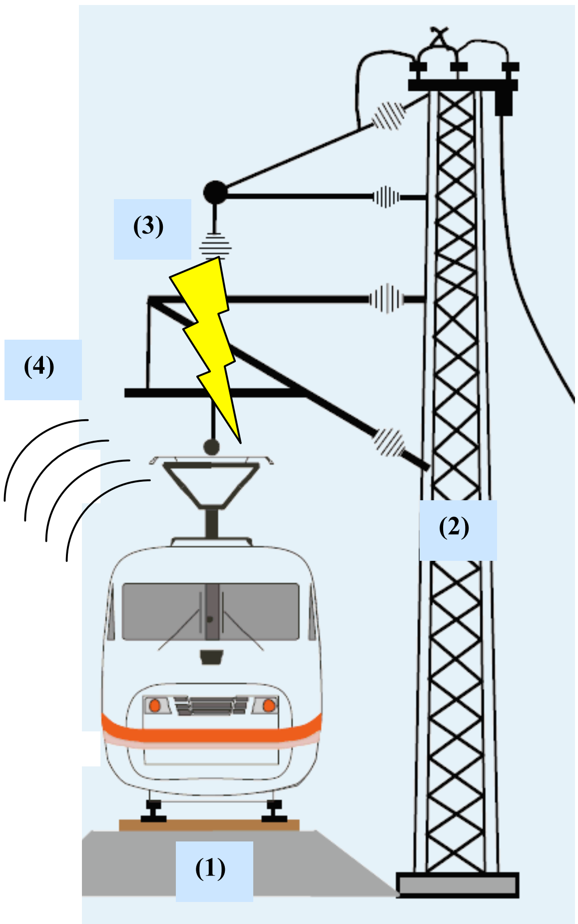
- "*The determination of the charge for the use of infrastructure and the collection of this charge shall be performed by the infrastructure manager, provided the infrastructure manager is independent of any railway undertaking*" (Art. 4.1). However, the rules for determining the infrastructure fees are still set by the national governments (Directive 91/440/EEC as amended by Directive 2001/12/EC).
- "*Where the infrastructure manager [...] is not independent of any railway undertaking, the functions [...] other than collecting the charges shall be performed by a charging body that is independent in its legal form, organisation and decision-making from any railway undertaking.*" (Art. 4.2).

Second, attention is driven on the relation between the Administration and the infrastructure manager, which according to Art. 6 can rely upon regulation or upon contractual agreements. The Directive states the requirement of financial equilibrium for the infrastructure manager and opens the door to reach it without recourse to State subsidies: "*Where rail transport is able to compete with other modes of transport, within the charging framework of Articles 7 and 8, a Member State may require the infrastructure manager to balance his accounts without State funding.*" (Art. 6.1).

Third, the Directive classifies the services to be supplied to the railway undertakings in four packages depending on their relevance (Fig. 6): 1) *Minimum access package* - e.g.

the use of track and junctions; 2) *Track access to service facilities* - e.g. freight terminals; 3) *Additional services* - e.g. traction current; and 4) *Ancillary services* - e.g. access to telecommunication facilities. This distinction is not neutral, as while the services included in the first two groups (minimum access package and track access to service facilities) must respect the principle of marginal cost pricing, the additional and ancillary services only need to reflect their costs if they are provided under monopoly conditions.

Fig. 6: Classification of railway services according to Directive 2001/14/EC



Example of railway services according to Directive 2001/14/EC:

(1) Minimum access package:
(Use of running track)
(2) Track access to service facilities:
(Use of electrical supply equipment for traction current)
(3) Additional services:
(Traction current)
(4) Ancillary services:
(Access to telecommunication network)

Source: own elaboration on a graphical basis of Ludwig, 2006, p.2

When it comes to the setting of track access charges, Directive 2001/14/EC assumes the main recommendations arising from the economic theory (in terms of social welfare maximization) and therefore proposes *social marginal cost pricing* as the basic rule to follow. This means that the users of the infrastructure should be charged the share of the total infrastructure cost that their individual train causes to the system including the external cost to society (e.g. air pollution caused by diesel emissions or the annoyance of the noise emissions of a passing train). The final objective is to ensure socially optimal use of the infrastructure. However, the Directive also allows the possibility of recovering a higher share than just the marginal infrastructure costs or the costs of investment projects through mark-ups, as well as charging to reflect the relative lack of capacity in certain links of the network during times of congestion.

It is noticeable the fact that Directive 2001/14/EC does not prescribe in detail the rules and methodologies for establishing the various charging elements, giving freedom to the Member States as regards their implementation. A main reason for this flexibility might be found in the subsidiarity principle, which allows Member States a high degree of discretion in their methods of implementation. Another reason for flexibility might be the complex negotiation process related to the approval of EU legislative instruments, usually resulting in frameworks flexible enough to reconcile the diverging points of view of the Member States (in this case on a possible harmonization of charging policies and on how the railway infrastructure should be financed in their countries).

In practice, the enactment of this flexible framework has led to a great diversity among the charging practices in the EU as regards the principles and structure of charges, their level, the variables adopted and the calculation procedures followed to set them.

2.3.3.3 Railway market competition

The vertical separation of the railway sector and the introduction of track access charges can only be understood in the light of the final objective of opening the railway operation market to competition. To fulfil this aim, the Member States are faced to two possible alternatives, rather different in their characteristics and implications.

On the one side they can chose a model based on the competition *in* the market (also known as on track competition), where several railway undertakings compete to provide services on the same network during the same time period. On the other side they may set a model based on the competition *for* the market (competition for the tracks), whereby railway undertakings are in competition prior to start the operations through alternative offers for a contract to provide services.

Although clearly setting the conditions for the competition in the market, the First and the Second Railway Packages do not include any resolution on the competition for the market, and do not give any hint on when and how each model should be applied. Moreover the legal sources for this type of competition are to be found in a separate stream of norms.

For years the main norm at the Community level governing the procurement and funding of inland public transport has been Regulation 1191/69 concerning the obligations inherent in the concept of a public service in transport that authorized the Member States to conclude public service contracts with the transport companies and first introduced the PSO notion. In the last years, several attempts of revision of this norm have been promoted by the European Commission, who prepared a first proposal for a new Regulation in the year 2000 (EC, 2000) rejected by the European Parliament, an amended proposal two years later (EC, 2002) and a third proposal in the year 2005 (EC, 2005a). This third attempt has been finally approved by the European Parliament in May 2007 and will substitute regulation 1191/69.

Among its main resolutions there are the limitation in time of long term franchises (a maximum of 15 years for railway transport) and the approval of three different modalities for awarding contracts (to an "internal operator", to external operators through a call for tenders and some special arrangements when small and medium size companies are involved).

According to this new framework "*the competent authorities may act in the field of public passenger transport to guarantee the provision of services of general interest which are among other things more numerous, safer, of a higher quality or at a lower cost than those that mere market forces would have allowed*." (EC, 2005a, Art. 1.1) Where "public passenger transport" means "*transport services of general economic interest organised by the competent authority and provided to the public on a non-discriminatory and continuous basis*" (EC, 2005a, Art. 2).

The Third Railway Package included as well a Proposal for a Directive amending Council Directive 91/440/EEC now approved (EC, 2004a). In this text, regulating the opening of the passenger rail market to competition, arose the problem of its coordination with the existence of public service obligations, finally solved through the following provision: "*Member States may limit the right of access [...] on services between a place of departure and a destination which are covered by a public service contract conforming to the Community legislation in force. Such limitation may not have the effect of restricting the right to pick up passengers at any station located on the route of an international service and to set them down at another, including stations located in the same Member State, except where this is strictly necessary to maintain the economic equilibrium of the service defined in a public service contract ...*"(EC, 2004a, Art. 1.7).

From the legal framework described, it can be noticed that competition for the market may only arise in the field of passenger railway services, and that competition in the market is compulsory for freight railway services.

Another important consideration related to the opening of the railway operation sector is related to the nature of the railway services opened to competition, in terms of passenger / freight services and national / international services. As far as the freight services are concerned, the rail freight market in Europe is completely opened for railway undertakings established in Member States from the 1st January 2007 for both, international and national services (cabotage), as stated in Directive 2004/51/EC (Art.1).

As regards the passenger services, the operation market will be opened from 1st January 2010 for international services produced by railway undertakings that have a license and the required safety certificates. These services will have the right to pick up and set down passengers along the route and will be only limited by their possible negative effects on the economic equilibrium of PSO services. "*For example, it would be possible on the future high speed line between Madrid and Perpignan to conclude a public service contract granting exclusive rights for the section between Madrid and Barcelona. These exclusive rights would prevent any other operator from operating a national service limited to the Madrid-Barcelona section. However, these exclusive rights could not prevent an international operator running a service between Perpignan and Madrid from picking up or setting down passengers in Barcelona, unless it was shown that this could affect the economic equilibrium of the public service contract in question*" (EC, 2004a, p.6).

2.4 The preliminary results

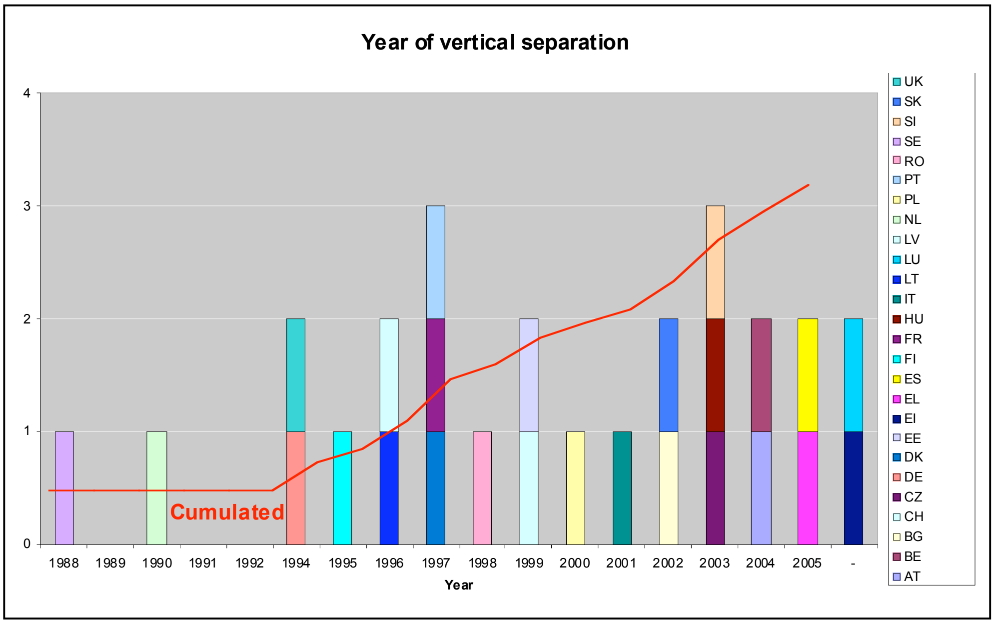
Since it was first proposed at the beginning of the nineties to our days, the European Railway Reform has been implemented according to a step-by-step approach that has faced different national conditions (from a completely privatized sector in the UK to national monopolies in the vast majority of EU countries) and several enlargements of the EU itself, from the EU-12 to the EU-15 in 1995, then EU-25 in 2004 and finally EU-27 in 2007 (adhesion of Romania and Bulgaria). In order to illustrate the results so far achieved in the reform process, this section focus first on the degree of implementation of the railway reform, then analyzes its effects on the degree of competition in the railway market and finally presents some considerations about its economic effects.

2.4.1 Degree of implementation

The first step to assess the effects of the European Railway Reform on the market opening or the market share of the railway mode is the evaluation of the degree of implementation of its main determinations.

As far as the vertical separation of the sector is concerned, most of the Member States have formally separated railway infrastructure and operation activities from an accounting and functional point of view. According to the ECMT (2005, p.14), 23 Member States had already set up a functionally independent infrastructure manager in the year 2005 (see Fig. 7). This view is shared by the RAILIMPLEMENT study, which pointed out that in the year 2005 only the Irish Railways and one of the Estonian national railway companies were still integrated (Steer Davies Gleave, 2005a, p.69). This list should be completed with Luxembourg.

Fig. 7: Implementation of vertical separation in the EU-27. 1988-2005



Note: AT-Austria, BE-Belgium; BG-Bulgaria; CH-Switzerland; CZ-Czech Republic; DE-Germany; DK-Denmark; EE-Estonia; EI-Ireland; EL-Greece; ES-Spain; FI-Finland; FR-France; HU-Hungary; IT-Italy; LT-Lithuania; LU-Luxembourg; LV-Latvia; NL-The Netherlands; PL-Poland; PT-Portugal; RO-Romania; SE-Sweden; SI-Slovenia; SK-Slovakia; UK-United Kingdom.
Source: own elaboration with data from ECMT, 2005, p.14

More difficulties are found when trying to assess the degree of implementation of the specific regulations contained in the First Railway Package, since several countries delayed their transposition into national law (e.g. Germany, Luxembourg, Greece and United Kingdom referred a late transposition of Directive 2001/14/EC) or did not proceed to their full implementation at national level.

The abovementioned research (Steer Davies Gleave, 2005a, p.66) performed a country-based study on the degree of implementation of the First Railway Package, and concluded that:

- Not all the Member States had transposed the Directives into national law.
- Even where the Directives had been transposed, there may not have been effective domestic implementation, for a number of reasons.
- Even where implementation had taken place, it can take up to two years for a new entrant to gain access to the infrastructure and begin to provide services.

These conclusions were in line with those obtained the year before by the study Rail Liberalisation Index 2004 (LIBEX), second of a series of reports oriented to monitor the evolution of the opening of the rail market to competition. More precisely, the study pointed out that "*in the manner in which the liberalisation steps introduced by the European Commission are implemented at the national level there are still considerable differences from one country to another, which can lead to distortions in competition*" (IBM et al. 2004, p.2).

The update of the LIBEX study in the year 2007 showed a greater level of implementation of the EU legislative framework, though remarked that "*the practical market access conditions for external RUs in most countries – due to the relatively short period of time available for the practical implementation of the legal framework – are not as pronounced and developed as the legal requirements.*" (IBM et al. 2007, p.15).

This heterogeneity in the implementation of the First Railway Package and the unclear effects of the national inertia, together with the phased nature of the railway reform, may lead to a diversity of interpretations when evaluating the extent to which markets are actually opened for potential entrants.

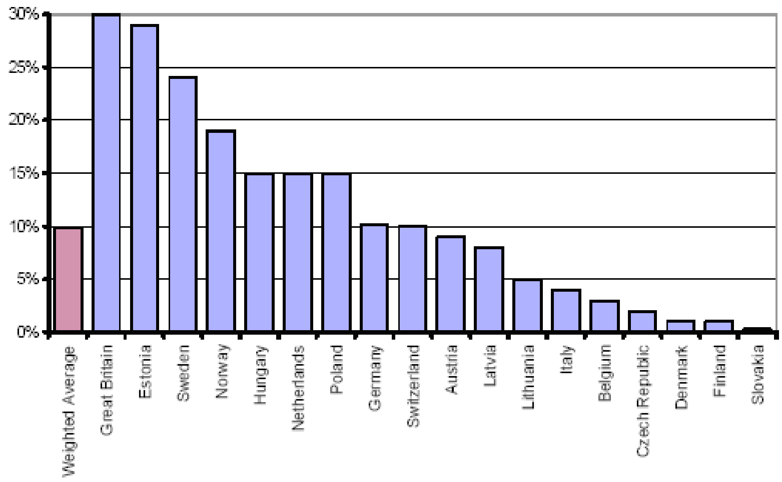
2.4.2 Degree of competition

As part of the monitoring scheme, the LIBEX study calculated several aggregated indicators designed to highlight the results achieved by the railway reform in the Member States. One of them, the COM index[10], indicates the degree of competition in the rail transport markets. In year 2004, this index reached the higher values for United Kingdom, Sweden, Germany, Switzerland and the Netherlands, a group that not surprisingly includes the four countries that first achieved the vertical separation in the railway sector (IBM et al. 2004, p.3).

An alternative assessment of competition in the freight market is found in the RAILIMPLEMENT study, that focused the analysis on the market share not held by the largest national operator (Fig. 8). This analysis remarked that there are still many Member States where the incumbent operator controls almost 100% of the freight market (e.g. France or Spain). Moreover, even in the more opened markets freight and passenger transport is dominated by the incumbent operators. Only in very rare cases, like in the United Kingdom, Estonia or Sweden, the market share of the largest supplier is below 80%.

[10] Index based on the evolution of the modal split (5%), the number of new railway undertakings (45%) and the market share of new entrants (50%) (IBM et al. 2004, p.23).

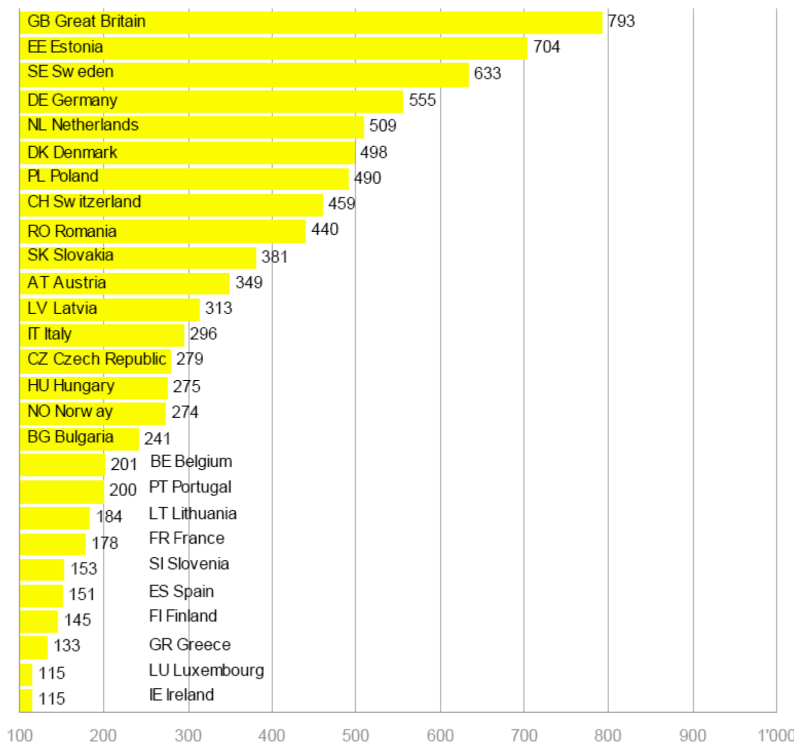
Fig. 8: Freight market share not hold by the largest rail operator in European countries. 2004



Note: market share calculated as a % of total ton-km.
Source: Steer Davies Gleave, 2005a, p.38

The more recent reference on the degree of competition in the rail market has been provided by the update of the LIBEX study in 2007 (Fig. 9). With respect to its previous version, the update showed a general increase in the value of the index, though without important changes in the relative position of European countries with respect to competition.

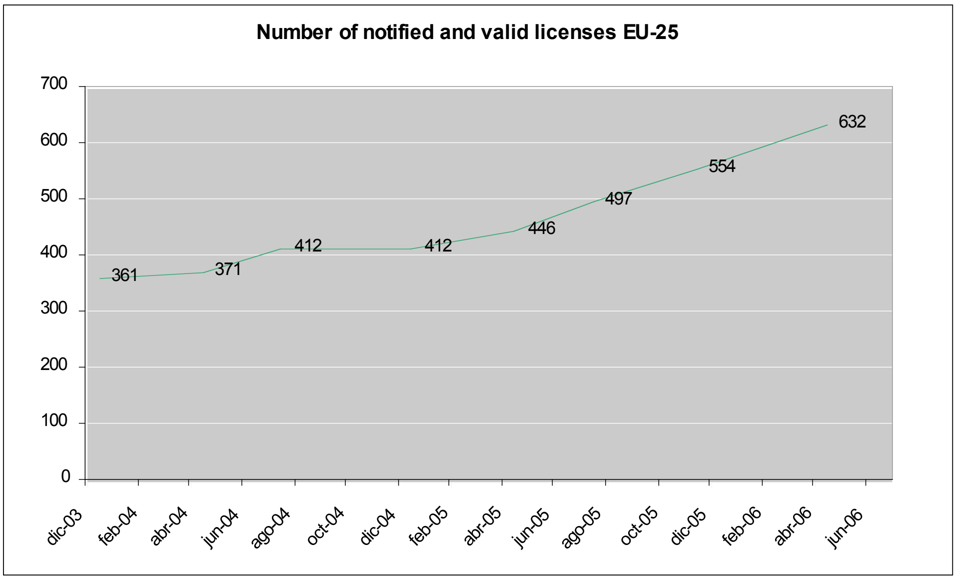
Fig. 9: Degree of competition in European rail markets. COM Index. 2007



Note: the COM index ranges from 100 (minimum opening to competition) to 1000 (maximum).
Source: IBM et al. 2007, p.20

The previous references clearly show the existence of very different degrees of competition across the Member States that might be explained by their national characteristics as well as by the different degrees of implementation of the regulations contained in the First Railway Package. The apparent relationship between the degree of competition and the year of accomplishment of the vertical separation of the railway sector seems to suggest the need of a longer period of time after the restructuring in order to identify a positive effect on competition. This point seems to be confirmed as well by the overall evolution of the licensing activity in the operation sector (Fig. 10).

Fig. 10: Evolution of licensed railway operators in the EU-25. 2003-2006



Source: own elaboration with data from EC, 2006b, Annex 9, p.56

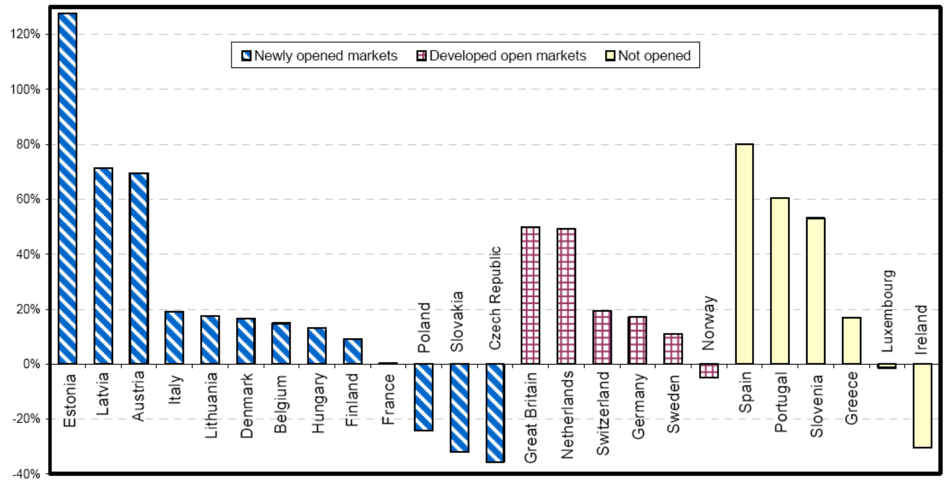
2.4.3 Economic effects

Some attempts have also been carried in order to evaluate the economic effects of the ongoing railway reform. Most of the studies carried in this domain drive their attention to the reductions in the overall operation costs of the system, while others are focused on the market share for railways.

An example of the first kind of analysis can be found in Shires and Preston (1999), who found that operation costs in Sweden have reduced by around 10% since the separation, what was interpreted as empirical evidence on vertical disintegration. Preston (1999) also performed some qualitative assessments on the benefits of the railway reform in the United Kingdom and observed improvements (product differentiation, increase in service frequencies and selective fare cuts) where on-track competition had been applied and reductions in subsidies where off-track competition had been implemented.

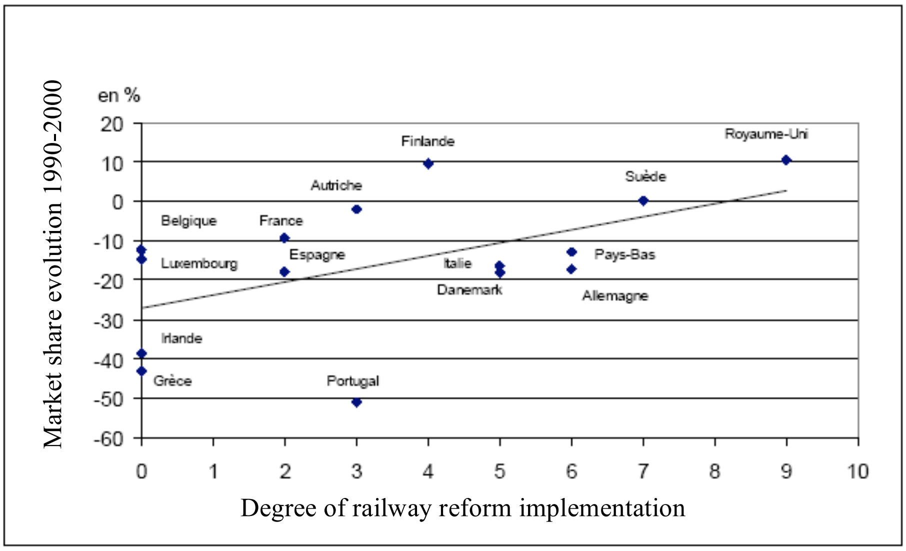
Among the second type of studies, RAILIMPLEMENT (Steer Davies Gleave, 2005a) provides quantitative evidence on the effect of the reform on the market share of railways. Its authors present the percentage growth in rail freight in different Member States according to three different groups: newly opened markets (more than one operator after 2000), developed open markets (more than one operator since before 2000) and not opened markets (Fig. 11). From their analysis it is not possible to reach a general conclusion on the effects of competition on the railway market share. It is possible however to note the positive evolution of rail in almost all the opened markets, although Member States included in the other groups seem to obtain better results in some cases.

Fig. 11: Evolution of rail freight transport split according to the degree of competition. EU-25. 1993-2004



Note: change in total ton-km carried in the period 1993-2004.
Source: Steer Davies Gleave, 2005a, p.35

Fig. 12: Correlation between railway reform implementation and market share evolution in selected European countries. 1990-2000



Source: Goujon 2004c, p.2

A more complete analysis has been performed by the French Ministry of Ecology, Development and Land Planning. Their study defined a synthetic indicator evaluating the degree of implementation of the railway reform according to three axes (independence of the incumbent operator from the State, the degree of separation between infrastructure and operation activities and the markets effectively opened to competition) and then correlated it with the evolution of the railway market share in different Member States. The result fitted to a straight line with a correlation factor R^2 = 0,67 (Fig. 12), meaning that where the liberalization has been better achieved, the decline of the railway market share has been lower.

As it has been observed for the degree of implementation of the railway reform and the degree of competition, the economic effects that can be so far assessed are heterogeneous across the different Member States. This heterogeneity might be explained by different political commitment with the reform, by specific national characteristics or by the fact that the reform is still ongoing. It seems however that positive effects in all the three fields may be observed in the "more experienced" countries.

2.5 The quest for harmonization

Together with the measures directed to the opening of the operation market to competition, the European Railway Reform has also sought to achieve greater levels of harmonization, able to consolidate a supranational railway market.

Broadly speaking, the EU has promoted actions towards harmonization in the technical and the regulatory fields, with dissimilar success so far. While the steps towards technical integration have proceeded steadily, the attempts to promote common approaches to regulation have gone against a number of problems.

The overview of the current situation has awaken a number of unanswered questions related to the harmonization process, like those concerning the determination of the optimal level of harmonization or the best steps to follow in order to create an integrated transport market. Behind them there is the fear that further divergence may only represent a threat for the efficiency and competitiveness of rail transport in relation to its competitors, road and air.

2.5.1 Harmonization of railway markets in the EU

Their historical development on a national scale, their strong links to national governments or the rigidity of their infrastructure are some of the factors that have shaped the current heterogeneity of European railways. Traditionally more isolated than other sectors and deprived of competitive pressure, the national railway systems have often evolved along diverging tracks, building particular institutional frameworks and specific technical standards fit to their domestic conditions. The cumulative effect over time of these individual trajectories has ended up in the present situation, which still looks more like a patchwork than a common market.

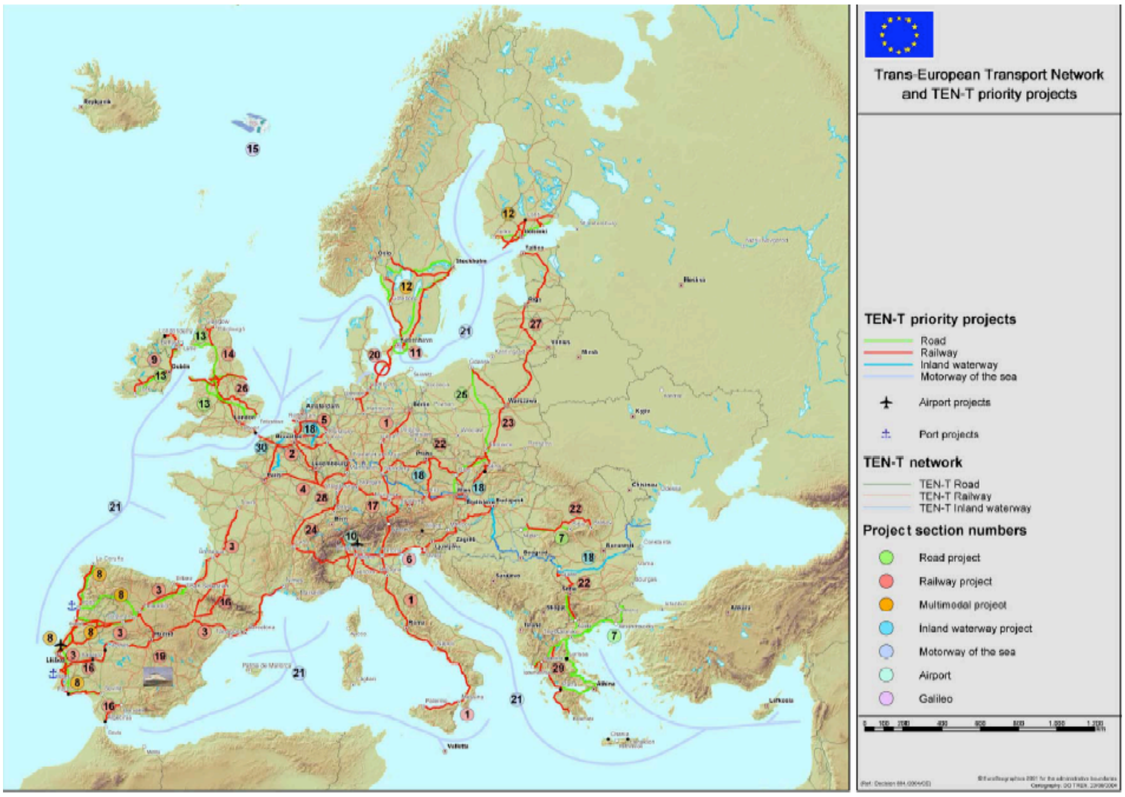
Against this background, the European Commission (2001a, pp. 26-30) has repeatedly stated the goal of creating a genuine internal rail market able to overcome the existing technical and regulatory barriers in order to set up a legally and technologically integrated railway area. In line with this objective, the EU has promoted several actions to improve the integration of national railways:

- The development of the trans-European rail network.
- The technical harmonization of the trans-European rail network through the development of common standards.
- The elaboration of a common approach to rail safety.
- The establishment of the European Railway Agency (ERA) to implement the EU interoperability and safety legislation and to act as a network integrator at the European level.
- The development of common principles for the opening of rail transport to competition and the regulation of access to rail networks.

As far as the technical aspects are concerned, harmonization policies have been launched since the mid nineties and are currently being developed at different levels of advancement.

Since the Treaty of Maastricht defined the trans-European transport network, its development has progressed constantly. Already in 1994 the European Council held in Essen selected 14 priority transport projects for the EU, most of which corresponded to railways. Two years later the same projects were confirmed and included within the guidelines for the development of a trans-European transport network (TEN-T) set in the Parliament and Council Decision 1692/96/EC. In 2001, the EC (2001a, p.17) proposed the amendment of the priority projects arguing that some of them had already been concluded and others could be added. After an intense debate, the list of priority projects was finally updated through Decision 884/2004/EC, that increased their number to 30 (Fig. 13).

Fig. 13: TEN-T priority projects



Source: EC, 2004b

Together with the development of the infrastructure, measures have also been adopted in order to eliminate the existing technical barriers. The Rail Interoperability Directives (96/48/EC for the high speed network and 2001/16/EC for the conventional network) made it possible to launch the work needed to define the Technical Specifications for Interoperability (TSI), essential to ensure that trains can run safely and seamlessly throughout the entire trans-European rail transport network. In fact, the TSI define the requirements for interoperability and the parameters to be respected for all the subsystems and interfaces of the trans-European rail system. Since then, the process of technical harmonization has continued its steady course, as it is shown by the constant legislative development (Directive 2004/50/EC updating of the Railway Interoperability Directives or the recently approved recast - Directive 2008/57/EC).

The introduction of a common approach to safety started with the enactment of the Railway Safety Directive (2004/49/EC) within the Second Railway Package. The text established guidelines to develop common safety indicators, methods, targets and management systems and regulated the delivery of safety certificates and authorizations in the Union as well as the functions of Safety Authorities.

Particularly relevant for the technical interoperability is the role of the ERA, set up to help create this integrated railway area by reinforcing safety and interoperability. Its main task is to develop economically viable common technical standards and approaches to safety, working closely with railway sector stakeholders, national authorities and other concerned parties, as well as with the European institutions.

In contrast with the progress performed in the previous technical aspects, the initiatives oriented to the harmonization of institutional and regulatory conditions, have progressed slowly and find important difficulties in many fronts. Though the EU promoted vertical separation, mandatory access regulation or pricing principles within an ideal of consistency, the reality has been diverging regulation. The heterogeneity of the system has even been increased by the preliminary results of the reform, which have brought in a large number of new stakeholders, multiplying the quantity of interfaces in the system and their complexity.

The evidence of poor and slow success so far in the harmonization of regulatory aspects, together with the increased complexity observed in the present situation, has risen the point of whether the implementation of harmonization policies in these fields might be feasible or whether it could be improved. This consideration is particularly relevant as regards current diversity of railway infrastructure charges, which could be seen as the symbol of the failure of the European harmonization quest.

2.5.2 Optimal harmonization level

The promotion of harmonization policies by the European institutions and the resistances encountered so far at national level have fed the debate on what should be the *optimal harmonization level*[11] for railway regulation across the Member States. On the one hand harmonization may deliver benefits such as lower input costs, better operational efficiency or access to wider markets. Moreover, as stated in the rationale of the railway reform, it may facilitate the introduction of competition in the European railways, improving their performance against less efficient competing modes. On the other hand, customization is often a cost effective answer to particular domestic conditions, generally better than a one size fits all practice, but imposes costs on those users shifting from one system to the other. As well, inadequate or excessive harmonization relative to the geographical, operational and traffic needs can generate additional costs for maintaining and using the network.

The optimal harmonization level results from a trade-off between the benefits of both alternatives, and will certainly depend on the number of interfaces existing in the overall system, the number of real or potential users aiming to travel across national systems

[11] Harmonization is not an absolute concept; more precisely we should talk about harmonization level as a compromise between customization and total harmonization.

and the local specificities of every system. In line with these arguments, an extensive report on railway harmonization from the Australian Bureau of Transport and Regional Economics (2006, pp.47-63) points out the dependency of this trade-off on market and geographical operating environments, as well as on financial and safety risks. It also underscores the relevance of the inherited historical decisions, which influence the future evolution of the system.

The problem remains in the quantification of the costs and benefits involved in the trades-off leading to a certain degree of harmonization. In a report to the European Commission, NERA (2000, pp.101-102) argued that such estimation would be unrealistic if conducted ex ante because of the indefinition of the alternatives to be compared and the relevance of indirect effects like greater flexibility or more competition. The distribution over time of costs and benefits was also pointed as an issue, given the temporal uncertainty of the benefits resulting from harmonization.

As regards the particular case of international rail services, Bassanini and Pouyet (2000, p.18) demonstrated that in the absence of any regulatory harmonization the vertical separation produces particular problems for international rail traffic. They identified the *double marginalization problem*[12] and the *constituency effect*[13] and remarked that the natural output is suboptimal pricing of the rail system as a whole. Their result certainly suggests the need of some kind of harmonization of infrastructure charging, but should charges be harmonized? If yes, to what extent? These are questions without a clear practical answer so far.

On the one side it seems that heterogeneity has certainly contributed to the poor development of the international rail services observed in the last years, delaying relevant performance improvements as well as appropriate investments. On the other, diversity in charging levels and structures may be preferred to harmonization in several circumstances, including different availability of State funding or new investments. From this second point of view, only the diversity of levels and structures will be able to reflect the infrastructure and train operating economics and the requirements of the domestic goods and passenger markets.

Thus, there is no irrefutable evidence that charging levels and charging structures should be identical across the system, but it is still certain that harmonization can be promoted at different intensities and that a greater degree of harmonization seems to be desirable.

[12] The double marginalization problem arises as the vertical enchainement of two monopolies, the second having as input the price set by the first.

[13] The constituency effect results from the unilateral behavior of each infrastructure manager, that will ignore the effect on the welfare of the other of its own decisions.

The alternative to the efforts towards a greater level of harmonization has been clearly described by Nash and Niskanen (2000, p.4) in the following terms: "*the result that the optimal approach to rail infrastructure charging varies so strongly with circumstances means that the prospects for the degree of harmonisation throughout Europe seen as necessary to promote international rail traffic may seem poor*".

2.6 Synthesis

From the beginning of the '90s, the European Union has undertaken a deep reform of the railway sector with the declared aim of revitalizing this mode, affected by a decreasing market share in spite of the significant raise in the overall transport demand observed during the last decades. This evolution has led to an unbalanced transport system, strongly relying on the road mode, in which increasing environmental and economic problems arise.

To address this situation, the EU has promoted a step-by-step market opening directed to introduce competition in a sector where national monopolies have constituted the main industrial structure. The core principle for the implementation of the reform has consisted in the vertical separation of the infrastructure management and the operation business, with the opening to competition of the latter and the introduction of infrastructure charges as main results. Although this reform is still ongoing, a preliminary evaluation suggests that its degree of implementation, the degree of competition introduced in the market and the final economic effects are evolving slow and with poor success so far.

Part of these shortcomes may be attributed to the failure in harmonizing the regulatory aspects of the reform across the Member States, together with the increased complexity derived from the reform itself. There is evidence that the combination of vertical separation and non-harmonized regulation may hinder the development of international rail traffic. This consideration is particularly appropriate in relation to the current diversity of railway infrastructure charges and has recently fostered the debate on what should be their desirable level of harmonization. The preliminary outcome of the ongoing discussion suggests the convenience of promoting a greater degree of harmonization.

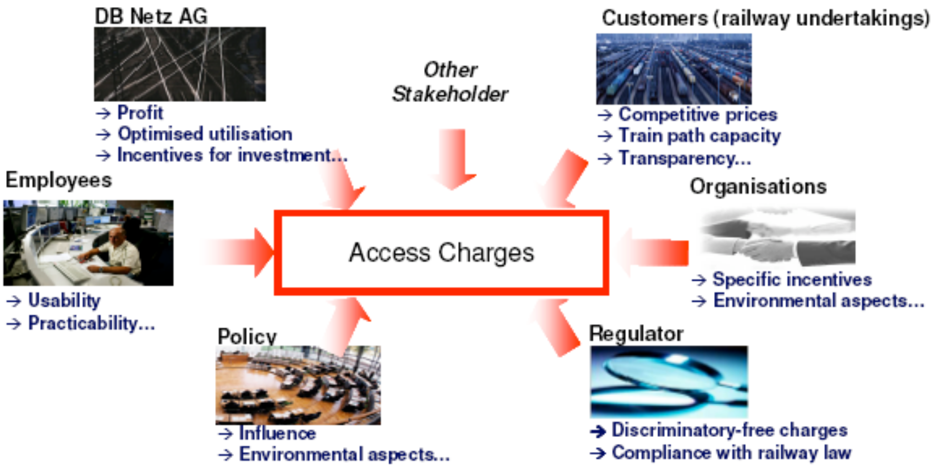
Chapter 3

RAILWAY INFRASTRUCTURE CHARGING

3.1 Introduction

Within those networks where vertical separation has been enforced or where mandated access is compulsory, infrastructure charges are essential for the correct functioning of the whole railway system, either above and below the track. In fact, under these arrangements the level and the form of the charges act as the control element of the whole productive system of railway transport. They are the natural source of incomes for the infrastructure manager, often complementing public funding; they are a cost for the operator, influencing the supply of railway services and contributing to the formation of the final user charge; finally they set the conditions to access the network, favouring or limiting the effective opening of the operation business to competition.

Fig. 14: Scheme of the multiple interests involved in the definition of track access charges



Source: Bohrer 2007, p.3

Furthermore, their definition involves both economic and political considerations. This double character derives from the monopolistic nature of the railway infrastructure business, requiring the adoption of regulations to set prices, and from the strong decision power in the hands of the public sector, which often sets the goals and aims to be achieved by the infrastructure charges. The political character is reinforced by the existence of a large number of agents affected by the final form and level of the charges, often with conflicting interests and requirements (Fig. 14). On the other side, the economic theory provides a number of recommendations and guidelines as regards the setting of track access charges, including the principles that should drive them, the differentiation of their structure or the calculation of their levels.

This chapter seeks to illustrate the specificities of the railway infrastructure charging activity, particularly in relation to the regulation and the pricing theory. This characterization will be the basis for the particularization of the conceptual framework proposed in chapter 5.

Section 3.2 examines the distinctive aspects of railway infrastructure markets; Section 3.3 analyzes the approaches to their regulation proposed by the economic theory; Section 3.4 treats the specific issue of pricing regulation; Section 3.5 provides a reflection on the pricing principles available in the economic theory and the problems related to their practical implementation; Section 3.6 elaborates on the differentiation of charges for the use of railway infrastructure; Section 3.7 is focused on the level of charges; All of them provide a specific insight on the situation in Europe.

Section 3.8 analyzes previous works on the conceptualization of pricing policies and proposes a scheme for the decision process involved in the definition of railway infrastructure charges; Finally, section 3.9 presents a synthesis of the chapter.

3.2 Railway infrastructure markets

3.2.1 Definition and structures

The vertical separation between the provision of train services and the infrastructure management has set the fundamentals for the development of a new railway related market at the interface between infrastructure managers and transport operators: the railway infrastructure market. Within it, the infrastructure managers allocate capacity use rights to the railway operating companies in exchange of the payment of an access charge (the railway infrastructure charge or track access charge).

The goods sold in such market, the capacity use rights, are generally bundled in the form of train paths differentiated in time and space. They may also be characterized by their quality related to operational and/or technical features (e.g. gauge or maximum axle weight allowed).

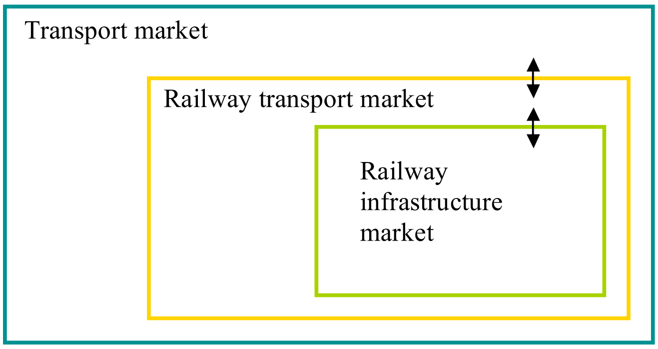
The production of capacity use rights depends on the specific assets available to the IM, namely the railway infrastructure[14]. Accordingly railway infrastructure markets are strongly conditioned by the network inherited from the past, in terms of extension, technical characteristics, quality or state of maintenance and renewal.

Obviously, the production and selling of capacity use rights shares the economic characteristics of the railway infrastructure itself. The more remarkable among them are the high level of fixed and sunk production costs (leading to a natural monopoly), the presence of indivisibilities that cause the lumpiness of any increase in capacity, the multi-product nature of the output (as it is possible to produce a large number of different train paths within the same infrastructure) or the strong inertia of the system (due the long useful life and rigidity of the network).

As well, it also shares some of its "political" characteristics, as its conception as a public service. As noted by Campos et al. (2000, p.7) "*the conception of rail transportation as a public or social service, irrespective of its profitability, is another of the defining elements that have determined the worldwide industry organization and performance during this century*".

Railway infrastructure markets are intermediate markets strongly interdependent in their vertical relations (Fig. 15). In fact, the demand of infrastructure capacity is directly related to the demand of railway transport, result of the total volume of transport requested by the market and the particular intermodal competition conditions. The segmentation of the demand for infrastructure capacity and the formation of train paths depend as well on the particular segmentation of rail transport demand (e.g. freight, regional, long distance, etc.).

Fig. 15: Conceptual diagram of the interdependencies between transport and railway infrastructure market

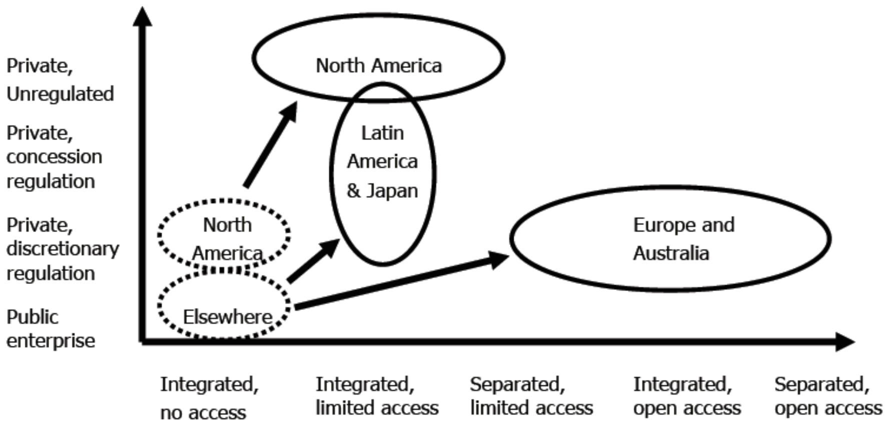


Source: own elaboration

[14] At European level, railway infrastructure was legally defined in Regulation 2598/70/EEC, which included the following elements: ground area, track and track bed, engineering structures, level crossings, superstructures, lighting installations, plants for transforming and carrying electric power for train haulage and the buildings used by the infrastructure department.

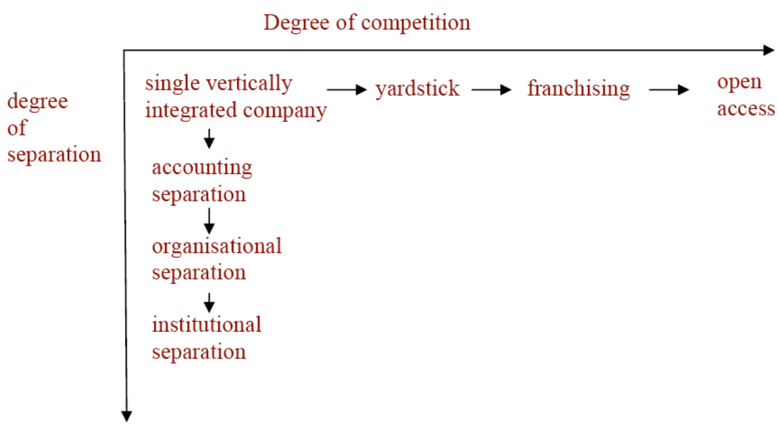
The intensive reform of railway sectors across the world with the objective of improving their organization and performance has changed their traditional structures, favouring in a number of cases the introduction of vertical separation and the creation of new railway infrastructure markets. Several classifications have been proposed for the resulting market structures, particularly as regards the degree of vertical separation and privatization (Fig. 16) or the degree of separation and competition in the operation business (Fig. 17).

Fig. 16: Classification of railway infrastructure markets according to degree of privatization and separation



Source: Gómez Ibáñez, 2004, p.6

Fig. 17: Classification of railway infrastructure markets according to degree of separation and competition



Source: Nash et al. 2004, p.14

These same three axes, together with a fourth one related to the type of regulation implemented to avoid the market power of the IM, describe the particular structure of the different railway infrastructure markets:

- *Type of separation* between the operation and the infrastructure business. On a growing scale from integration to separation it is possible to distinguish total integration, accounting separation, functional separation and institutional separation. Even in the case of total integration, the infrastructure manager may be obliged to sell capacity to other operators (e.g. US freight operators).
- *Type of competition* in the operation segment. On a growing scale from totally opened to absence of competition four stages can be defined: competition in the market (free entry and exit, demand and supply determine prices and quality mixes), competition for the market (auction used to force potential monopolists to compete with each other for the right to be the single provider of a service), yardstick competition (based on performance comparison with similar entities) or absence of competition.
- *Type of ownership* of the infrastructure business. It can be carried on by a State agency, a public company or a private company.
- *Type of regulation* applied to the infrastructure manager. This point will be developed in the sections to come (3.3 and 3.4).

3.2.2 Railway infrastructure markets in the EU

The European Railway Reform has enforced the vertical separation of infrastructure management and transport operation across the EU, creating a railway infrastructure market on every national network, with its own technical and operational characteristics. Furthermore, the flexibility permitted by the European legislation concerning the type of separation, the type of competition, the type of ownership or the type of regulation, has allowed the development of different market structures. This section is aimed at briefly describing them.

As regards the technical and operational characteristics of the European railway networks, they have been depicted in Table 7. The technical description of the network has been performed through the length of the network (km of line), the percentage of electrified lines and the percentage of lines equipped with more than one track. The operational description of the network has been done through the total traffic volume supported (in train-km), the intensity of use of the infrastructure (established on the basis of an estimated number of track-km) and the mix of the traffic (expressed as the percentage of the total traffic volume corresponding to freight services).

Table 7: Technical and operational characteristics of railway infrastructure markets in the EU-27

Country	IM	Infrastructure (year 2006)			Operation (year 2006)		
		Length (km line)	**Electrif. (% line-km)**	**> 1 track (% line-km)**	**Train-km (000)**	**Intensity (train-km /track-km)**	**Freight (%train-km)**
AT	OBB Infr.	5.702	62%	36%	139.200	17.968	35,1%
BE	Infrabel	3.560	84%	77%	104.900	16.664	n/a
BG	NRIC	4.146	70%	23%	36.097	7.052	29,6%
CZ	SŽDC	9.491	32%	20%	148.839	13.123	22,2%
DE	DB Netz	34.128	57%	53%	1.016.354	19.441	24,2%
DK	Banedanmark	2.011	31%	46%	48.600 *	17.916	8,7%
EE	Eesti Raudte	801	16%	13%	8.300	9.141	71,1%
EL	Edisy	2.509	4%	19%	19.071	6.363	11,4%
ES	ADIF	12.991	59%	32%	175.000	10.206	20,6%
FI	RHK	5.905	52%	10%	50.880	7.858	36,1%
FR	RFF	29.547	48%	56%	537.222	11.681	25,0%
HU	MAV	7.648	34%	15%	95.100	10.769	18,7%
IE	Iarnród Éireann	1.919	3%	26%	18.242	7.550	20,5%
IT	RFI	16.295	70%	42%	345.695	14.905	19,2%
LT	LG	1.771	7%	22%	13.818	6.409	66,0%
LU	CFL	275	95%	51%	5.061	12.195	12,1%
LV	LDZ	2.374	19%	10%	16.769	6.422	56,3%
NL	ProRail	2.776	73%	67%	130.000 *	28.102	n/a
PL	PKP PLK	19.429	61%	44%	222.999 *	7.945	41,0%
PT	REFER	2.839	51%	21%	39.039	11.329	18,5%
RO	CFR	10.781	37%	28%	170.284	12.348	29,3%
SE	Banverket	9.957	78%	19%	124.000	10.495	35,5%
SI	AZP	1.228	41%	27%	18.794	12.063	42,7%
SK	ZSR	3.658	43%	28%	49.936	10.678	36,0%
UK	Network Rail	19.568	79%	n/a	463.500 +	n/a	n/a

*Note: Electrif.: % of lines electrified; Intensity estimated as train-km/[(1+%lines > 1 track)*Length]; *: Data corresponding to year 2005; +: only passenger traffic; n/a: non available.*
Source: own elaboration with data from UIC (2007), López Pita (2006, p.21), Banverket (2007b, p.10), PKP PLK (2006a, p.31), ORR (2007, p.70), Infrabel (2007, p.92), OBB (2007, p.65), Brockhoff (2006, p.2) and Statistics Denmark (2006, p.10)

As regards the type of separation, all Member States (except the Republic of Ireland, Northern Ireland and Estonia, for one of two networks) have achieved at least accounting separation of infrastructure and operations (Steer Davies Gleave, 2005a, p.69). However, depending on their national situation in terms of historical, political and institutional settings, they have adopted one or another arrangement for their railway sector. At present, 13 Member States have implemented the full separation of infrastructure and operation activities by constituting two legally and functionally independent companies. However, in few of these cases (France, Czech Republic, Finland and Slovenia) there is still a strong participation of the operation company in the network management activity (Hovald, 2006, pp.9-10). Twelve European countries have set up two different companies for infrastructure and operation, but they are still linked since they belong to the same holding company. A synthesis of these results is shown in Table 8.

Table 8: Vertical separation in the EU-27

Full separation	Partially integrated separation
Bulgaria, Czech Republic, Denmark, Finland, France, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom	Austria, Belgium, Estonia, Germany, Greece, Hungary, Italy, Ireland, Latvia, Lithuania, Luxembourg, Poland

Source: own elaboration with data from Steer Davies Gleave, 2005a

The railway infrastructure markets in the EU are also different as regards the type of competition. Some Member States have introduced competition for the market mechanisms in the passenger transport segment[15]. This is the case of Austria (limited to regional passenger services), Denmark (progressive introduction for regional passenger services), Estonia (all passenger services), Germany (some regional passenger services), Italy (now being introduced for regional passenger services), Netherlands (some regional services), Portugal (one service), Sweden (all subsidized passenger services) and United Kingdom (all domestic passenger services) (ECMT, 2005, p. 69).

The European scenario is more homogeneous as regards the type of ownership, as the infrastructure management activity in Europe is performed by entities directly or indirectly owned by the Member States (Table 9). Four major arrangements can be found: 1) Infrastructure managers integrated in the structure of the State in the form of an agency (e.g. Banverket or RHK); 2) Infrastructure managers established as public business entities owned by the State (e.g. ADIF or RFF); 3) Infrastructure managers in the form of stock companies, whose shares are owned by public holdings; and 4) The British arrangement, in which the control is exerted by the State though the company nominally belongs to various stakeholders without the emission of shares.

It is noticeable the fact that the two European experiences that foresaw the privatization of the infrastructure management activity (the case of Railtrack in the UK and the case of EVR in Estonia) have ended up in the renationalization of their businesses.

[15] As regards the freight transport segment, the EU legislation only allows competition in the market mechanisms (see section 2.3.3.3).

Table 9: Ownership and legal form of the national infrastructure managers in the EU-27

Country	Infrastructure manager	Legal form	Ownership
AT	OBB Infr.	Joint stock company	100% owned by ÖBB Holding AG, in turn owned by the Austrian State
BE	Infrabel	Public business entity	7,34% Belgian State, 92,66% SNCB Holding, in turn owned by the Belgium State (99,9%)
BG	NRIC	State organization	Bulgarian State
CZ	SŽDC	State organization	Czech State
DE	DB Netz	Joint stock company	100% owned by DB AG, in turn 100% owned by the German State
DK	Banedanmark	Public business entity	Danish State
EE	Eesti Raudte	Joint stock company	66% is privately owned by BRS (Baltic Rail Service), 34% Estonian State (until 2006). Renationalized since 2007
EL	Edisy	Joint stock company	100% owned by OSE SA, in turn 100% owned by the Ministry of Economy
ES	ADIF	Public business entity	Spanish State
FI	RHK	State organization	Finnish State
FR	RFF	Public business entity	French State
HU	MAV	Public business entity	Hungarian State
IE	Iarnród Éireann	Joint stock company	100% owned by CIÉ Group, in turn 100% owned by the Irish State
IT	RFI	Join stock company	100% owned by FS, in turn 100% owned by the Italian State
LT	LG	Joint stock company	100% owned by the Lithuanian State
LU	CFL	Joint stock company	Luxembourg State
LV	LDZ	Joint stock company	Latvian State
NL	ProRail	Company limited by shares	Dutch State
PL	PKP PLK	Joint stock company	Jointly owned by PKP S.A. and Ministry of Finance.
PT	REFER	Public business entity	Portuguese State
RO	CFR	Joint stock company	100% owned by the Ministry of Transport, Construction and Tourism.
SE	Banverket	State organization	Swedish State
SI	AZP	State organization	Slovenian State
SK	ZSR	State organization	Slovak State
UK	Network Rail	Company limited by guarantee	Several entities, among them the DfT (UK State)

Source: own elaboration with data from RAILCALC Consortium, 2008b, Annex B, pp.33-95; RDC (2007); ERAIL Consortium (2005a, p.15); ERAIL Consortium (2005b, p.10); ERAIL Consortium (2005c, p.15); Coutrouba et al. (2006, p.15) and TREND Consortium (2006, p.19)

Lastly, the railway infrastructure markets of the Member States can be distinguished by the type of regulation implemented. This aspect is developed in sections 3.3.2 and 3.4.2.

3.3 Regulation of railway infrastructure markets

According to the public-interest theory, governments must step in to regulate markets whenever markets fail to regulate themselves. These so-called *market failures* occur where the price mechanism that regulates supply and demand breaks down, leading to undesirable outcomes. This is obviously the case of monopolies.

Regulation of railway infrastructure markets is aimed at minimizing the arbitrariness and the inefficiencies that could arise under monopolistic conditions. Under perfect competition conditions, the freedom of service providers to set prices tends to benefit users. In addition, it ensures that the providers will have an incentive to minimize costs while setting prices that guarantee their financial equilibrium. On the opposite, under monopolistic conditions the service provider is free to set the price that maximizes its profit, without any constraint on its efficiency or the service quality delivered.

In this case, the role of regulation is to set *infrastructure prices* and *service quality* so as to ensure that users get an outcome similar to the one expected under effective competition. The choice of whether and how a government should regulate monopoly depends in part on the values or goals it considers important.

The vertical separation of railway transport markets reduces the need for regulation to the segments of the industry where there still remain elements of monopoly power, but comes at the cost of an increasing regulatory complexity at the interface between its different segments. Additionally, the regulator has still to care about infrastructure prices and service quality, but also about *non-discriminatory access to the network*, which usually involves the consideration of multiple issues (e.g. information made available to operators, capacity allocation procedures, access to facilities, etc.).

3.3.1 Regulatory options

To protect the public interest objectives against the market power exerted by a monopoly there is a number of different regulatory systems that may be applied. In the particular case of railway infrastructure markets, the choice of one or another option depends on the government objectives and the specific structure of the market[16].

In broad terms, the regulation alternatives available may be distinguished among direct regulation, indirect (or incentive-based) regulation and mixed regulation depending on the

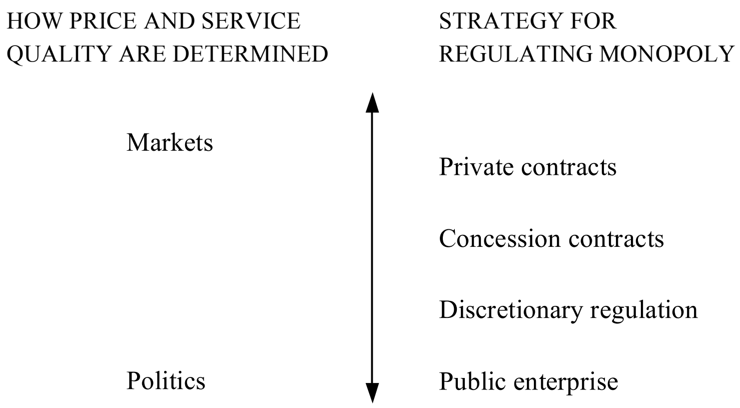
[16] There is an extensive literature dedicated to assess the advantages and disadvantages of the different regulatory systems and to investigate which would be the more appropriate form of regulation for railway infrastructure. This debate is not detailed here, as it falls beyond the objectives of this thesis.

type of coercion involved. *Direct regulation* is anchored in the direct coercion of the regulated agent, normally through decision-power backed by legislative provisions. This alternative includes constraints and obligations such as structure regulation (enforcing certain company structures), the specification of terms ruling concession agreements and territorial licenses or security of supply requirements. *Indirect regulation* exerts indirect coercion on the behaviour of the regulated agent through the definition of economic penalties and rewards. Price regulation mechanisms such as revenue caps, performance agreements or bonus/malus systems fall within this category. Finally, *mixed regulation* applies a mix of direct and incentive-based regulation to guide the regulated agent. This form of regulation is applied in most countries, as direct regulation is often a necessary supplement to incentive regulation.

Though these alternatives are available to any government, the historical evolution of monopoly regulation seems to design a trend towards an increasing use of indirect mechanisms, going from the nationalization of the industry to avoid the misuse of market power to new paradigms of regulation adapted to the recent privatisation and deregulation trends.

If attention is directed now to the specific solutions available to policy-makers, it is possible to draw more detailed distinctions in the previous classification. According to Gomez Ibañez (2006, p.11) "*the solutions to monopoly can be arrayed along a continuum according to the relative roles that markets and politics play in determining infrastructure prices and service quality*". Along this continuum, the author distinguishes commercial contracts, concession contracts, a discretionary approach (i.e. the creation of specialized regulatory institutions) and a public policy approach (Fig. 18).

Fig. 18: Classification of regulatory solutions to monopoly



Source: Gómez Ibañez, 2006, p.11

In the case of railways, regulation has been mainly performed from *politics*, in the form of concession contracts, discretionary regulation and public control (Gómez Ibáñez, 2006, pp.29-32).

When the regulation of the infrastructure business adopts the form of a *concession contract*, the concessionaire takes on operations and investment as well as commercial risk within the limits set in the contract. The contract is signed between the government, representing the public interest, and the infrastructure manager, usually selected through competitive bidding. The definition of concession contracts is intended to specify the outputs and economic compensations related to infrastructure provision, as well as to regulate as much as possible unpredictable events. Accordingly concession contracts clearly state key aspects such as duration, investment and other obligations, revenue, tariffs, regulatory regime, control, sanctions, renegotiation conditions, etc. (Estache, 2000, pp.16-22).

A more frequent form of regulation in the infrastructure business is *discretionary regulation*. This approach involves creating a government regulatory agency with the power to unilaterally establish the infrastructure firm's tariffs and service standards. It is a more flexible approach than a contract, as the agency has the possibility to react to changing circumstances. Contrarily to the concession contract, the influence of market forces is reduced and the agency must set conditions to mimic what the competitive outcomes would have been. A specific problem of discretionary regulation regards its wide information requirements and the information asymmetry between the agency and the infrastructure manager (as technology, cost structure or demand are better known by the regulated agent).

The settlement of regulatory agencies finds different degrees of decision independence from the government. In those cases in which the regulatory agency is closer to the government, it can suffer strong political pressures in the form of government objectives other than those dictated by the public interest. This is frequently the case for fiscal and distributional objectives.

If the infrastructure business is integrated within the structure of the State, then it is generally the case for *direct public control*. Different options may be included within this concept, from the signature of framework agreements between the State and the infrastructure manager (as a way to set technical, economic and financial targets able to increase performance) to the direct imposition of government's targets and goals.

As regards the particular problem of regulating the access of operators to the network, three solutions are foreseen by the theory (Gómez Ibáñez, 1999, pp.12-14):

- *Track access charges* publicly defined by the Member State or the regulator in order to provide access to the infrastructure. They may be complemented by some type of rule-based allocation of capacity able to solve conflicting demands on the access to bottleneck facilities. Their setting becomes particularly relevant in the case of partially integrated separation, where the infrastructure manager may have strong links to the incumbent operator.

- *Negotiated access* between the monopolistic infrastructure provider and the operators. The agreements should clarify the access charges, services, and investments involved on both sides. This type of agreements should be reviewed by the regulator, to insure that the infrastructure provider is not abusing of his monopoly position.
- A final strategy for coordinating vertically separated industries is to create a *market for capacity rights* in the monopoly infrastructure system. In the case of railways, this type of markets has not been developed, mainly because of the limitations found to clearly define the capacity and the difficulties encountered in designing appropriate auction mechanisms in situations of scarce capacity. As remarked by Gibson (2003, p.40), railway infrastructure capacity is non homogeneous and it is subject to network effects, interdependency and contingent valuation. These characteristics would require a hugely complex mechanism to introduce an auction-based approach to capacity allocation.

3.3.2 Regulatory approaches in the EU

In the EU, the basic approach to the regulation of railway infrastructure markets has been the establishment of access charges at the interface with operators and the constitution of regulatory agencies in order to control the monopolistic behaviour of the IM. Only in very specific cases the regulation of the infrastructure business has been provided through concession contracts[17].

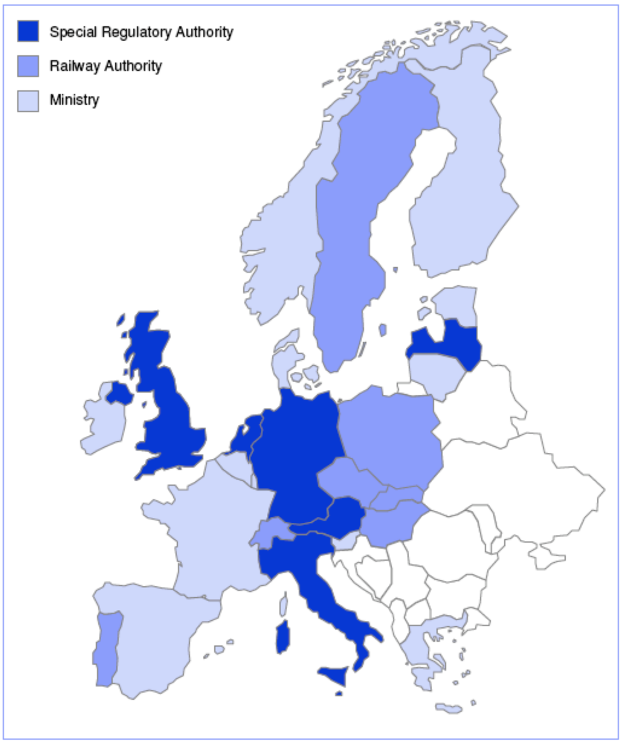
In fact, the current legislation requires the constitution of a regulatory body independent from the infrastructure manager and the transport operating companies in its organization, funding decisions, legal structure and decision-making. The body is responsible for various regulatory functions, including complaints and appeals from applicants as well as for ensuring that infrastructure charges are set in accordance with EU legislation and are non-discriminatory. As well, the regulatory body shall supervise any negotiations between the infrastructure manager and applicants (Directive 2001/14/EC, Art. 30).

[17] An example of this kind of regulation may be found in the concession contract defining the activity of the private infrastructure manager TP Ferro in the link Figueres-Perpignan.

Within this basic framework, a recent study by IBM (2006) on rail regulation in Europe identified three models of regulatory bodies (Fig. 19):

- The *Ministry regulatory model*: includes Member States that have either named the Transport Ministry as the regulatory body, have no regulatory body with decision-making powers and/or have no standing organization that is responsible for regulatory matters in the rail sector.
- The *Railway Authority regulatory model*: includes Member States that have assigned regulatory duties to a traditional railway supervisory authority dealing primarily with licenses, safety and other railway-specific administrative tasks.
- The *Special Regulatory Authority regulatory model*: includes the Member States that have set an independent authority with decision-making powers that is specialised in regulatory matters, has specially trained staff, is provided with far reaching power to enforce their decisions and has already cumulated a considerable experience in regulatory cases.

Fig. 19: Classification of regulatory bodies in Europe. 2006



Source: IBM, 2006, p.18

In spite of the form of the regulator, under EU Law the access to the network is controlled by railway infrastructure charges and priority rules. Allocation of capacity must be performed by the infrastructure manager according to specific capacity allocation rules, and any secondary trading of capacity is explicitly forbidden (Directive

2001/14/EC, Arts. 13 and 14). To avoid discrimination of operators and increase transparency, the infrastructure manager must develop and publish a network statement with information about the technical nature and limitations of the network, access conditions, rules on capacity allocation as well as the tariff structure and the priority rules to be applied in case of conflicting demands (Art.3). The Directive 2001/14/EC also regulates investments in the network, requesting the IM to perform network capacity analyzes in order to identify bottlenecks, as well as specific plans to improve the quality and capacity of the infrastructure (Arts. 22, 25, 26).

Currently almost all EU countries publish network statements in accordance to the legal requirements (RAILCALC Consortium, 2008b, pp.18-19). In rare cases they include explicit references to auctioning procedures (e.g. in Estonia – Eesti Raudtee, 2006, p.14) or negotiations (e.g. in Poland – PKP PLK, 2006b, p.26).

In some markets, the implementation of infrastructure charges to regulate the access to the network and the setting of priority rules must be coordinated with the existence of franchising agreements.

The main characteristics[18] of such agreements in the EU can be resumed as follow:

- They are mainly signed for regional passenger services.
- They are awarded through a bidding procedure pointing at a minimum subsidy request or at an improvement of the quality/quantity of the supply. Frequently the agreements include a tight service specification on frequencies, timetables and rolling stock.
- Their durations differ across Member States, in particular depending on the inclusion or not of rolling stock. Typical durations are 3-5 years (Sweden), 5-6 years (Netherlands - without rolling stock), 7-9 years (UK, Denmark, Germany), 10-15 years (Netherlands - with rolling stock) and 30 years (Portugal).
- They are generally established on a net cost basis (transferring both cost and income risk to the franchisee).

As regards their coordination with access charges, they normally include cost pass-through provisions or facilitate adequate information on them and their likely evolution at the time of the bidding procedure. The second is the case of the passenger franchises in the UK, described by NERA (1998, pp.90-91) in these terms: "*Where train services are franchised, in particular, fixed charges announced before franchise bids are submitted should not affect the profitability of franchised train operators (since train*

[18] Based on ECMT (1998a, pp.74-75), Brenck et al. (2006, p.16), Dijk (2006, p.17), Alexandersson et al. (2006, p.7) and Kain (2006, p.4).

operators can pass these charges on to the franchising authority in the form of higher subsidy requirements or lower payments for the franchise)".

3.4 Price regulation

The adequate control of the infrastructure provider requires the implementation of regulatory schemes able to influence directly or indirectly the prices applied in the market, bringing them closer to the equilibrium resulting from competitive conditions and guaranteeing fair access to the railway network. Nevertheless, other considerations intervene in the formation of prices.

In fact, apart from looking for *static and dynamic efficiency*[19] in the infrastructure market, the setting of prices must also allow the infrastructure manager to reach the financial equilibrium and avoid imposing excessive regulatory compliance costs. As well, pricing should ensure *fair access to bottleneck facilities* at the same time that it provides adequate resources and *incentives for capacity improvement*. Finally, it may also be subject to other governmental requirements in terms *of equity or distribution effects*.

To give an answer to these requisites, regulators have a number of options to influence the prices in the infrastructure market and drive the behaviour of the monopolistic agent.

3.4.1 Approaches to price regulation

Once the decision to regulate the infrastructure railway market has been taken, there is a substantial menu of options from which to choose[20]. Next, they are briefly described and discussed.

Direct price setting – the regulator directly sets the price of the capacity rights in the railway infrastructure market. The main criticisms to this approach come from the inefficiencies likely to arise as a result of political pressures and information asymmetry.

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[19] Several definitions of efficiency are provided by the economical science. *Allocative efficiency* refers to the allocation of resources to the production of the goods and services most valued by society; *Productive efficiency* refers to the use of the minimum quantity of inputs to produce goods and services; *Static efficiency* is referred to the conditions prevailing in the present situation; *Dynamic efficiency* takes into account the evolution of the system, delivering adequate signals to the market for investment and disinvestment decisions.

[20] This section mainly builds on Campos et al. (2000, pp. 24-28), De Rus et al. (2003, pp.270-285) and King (1997, p.47).

Rate of return regulation (ROR) – under this scheme the regulator fixes the return on investment allowed to the infrastructure company in addition to its operational costs. As the financial equilibrium condition stands, in doing so, the regulator fixes indirectly the prices (calculated as a residual figure). The regulator has to define the asset base over which the return is allowed (regulatory asset base), the operational expenditures and the rate of return applied. Though it limits indirectly the revenues of the infrastructure company, this approach does not provide incentives for efficiency. On the contrary, it incentivates overinvestment and overvaluation of assets and frees the company from demand risk (which is passed directly to users). It poses strong information requirements on the regulator.

Cost plus regulation – under this scheme, the regulator constrains the revenues of the infrastructure company not to be more than actual costs plus a mark-up. Prices are then derived from the total revenue requirement. The regulator needs to define the cost basis applied to set the regulation and the extra revenue allowed. This approach can also be applied on an efficient cost basis, though it can be very demanding in information. Like in the previous case, the action on the revenue side of the financial equilibrium does not provide any efficiency incentives (in fact it fosters increases in those costs included in the regulatory asset base).

Revenue cap regulation – under this scheme, the infrastructure company is allowed to keep the difference between the total revenues, up to a permitted maximum, and the actual costs. The company is not guaranteed full cost recovery, but through efficiency and cost reductions will be able to increase its profit. Prices are indirectly limited by the cap on the revenue. The regulator fixes the period over which the incentives will be maintained and frequently allows adjustments to the revenue level with regard to efficiency improvement, inflation and the cost of essential supplies/energy. The independence of the cap from costs provides strong incentives to the infrastructure company for efficient management. However, the regulator needs to control the costs of the company in order to ensure its financial viability, especially when future investments are foreseen.

Price cap regulation – the regulator allows the infrastructure company to increase its prices with inflation, less a "discount" reflecting all or part of the average increase in productivity in the sector. In this case the regulator sets a maximum average of the tariffs, below which the company has full pricing freedom. The price level is updated according to the RPI-X formula, where RPI is an inflation factor and X is meant to reflect potential cost savings by the firm due to either increased efficiency or technological progress. Prices are directly limited by the cap.

The regulator fixes the period over which the cap will be maintained (normally 3-5 years) and, as in the previous case, normally allows adjustments to the revenue level with regard to efficiency, inflation and delivered supply / energy. This approach requires low information requirements: an estimation of the appropriate level of prices at the beginning of the first regulatory period, the estimation of the X factor and the time between reviews.

When the regulated firm produces multiple services, the price cap is frequently set for the bundle of services provided (generally averaged after weighting services with their volume of sales). This approach provides incentives to efficiency and cost reduction because profit remains with the regulated company. As in the previous case, the regulator must ensure the financial viability of the company.

With independence of the final election made by the regulator, the implementation of the mentioned schemes faces specific information requirements and decisions that may condition their outcomes to a large extend: 1) They must define the asset base or the cost base to be adopted for the calculation; 2) They must select valuation criteria and depreciation rules in order to calculate capital expenditures; 3) They must assess the level of operational costs of the network; and 4) They must ensure the financial viability of the infrastructure company. None of these requirements is simple when it is applied on a railway infrastructure network.

3.4.2 Price regulation in the EU

The regulation of prices in the European railway infrastructure markets is strongly conditioned by the EU legislative framework, that sets conditions on the financial equilibrium of the infrastructure business and on the basic pricing principles that must drive the determination of track access charges.

According to this framework, most of the Member States have adopted direct price setting rules either based on costs or taking into account the willingness to pay of the demand. In this case, given the fact that charges are usually below the full cost level, the national administrations regulate the behaviour of the infrastructure managers through the signature of framework agreements linking the payment of public funds to the achievement of specific levels of performance.

However, some Member States report price-setting procedures that place efficiency incentives within the definition of track access charges. One of these states is the UK, which establishes the value of the fixed charge to be paid by operators according to a price cap mechanism. The regulator defines the financial needs of the infrastructure manager for the five-year control period on the basis of efficient costs and then sets the fixed charge accordingly (see section 6.4.3 for further details). Another case can be found in Portugal, which allocates a bundle of costs to prices taking into account an efficiency curve modulated for a seven year period (see section 6.4.5).

3.5 Pricing principles

Price systems exist to guide decisions in such a way as to reach the more efficient use of scarce resources. When price systems are applied to railway infrastructure, then the concerned scarce resource is capacity. Consequently, a system of access charges should serve to improve the utilization of the available capacity, guaranteeing rights of use to the most valuable services for society. Although certainly desirable, this objective is not the only one that can be reached by the infrastructure charging systems, that can also be set to recover a given level of costs, to optimise the network management, to orient investment decisions or to encourage productivity gains in the operation and maintenance of the infrastructure (ECMT, 1998b, pp.1-2).

Unfortunately, there is not a pricing principle able to fulfil all the objectives at the same time, as a result of the particular characteristics of the railway infrastructure business, namely the presence of economies of scale, density and scope. The high amount of fixed costs makes incompatible to reach optimal efficiency and cost recovery at the same time. If the fixed costs are recovered through a fixed charge, then there is a risk of discrimination of new entrants, and so on. Therefore, the selection of a pricing principle implies a trade-off between alternative objectives of infrastructure pricing.

In turn, the choice of the objectives that shall drive the selection of a pricing principle will result from the political and regulatory objectives established for the railway infrastructure market.

3.5.1 Basic economic principles

3.5.1.1 Marginal Cost Pricing

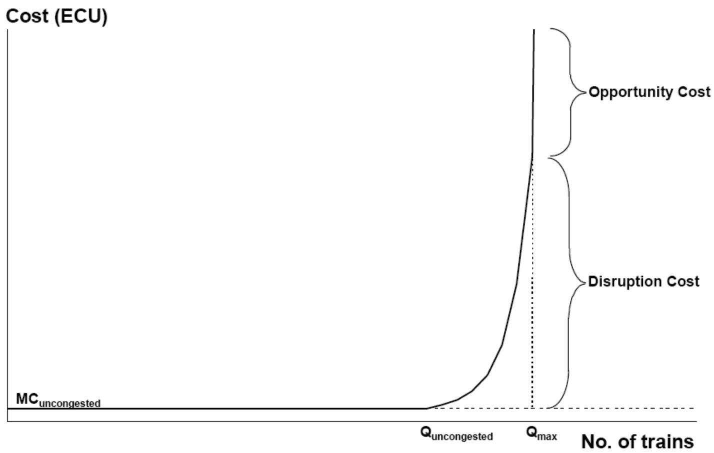
The marginal cost[21] pricing principle was first formulated by Hotelling (1938) in its now classical work "*The general welfare in relation to problems of taxation and of railways and utility rates*", in which he proved that marginal cost pricing is sufficient for welfare

[21] Marginal costs are specific variable costs related to the provision of a service or use of infrastructure. Marginal cost is the extra cost that is incurred by increasing output by one unit, and therefore can be expressed as the variation of the total costs with the production level.

optimality. Accordingly, marginal cost pricing should be adopted as principle in order to maximize social welfare, constituting the *first best* solution to the pricing problem.

In the *short run*[22], the marginal costs of rail infrastructure are the operation, maintenance and renewal costs that arise when an additional train runs in the network. Pricing railway infrastructure according to them minimizes the exclusion of railway operators, as every train able to pay its marginal costs will be admitted in the network.

Fig. 20: Evolution of short run marginal costs with the quantity of output



Note: $MC_{uncongested}$ – marginal costs in uncongested conditions; $Q_{uncongested}$ – maximum quantity of output in uncongested conditions; Q_{max} – maximum quantity of output for the available capacity.
Source: NERA et al. 1998, p.24

However, due to the economies of scale existing in the rail infrastructure, the incomes generated by this principle will not be able to cover the fixed costs of operation, maintenance and renewal or the costs of upgrading and enlarging the network, resulting in deficit for the infrastructure manager. This deficit could be covered by general taxes, but at the cost of introducing distortive effects in the market. Another difficulty comes from the volatile nature of short run marginal costs when demand is approaching or even rising above the available capacity of the infrastructure (Fig. 20). In this case, the marginal costs should include disruption costs generated to other users or even scarcity costs (opportunity cost of the circulations priced off from the market).

Other drawbacks of short run marginal cost pricing have been referred by Rothengatter (2003, p.124), who remarked the following points: 1) The practical measurement of SRMC is complex; 2) Equity is ignored, as general taxes must be used to cover the deficit; 3) Dynamic effects are ignored, as welfare maximization is achieved for the

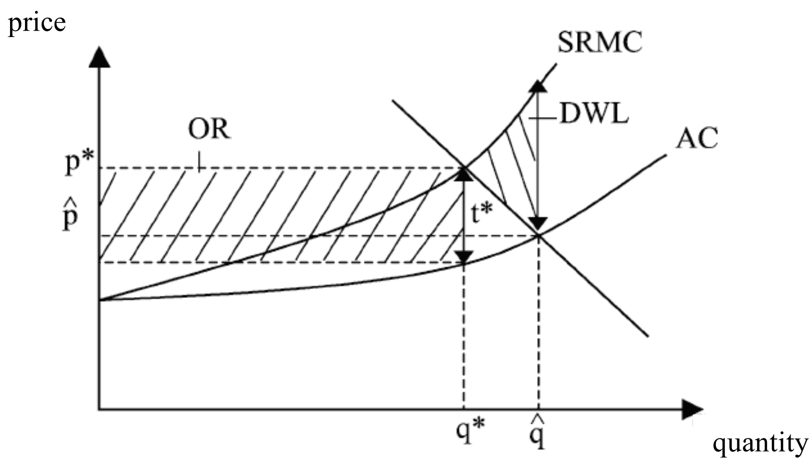
[22] Depending on the period of time considered for the definition of marginal costs, it is possible to differentiate between: 1) *Short run marginal costs* (SRMC), calculated on the assumption that some production costs are fixed in the short term (e.g. infrastructure); and 2) *Long run marginal costs* (LRMC), obtained on the basis that all costs may be deemed variable with the output on the long run.

existing network without considering future investments or technology changes; 4) Financing issues are ignored; 5) Institutional issues are ignored; 6) Price distortions elsewhere in the economy are ignored; and 7) Implementing marginal social cost pricing may involve substantial administrative costs which may not always be justified by the benefits it brings.

Nash (2003, p.348) replying to the previous assertions, admitted most of the criticisms raised, but also pointed out that this does not mean that a totally different theoretical approach to pricing policy needs to be adopted. He stated that "*considerations such as budget constraints, equity, institutional issues, simplicity and price distortions elsewhere in the economy lead to a need to depart from pure marginal social cost pricing but do not change the position that the measurement of marginal social cost is the correct starting point in the development [of] any efficient pricing policy*".

In the *long run*, the marginal costs of rail infrastructure also include the capital costs of expanding capacity to accommodate an increase in output. Pricing rail infrastructure according to them sets a price that is equal to the value of the resources that must be used to produce the transport performance in the future, ensuring the financial equilibrium of the infrastructure manager. Nevertheless, this approach finds difficulties because of the indivisibility of infrastructure assets, which imposes a long term forecast of which capacity enhancements will be carried in the future and at what cost.

Fig. 21: Pigouvian taxation



Note: In order to introduce marginal external costs in the charge and avoid the deadweight loss DWL, the price must include a tax t able to shift the equilibrium from the private marginal cost curve AC (^p, ^q) to the social marginal cost curve SRMC (p*, q*). The application of such a tax will generate extra revenues equal to the shaded area OR.*
Source: Rothengatter, 2003, p.124

In addition to the selection of the time horizon in which to calculate marginal costs, the marginal cost pricing principle may choose to include or not *external costs*, derived from effects on society such as ecological damage, congestion, noise, accidents, etc. In this case, externalities are included in the charge in the form of pigouvian taxation able to reflect social marginal costs. These taxes should be set equal to the difference between the marginal social cost (curve SRMC in Fig. 21) and the marginal private cost (curve AC) at the equilibrium between the marginal social cost and demand.

3.5.1.2 Ramsey Pricing

The basics of Ramsey pricing were set by Frank Ramsey (1927), who proposed it in the field of taxation after studying how to minimize the negative effects of indirect taxes.

Ramsey pricing aims to maximize social welfare under the constraint of deficit coverage. It considers rail infrastructure as a multi-product natural monopoly and tries to find mark-ups for each of the products in order to cover the deficit that results from SRMC pricing. This involves varying charges reciprocal according to the elasticity of demand of each user or group of users. Ramsey prices are a *second best* solution as they deviate from unconstrained welfare maximization.

Pricing railway infrastructure according to the Ramsey principle achieves static allocative efficiency under the constraint of deficit coverage, thus allowing the recuperation of a given cost target. As negative aspects it is to be noticed that it is a second best solution involving large information requirements (elasticities of the demand – e.g. willingness to pay of railway undertakings) and that it provides no incentives for the infrastructure manager investment once his deficit is covered (Peter, 2003, p.7).

3.5.1.3 Non-linear pricing and two-part tariffs

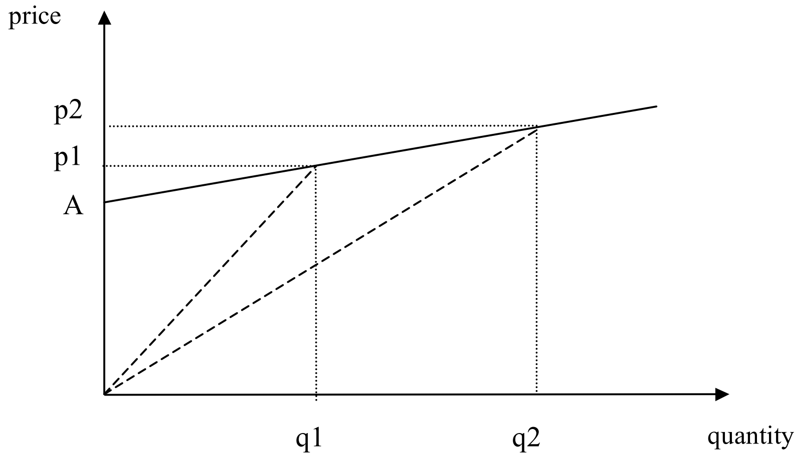
A non-linear tariff consists of various components, where each term is obtained by multiplying a basic cost parameter, such as tonne-km or type of train, by corresponding coefficients.

More precisely, a two-part tariff consists of an access charge independent from the quantity consumed and a variable charge set as a price for every unit consumed. When applied to railway infrastructure, the fixed charge is generally aimed at recovering fixed costs, while the variable charge usually reflects marginal or variable costs.

Two-part tariffs may be compulsory or optional (with self selection). In the first case, the operator must accept the payment of the fixed charge in order to access the network, while in the second he will be able to choose between the two-part tariff and a linear tariff. The operator will select one or another charging option depending on the total quantity of output consumed. The economic theory proves that in the particular case of a two-part tariff with self-selection there is an improvement with respect to a compulsory two-part tariff (De Rus et al. 2003, pp.202-204).

The main inconvenient linked to the use of two-part tariffs comes from the decreasing behaviour of unitary costs with respect to output, which may favours larger operators and penalize small ones, increasing the risk of exclusion of the latter from the market. Graphically, this fact is represented by the steeper slope that corresponds to a quantity of output *q1* lower than *q2* in a price – quantity graph (Fig. 22).

Fig. 22: Discrimination between operators induced by two-part tariffs



Note: A- level of the access charge; q1 – quantity demanded by operator 1; p1 – unitary charge paid by operator 1; q2 – quantity demanded by operator 2; p2 – unitary charge paid by operator 2.
Source: adapted from García Álvarez et al. 2007, p.30

3.5.1.4 Fully distributed costs pricing

The fully distributed costs pricing principle takes as a starting point the level of short run marginal costs and then seeks to cover the financial deficit of the infrastructure manager by allocating the remaining costs according to selected parameters such as train-km, revenues or the level of SRMC.

As major strength, this system achieves the complete coverage of the deficit, thus avoiding distortions in the market through general taxation, but it does it at the expenses of efficiency. In fact, under this principle neither static nor dynamic allocative efficiencies are reached, as demand elasticities are not taken into account. Furthermore, if it is applied on a network-based approach, it can cause negative chain reactions in secondary parts of the network, which may become too expensive, pricing off some operators with the consequent increase in costs in other lines (Peter, 2003, p.8).

Another limitations may result from the potential absence of equilibrium under this principle (it requires at least an intersection point between the demand curve and the average cost curve) and the difficulty of measuring total costs of providing the infrastructure.

3.5.1.5 Average cost pricing

The average cost pricing principle argues for setting prices equal to the average cost of provision of infrastructure services, so that prices cover both marginal costs and fixed overhead costs incurred through past investments. This approach involves the sometimes arbitrary apportionment of fixed costs to the trains running on the network.

Average costs can be calculated in the short run by dividing the total costs of delivering all infrastructure services, given current capacity, by the number of services delivered. In the long run approach they will also include investment costs for capacity enhancement and enlargement.

The average cost pricing principle is equivalent in most respects to fully distributed cost pricing, with which shares its main advantage (cost recovery) and important limitations like efficiency losses, potential absence of equilibrium or cost measurement difficulties. Moreover, the absence of relation between the cost drivers of infrastructure provision and the charges is more accused in this case, hindering the transmission of adequate incentives to the operators.

3.5.2 Practical implementation

The choice and implementation of pricing principles is not an easy task, as it must overcome a number of serious practical difficulties, as the specific situation of the infrastructure manager, the transport market it may serve and the characteristics of the demand. The choice has to be made also according to other transport markets, to prevent discrimination and to promote a system-wide efficiency.

Moreover, the implementation must face several constraints arising from the real world that modify and shape the theoretical principles in order to make them applicable. In the end, as stated by Houpis (2004, p.47) "*the access prices set by regulators in practice, will rarely if ever 'equal' their theoretical optimum. The expectation is however that the welfare implications of such 'deviations' are not as costly, as the additional effort and investment required to set access prices closer to the 'optimum'* ".

Maybe one of the most relevant constraints regards the calculation and allocation of costs to services, as it is then necessary to deal with the multi-product nature of the infrastructure activity, the high level of common costs and the indivisibility of infrastructure assets.

A particularly dramatic example is provided by the determination of short run marginal costs, which requires detailed cost studies to evaluate operating costs that can be traced to a particular train movement, wear and tear costs for maintenance and renewal of the infrastructure, costs for energy consumption and additional timetable planning, management and administrative costs. Moreover, in the case of including externalities, it will also require the estimation of air pollution, global warming, noise, accident, or congestion costs.

The strong orientation of the EU policy towards the adoption of the principle of marginal social costs for the pricing of transport infrastructure has played a major role in orienting research towards the estimation of marginal infrastructure and external costs. Several methodologies exist, which may lead to different results. Estimation of marginal costs can be characterised into two groups: top-down approaches, including econometric and cost allocation, and bottom-up approaches, mainly the engineering approach[23]. (IMPRINT-NET Consortium, 2006, p.15). However, there is still not agreement among researchers with respect to the level of railway infrastructure marginal costs, though the studies carried so far suggest that, in the case of railways, marginal cost pricing is likely to cover, at most, between 20%-30% of the total costs of infrastructure provision.

The calculation of costs is neither easy when total cost is involved, as it is then necessary to provide a valuation of the capital costs linked to the infrastructure assets. In the case of railway networks the difficulty arises from their long useful life, their singularity and the high level of interdependency between deterioration and operation and maintenance patterns.

As regards the first issue, most links of the rail networks were built decades ago and many of their components have been already replaced one or more times (according to their different useful lives). This makes hard to establish the production cost of the infrastructure, its useful life or its residual value, hindering the calculation of depreciation on a realistic basis. It also hampers the calculation of its value in use, as it is not easy to define the remaining useful life if the assets. Furthermore, the singularity of the rail network impedes any valuation according to market (there is not a market for rail infrastructure from where prices could be obtained).

As regards the high level of interdependency, it poses further difficulties to calculate the useful lives and deterioration of the infrastructure assets, as they depend upon the combination of the level of investment in the infrastructure, the level of performance

[23] *Econometric approach*: The total expenditure is considered to be explained by different variables, among which the transport outputs. Based on cross-sectional and/or time series data an econometric analysis can be used to determine and estimate a total expenditure function from which variable expenditures can be derived. *Cost allocation approach*: This method uses practical experiences, simple calculations and/or expert judgements to establish the variability of each expenditure category registered in the available accounting data. *Engineering approach*: The total expenditure is disaggregated into sub-categories, and for each of these categories, separate analyses provide the share of variable expenditures.

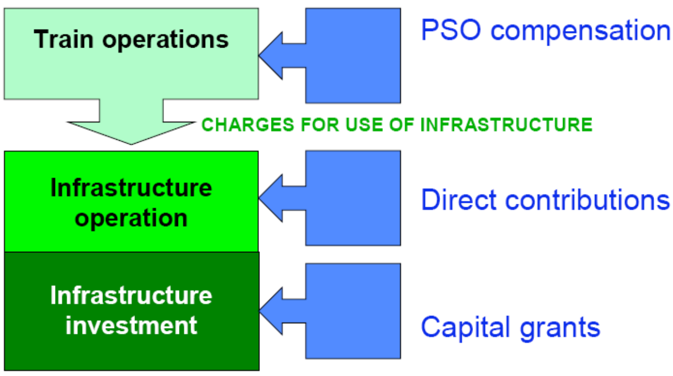
permitted (e.g. axle loads) and the maintenance and renewal strategies followed by the IM. Additionally, many of the cost estimations performed so far rely on budgeted expenditures or real expenditures as a proxy to the yearly maintenance or renewal costs. This practice may introduce serious divergences with respect to the real costs arising in the network[24].

Cost allocation is also particularly problematic, as in the rail network economy only a share of the costs can be directly allocated to particular operations and services. Other parts of the total costs have to be allocated through models that relate rail track use with the consumption of particular resources.

Another relevant point for the practical implementation of pricing principles results from financial considerations, particularly from the conditions existing on the financial equilibrium of the infrastructure business and the availability of State funding. The importance of the financial aspects makes that, on the ground, pricing principles are rather different than the ones formulated in the theory statements (Quinet, 1998, p.229).

In many cases, the achievement of financial equilibrium for the infrastructure management activity requires the participation of governments. Depending on the availability and the forms of their contribution, the results of implementing a pricing principle will be different. It is thus necessary to acknowledge the existence of several forms of public contributions under a vertically separated scheme (Fig. 23), as well as the differences in the funding capacity across the Member States. Taking as example the European case, NERA (2004, p.ix) found differences greater than 1 to 15 in the unitary contribution of governments to the railway sector in year 2001 (Fig. 24).

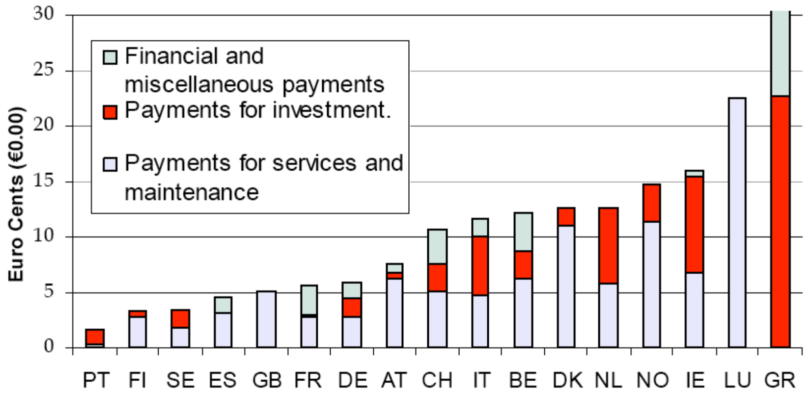
Fig. 23: Basic forms of public contributions to the rail sector



Note: PSO – Public Service Obligation.
Source: Perkins, 2005, p.12

[24] In fact, budgeted expenditures or real expenditures may indicate the availability of funds for a given year and not the costs produced in the network as a result of wear and tear, etc.

Fig. 24: Unitary level and form of State funding to the railway sector in Europe. 2001



Note: PT-Portugal; FI-Finland; SE-Sweden; ES-Spain; GB-Great Britain; FR-France; DE-Germany; AT-Austria; CH-Switzerland; IT-Italy; BE-Belgium; DK-Denmark; NL-The Netherlands; NO-Norway; IE-Ireland; LU-Luxembourg; GR-Greece.
Source: NERA, 2004, p.ix

3.5.3 Pricing principles in the EU

Taking into consideration the complex nature of the reformed railway sector and the natural monopoly characteristics of the infrastructure business, the European Union has defined through legislation the principles that must be observed when setting track access charges, in order to avoid potentially negative effects as the imposition of market power on operators (under a full separation scheme) or the price discrimination of new entrants in the market (under a partial separation scheme).

According to Directive 2001/14/EC (Art.7) "*the charges for the minimum access package and track access to service facilities shall be set at the cost that is directly incurred as a result of operating the train service*", making a reference to short run marginal cost pricing as the basic principle that should guide railway infrastructure pricing. The inclusion of opportunity costs of capacity and environmental costs is also foreseen.

The directive admits departures from the pure marginal costs in the following terms (Art.8) "*In order to obtain full recovery of the costs incurred by the infrastructure manager a Member State may, if the market can bear this, levy mark-ups on the basis of efficient, transparent and non-discriminatory principles, while guaranteeing optimum competitiveness*". This writing seems to admit Ramsey pricing for the allocation of mark-ups to railway services, with the condition that charges are not higher than full cost and that differentiation does not lead to discrimination of one operator with respect to the others in the same market segment (the "market can bear" rule). The directive accepts as well the setting of higher charges in order to take into account the costs derived from necessary investment projects.

The wide range of pricing principles permitted by such legal framework, going from the recovery of marginal costs to full costs, has found its manifestation in the disparity of philosophies adopted by infrastructure managers in the EU.

The ECMT (2005, p.30) classified them according to four categories: 1) Charges based on marginal social costs (MC); 2) Charges departing from pure marginal social cost through the application of mark-ups (MC+); 3) Charges recovering full costs minus the costs funded by the State (FC-); and 4) Charges recovering full costs (FC). The results (Table 10) showed a preponderance of the principles based on marginal costs in Western Europe and of the principles based on full costs in Eastern Europe.

Table 10: Pricing principles in Europe

MC	MC+	FC-	FC
Netherlands, Portugal, Sweden, United Kingdom (freight)	Austria, Bulgaria, Czech Republic, Denmark, Finland , France*, Romania*, Switzerland, United Kingdom* (pax)	Germany, Italy, Poland	Estonia*, Hungary, Latvia, Lithuania, Slovenia, Slovakia

*Note: MC – Marginal cost; MC+ – Marginal cost with mark-ups; FC- – Full cost minus State subsidies; FC – Full cost. * Includes a fixed charge (two-part tariff).*
Source: own elaboration with data from ECMT, 2005, p.30

As noted by the RAILCALC Consortium (2008a, pp.174-175), this classification is certainly useful to characterize the theoretical principles followed by the European infrastructure managers, but gathers together very different practices as regards their implementation. After an extensive review, the authors remarked a number of different implementation practices that could be included under the same pricing principle.

In the field of marginal costs, they reported cases of infrastructure managers currently estimating an average marginal cost per gross ton-km through an econometric model and directly transforming it into a basic charge. Other IMs applying this same procedure, performed different cost calculations for passenger and freight services and distinguished the charges accordingly. Other IMs estimated an overall level of marginal costs through cost allocation and then set charges by allocating it to different vehicles depending on their capacity to damage the network. A similar diversity was found with respect to mark-up allocation among different market segments. In the case of full cost or full cost minus subsidies, some IMs distributed full costs according to drivers related to marginal costs (weight of the train, wear and tear on the network, etc.), while others made a simple distinction between fixed and variable costs with low relation to cost causation variables.

3.6 Charging structures

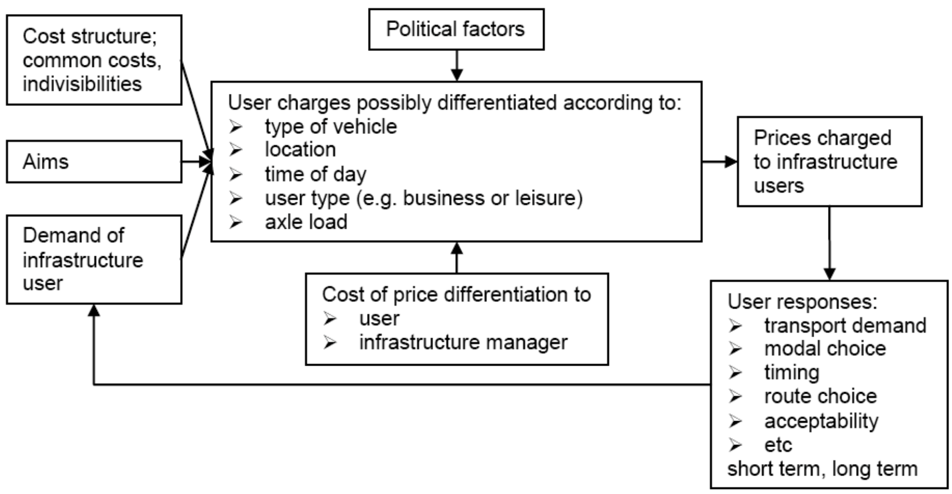
Once defined the principles that will drive the pricing of rail infrastructure towards the selected objectives, they have to be detailed and particularized as regards the relevant costs in the network, the characteristics of the demand or the signals that want to be transmitted to the operation segment. Most of these actions are performed through the differentiation of the prices according to a number of components and variables[25].

By structure this dissertation refers to the components that will be included in the charge, the relation among these components and the parameters used to vary their levels. All these elements come together to differentiate the charge in the market, providing a number of signals to the railway operators as regards, for instance, cost causation, operational conditions in the network, suitable rolling stock to be bought or market segments to be further developed.

3.6.1 Differentiation of charges

The structure of railway infrastructure charges depends on a number of factors, including the cost structure of the infrastructure business, the characteristics of the demand, the aims of the charge (particularly in terms of incentives to the different agents) or the cost of implementing the structure (Fig. 25).

Fig. 25: Analytical framework for the study of price differentiation



Source: DIFFERENT Consortium, 2008, p. 1

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[25] By component this thesis refers to the basic elements of the charge that are related through additive or multiplicative expressions. By variables it refers to the parameters needed to define the values of the components. A railway infrastructure charge that sums up a reserve charge A depending on the time band t and type of service S and an operation charge B depending on the type of line L, could be described as $A(t,S) + B(L)$, where $A()$ and $B()$ are components and t, S and L are variables.

The influence of the cost structure of the railway infrastructure business in the differentiation of the charges generally results from the implementation of cost-based pricing principles (e.g. marginal costs, average costs) that seek to allocate the costs caused in the network to the segments or services causing them. In this case, the level of aggregation of the cost information and the specific knowledge on the most relevant cost drivers will determine the boundaries of the differentiation exercise.

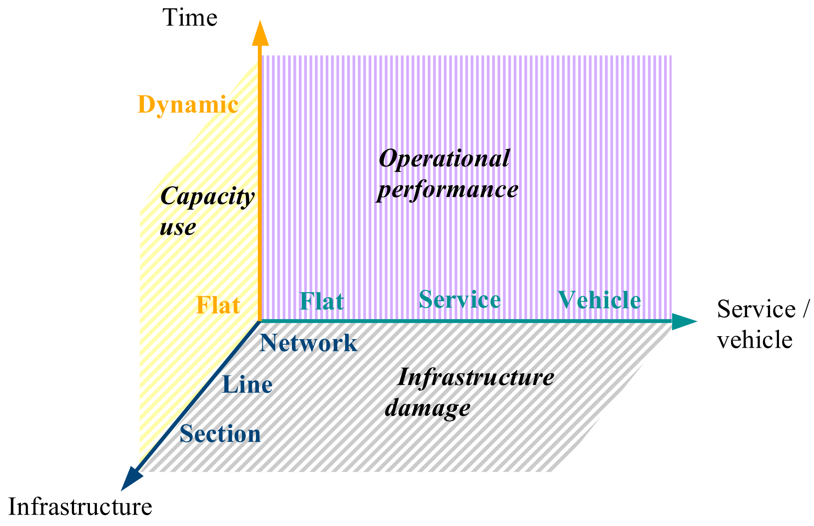
The charging structure may be set as well to reflect different characteristics of the demand with the aim of maximizing the cost recovery reached by the infrastructure manager. In this case the structure of the charge acts as a tool for price discrimination of third degree[26] that proxies the willingness to pay of the transport operating companies through observable characteristics (e.g. the type of goods being transported, the number of seats available, etc.).

The structure of the infrastructure charge also depends on the specific aims set for the charging scheme in terms of incentivization of the different agents and particularly of railway operators. In this case the charging structure is generally modulated to reflect various train operating conditions, including: train speed, wagon mass and volume, train length, train frequency, etc. In general terms, the more relevant incentives allocated to the operation segment are devoted to promote the operational performance of the trains running on the network, to diminish the costs generated by the infrastructure damage and to optimize the use of the existing capacity.

Though it may also include other dimensions of analysis, the transmission of the mentioned incentives requires the consideration of three basic axes of differentiation related to the vehicles running on the network (*service/vehicle axis*), to the infrastructure (*infrastructure axis*) and to the time (*time axis*). These axes have different roles depending on the incentive sought. Accordingly, the differentiation on the service/vehicle and the infrastructure axes is central to the transmission of incentives to reduce infrastructure damage; the differentiation on the service/vehicle and the time axes to incentive operational performance of the trains running on the network; the differentiation on the infrastructure and the time axes to optimize the use of the existing capacity. These relations are graphically represented in Fig. 26.

[26] According to the classification of Pigou (1938), it is possible to distinguish three degrees of discrimination, depending on the ability of the firm to discriminate buyers according to their willingness to pay: 1) *First-degree discrimination* - when consumers pay their maximal willingness to pay for each unit; 2) *Second-degree discrimination* - when the firm is better able to segment the market between different groups of buyers who have different demands; and 3) *Third degree discrimination* - when the firm can only imperfectly compartmentalize consumers according to their willingness to pay. The firm must use characteristics which it can directly monitor.

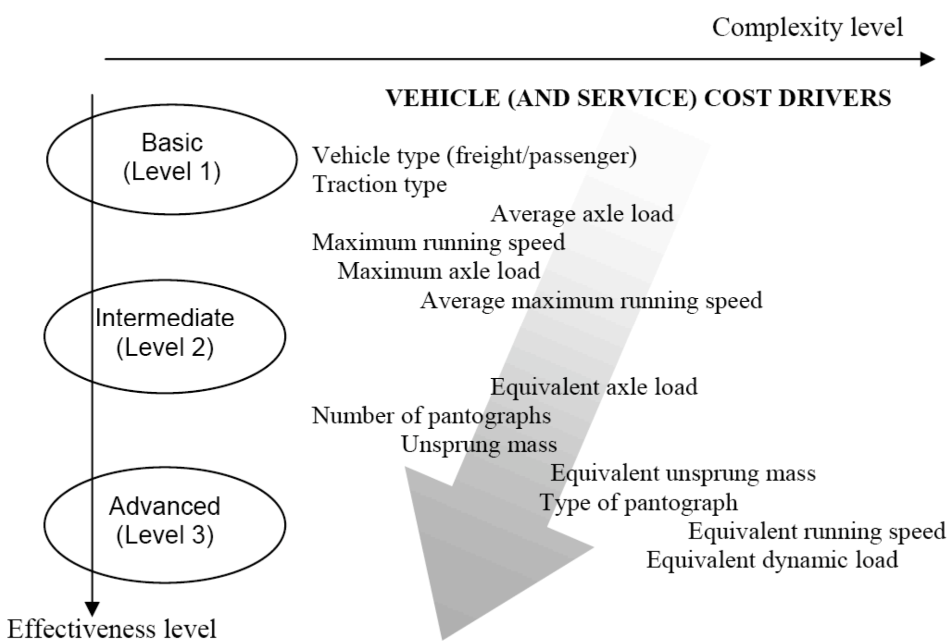
Fig. 26: Basic diferentiation axes and incentives provided to the operation segment



Source: own elaboration

The degree of differentiation achieved in each of the axes – across infrastructure users, over time and spatially – will condition the specific effects of the incentives in the short and the long run. According to the economic rationale, the extent of the differentiation should depend on the additional welfare benefits associated to a better transmission of incentives as compared to the costs of implementing a more sophisticated pricing system.

Fig. 27: Cost driver classification according to complexity and effectiveness levels



Source: Teixeira, 2006, p.15

Together with the consideration of the underlying cost structures and/or the willingness to pay of the demand, the provision of incentives or the degree and dimensions of the differentiation, the design of a charging structure requires to select the variables that will be effectively used to charge the services running on the network.

Usually, the selection of the charging variables results from the consideration of their effectiveness with respect to the aims of the differentiation, their simplicity and their facility to be measured and monitored. Nevertheless, it is often difficult to bring together these characteristics as increases in their effectiveness normally result in greater complexity and costs. An example of this argument can be found in the field of infrastructure costs, where the cost drivers with the greater ability to reflect deterioration increase the complexity of the system (Fig. 27).

3.6.2 Charging structures in the EU

The charging structure applied by each Member State is clearly dependent on the pricing principles and the objectives selected for the whole charging system. Moreover, the EU Law defines the nature of the elements that may form part of the charging schemes, though it does not include any specific provision on the functional relations or the variables to be adopted. Indeed, the Directive 2001/14/EC allows the inclusion of several additional elements in the railway infrastructure charging schemes, over and above the basic charges reflecting marginal infrastructure costs: *mark-ups*, *scarcity charges*, *environmental charges*, *discounts*, *performance regimes* or *reservation charges*.

The recent analysis performed by the RAILCALC Consortium (2008, pp.174-196) reviewed the charging schemes of the national infrastructure managers in the EU-27, identifying and classifying their basic elements. The research remarked the following aspects:

- *Basic charges* usually recovered marginal costs due to operation, variable operation /maintenance /renewal costs or a given percentage of total infrastructure costs. They depended on the type of service, the type of line, the type of network, the vehicle or train characteristics and vehicle variables like speed and weight, etc.
- *Mark-ups* above the marginal cost level are rarely based on pure Ramsey prices because of the need of estimating the elasticities of the demand. In consequence, the major part of charging schemes determines the mark-up in relation to a specific type of costs (i.e. depreciation costs) or a given percentage of the total costs.

- *Reservation charges* were differentiated in pure reservation charges levied before the use of the infrastructure and cancellation charges levied only in case of misuse of capacity. Pure reservation charges were found to be expressed in a wide range of forms: some were levied per train-path and others per train-km and some were intended to recover the administrative costs while others intended to recover part of the infrastructure costs. Cancellation charges are only levied in case of failure to use requested capacity. The amount of this second type of charges is levied according to different variables such as the anteriority of the cancellation to the circulation date, the percentage of volume of traffic requested that is misused, the time period, the number of train-paths, etc.
- *Congestion and scarcity charges*, set to take account of the effects of increasing saturation of infrastructure capacity and ultimately the scarcity of capacity were applied in various Member States.
- *Performance regimes* adopted the form of a bonus/malus charging scheme aimed at encouraging railway undertakings and infrastructure managers to minimise disruption and improve the performance in the railway network. Part of them were based on delay minutes accounting systems linked to economic penalties.
- Few infrastructure managers applied *environmental charges* or subsidies, which were mainly related to emissions and noise.
- Most of the infrastructure managers have introduced *discounts* available under certain circumstances, ranging from time-limited discounts to encourage the development of new rail services to discounts for charitable or nostalgic trains.

When the attention is directed to the specific practice of every Member State, the more remarkable characteristic is, once again, the diversity in the type and number of elements adopted, with a variable number between 1 and 5 (Table 11). Though generally each element corresponds to a component (e.g. a mark-up appears as an independent term in the "charging formula"), it may also be split in more than one component (e.g. a basic charge levied as the sum of an operation charge and a maintenance charge).

As regards the variables adopted in the charging schemes, diversity is also the norm among the schemes applied by the Member States. A study commissioned by the UIC and directed by Prof. López Pita, identified 46 different variables in the structures applied by twenty European national infrastructure managers (CENIT, 2006, p.41).

Table 11: Charging elements applied by national infrastructure managers in the EU-27

	Basic charge	Congestion / Scarcity	Environmental	Mark-up	Discount	Performance Regime	Reservation
Austria	X	X		X		X	
Belgium	X	X			X		X
Bulgaria	X						X
Chipre							
Czech Republic	X		X		X		X
Denmark	X	X		X	X		
Estonia	X	X					X
Finland	X		X	X			
France	X			X		X	X
Germany	X	X			X	X	X
Greece	X	X					
Hungary	X				X	X	X
Ireland							
Italy	X	X			X	X	X
Latvia	X				X		
Lithuania	X						X
Luxemburg	X	X					X
Malta							
Netherlands	X				X	X	
Poland	X				X	X	X
Portugal	X					X	X
Romania	X				X		
Slovakia	X						
Slovenia	X	X			X		X
Spain	X			X			X
Sweden	X		X	X			
United Kingdom	X	X		X		X	

Source: own elaboration with data from RAILCALC Consortium, 2008a, p.193.

In spite of the extreme heterogeneity that this evidence may suggest, most of the variables seek to differentiate similar concepts. These similar concepts constitute the "axes" or "dimensions" of the differentiation applied by the different structures. A further analysis suggested the existence of nine axes among the charging structures of the Member States (Table 12): infrastructure, railway service, rolling stock, operation, traffic, time, capacity allocation process, contractual agreement (between the infrastructure manager and the operator) and geographical areas.

Table 12: Pricing variables applied by national infrastructure managers in the EU-27

Type of variable (axis of differentiation)	Variables
Related to infrastructure	Type of line, Line, Section, Maximum speed of the section, Station category, Switch type, Switch category, Type of facility
Related to railway service	Type of railway service, Type of passenger service
Related to rolling stock	Type of train, Traction unit category, Vehicle class, Length of the train, Technical vehicle speed, Weight of the train, Type of traction, Gauge, Number of pantographs
Related to operation	Delay in departure, Time of use of the infrastructure, Speed deviation, Type of stop at station, Speed, Distance covered, Distance run out of the limit, Type of operation, Type of path
Related to traffic	Traffic volume, Traffic density, Congested sections
Related to time	Period of the day, Period of the week, Time
Related to the capacity allocation process	Time preceding path allocation, Time preceding path use
Related to the contractual agreement	Type of contract, Contract duration, Difference in state agreed
Others	Region/geographical areas

Source: adapted from Fernández Belmonte, Teixeira and López Pita, 2007, p.5

3.7 Charging levels

The complex chain of steps intervening in the setting of railway infrastructure charges - i.e. the overall regulation of the infrastructure manager, the price regulation mechanisms, the definition of the objectives and principles that should drive the pricing tool or the design of the structure – finds its final form in a set of components and variables (the charging structure) and levels. They are the only elements published in the network statement and thus directly perceived by the railway operators.

Moreover, they are the driving force of the charging scheme, and the major leverage on the operation segment. This fact was clearly exemplified in a position paper of the Community of European Railways and Infrastructure Managers (CER, 2005, pp.5-6) that referred the complaints of the international freight operators as "*Is structure the problem? [...]It's the level of charges*".

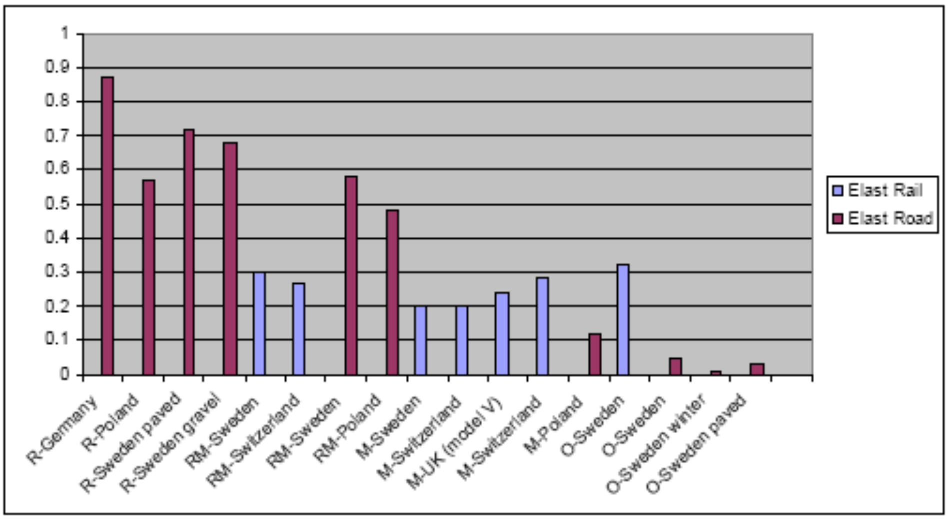
The characterization of the charging levels may adopt different forms. It is possible to examine the average level of a charging scheme (e.g. in terms of average charge or in terms of cost recovery), the level applied to some standard services (e.g. a standard freight train or a standard high speed train), the overall range of variation of the levels within the scheme (e.g. minimum and maximum unitary levels) or their specific variability with respect to the parameters included in the charge (e.g. relative variation of the unitary level with the type of service).

3.7.1 Definition of charging levels

The definition of the charging levels applied in the infrastructure network basically depends on the existence of price regulation mechanisms and the pricing principles adopted. Furthermore the allocation of prices to the different services requires an adequate coordination with the components and variables selected for the charge.

As mentioned in section 3.4, the application of indirect price regulation mechanisms on the infrastructure manager may set strict boundaries to the average level of track access charges, in the direct form of price caps or through limitations in the rate of return or the revenues allowed to it.

Fig. 28: Cost elasticity with respect to traffic for various road and rail case studies



Note: Blue columns refer to rail case studies, purple columns to road case studies; O-Operation costs; M-Maintenance costs; R- Renewal costs; RM-Renewal and Maintenance costs.
Source: GRACE Consortium, 2006, p.20

The selection of a given pricing principle establishes the fundamental relation of the charging levels to costs or demand, influencing both, the methodologies to define the price and the level itself. If the selected principle is based on marginal costs, the levels will be limited by the cost basis selected (maintenance cost only, maintenance and renewal costs, external costs, etc.) and they will be expected to achieve a low cost recovery. According to the more recent case studies performed by the GRACE Consortium, they will generally be below the 30% of the total operation, maintenance or renewal costs considered (Fig. 28). If the selected principle is based on average costs, the level of the charge will be defined by the level of total costs born by the infrastructure manager. If the selected approach is a full cost minus State subsidies, then the level will depend on both, total costs and the availability of public funding.

The procedures to define the charging levels may be less clear in those cases where the willingness to pay of the demand is involved, mainly because of information asymmetry and the deferred nature in time of the economic decisions of the operating company (e.g. buying new rolling stock).

Finally, the coordination between the level and the structure of the charging scheme is particularly relevant in order to reflect variations in the underlying demand and costs, but also to ensure the effectiveness of the incentives embedded in it (i.e. the intensity of the signals transmitted to the operators). Several considerations may be taken into account at this stage, particularly the achievement of an average level or the avoidance of cross subsidization between services, geographical zones, types of infrastructure, etc.

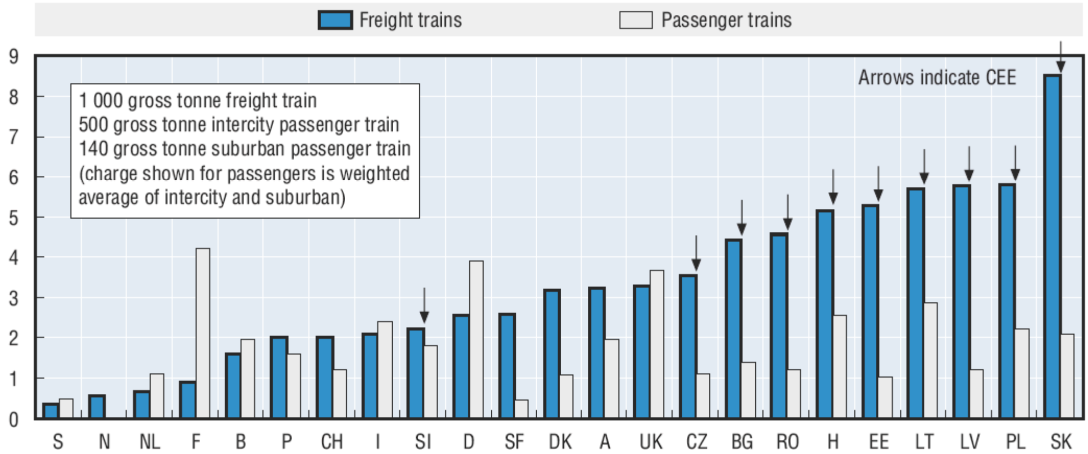
3.7.2 Charging levels in the EU

To complete this overview on the track access charges in the EU, something should be said on their economic influence in the railway transport production system. Few quantitative references exist in the literature about the weight that track access charges have on the competitiveness of railway undertakings. According to Scherp (2002, p.2) track access charges can represent up to 30 or 35% of the total production cost of rail freight services and therefore they are an important item in the competitiveness of railway undertakings. The final report of the Task Force on Track Access Charges set up by the European Commission (2005b, p.2) stated that infrastructure charges account for a significant part of the cost of a railway operator, and pointed out that rail freight operators pass on 5% to 25% of their revenues to the infrastructure managers.

When charging levels are observed for every Member State, it is possible to identify relevant differences among them. Some countries had set up relatively high infrastructure charges, while others had deliberately set them at a low level. These differences in charging levels in the EU have been analyzed by several studies in the recent years, though with different finalities in mind.

The ECMT studied the charges levied on average freight and passenger trains in order to assess the differences arising between Member States' charging levels (Fig. 29). They highlighted the dispersion of current charging levels across the Member States, and pointed out that in some regions, like in parts of Western Europe and in the Baltic States there is little sign that the current level of charges has a significant negative effect on market development.

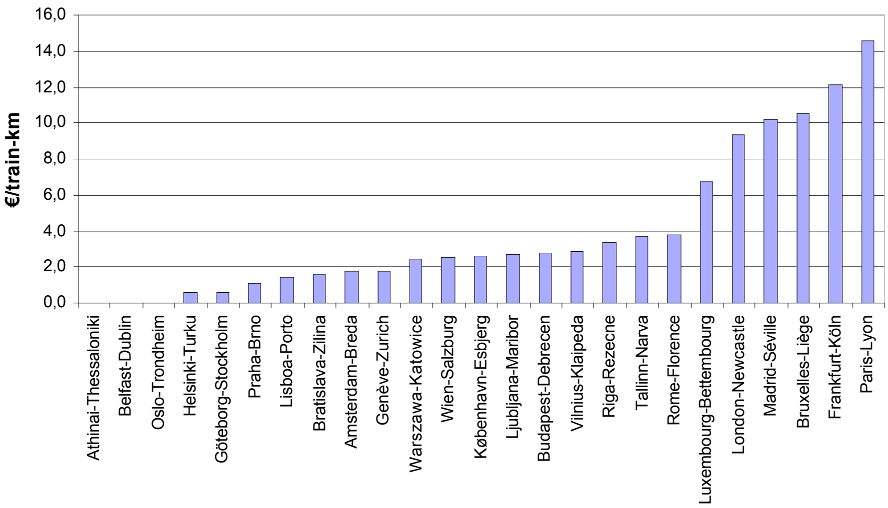
Fig. 29: Average access charges in selected European countries. 2004



Note: Figures in €/train-km, excluding cost of electric traction; CEE- Central Eastern Europe; S-Sweden; N-Norway; NL-Netherlands; F-France; B-Belgium; P-Portugal; CH-Switzerland; I-Italy; SI-Slovenia; D-Germany; SF-Finland; DK-Denmark; A-Austria; UK-United Kingdom; CZ-Czech Republic; BG-Bulgaria; RO-Romania; H-Hungary; EE-Estonia; LT-Lithuania; LV-Latvia; PL-Poland; SK-Slovakia.
Source: ECMT, 2005, p.40

The UIC promoted a study, aimed at determining the effect that track access charges could have in the development of high speed services at European level. Within it, a number of national and international high speed relations (or with the potential to become such) were identified and the average value of track access charges calculated for each of them. The results obtained for the national relations showed again a great dispersion in the levels applied throughout the EU (Fig. 30).

Fig. 30: Average access charges levied on selected European high speed relations. 2006



Source: CENIT, 2006, p.61

The study found out that track access charges range from 25% to 40% of the revenues for links using new high speed infrastructures and concluded that, with such a weight in the operating expenses, the infrastructure charges play a key role in the high speed rail economy (CENIT, 2006, p.7). The same study was updated one year later with the aim of observing the variations in the levels of the charges. The authors concluded that the level of track access charges presented a general trend to increase within the EU-27 (CENIT, 2007, p.14).

3.8 Conceptualization of pricing policies

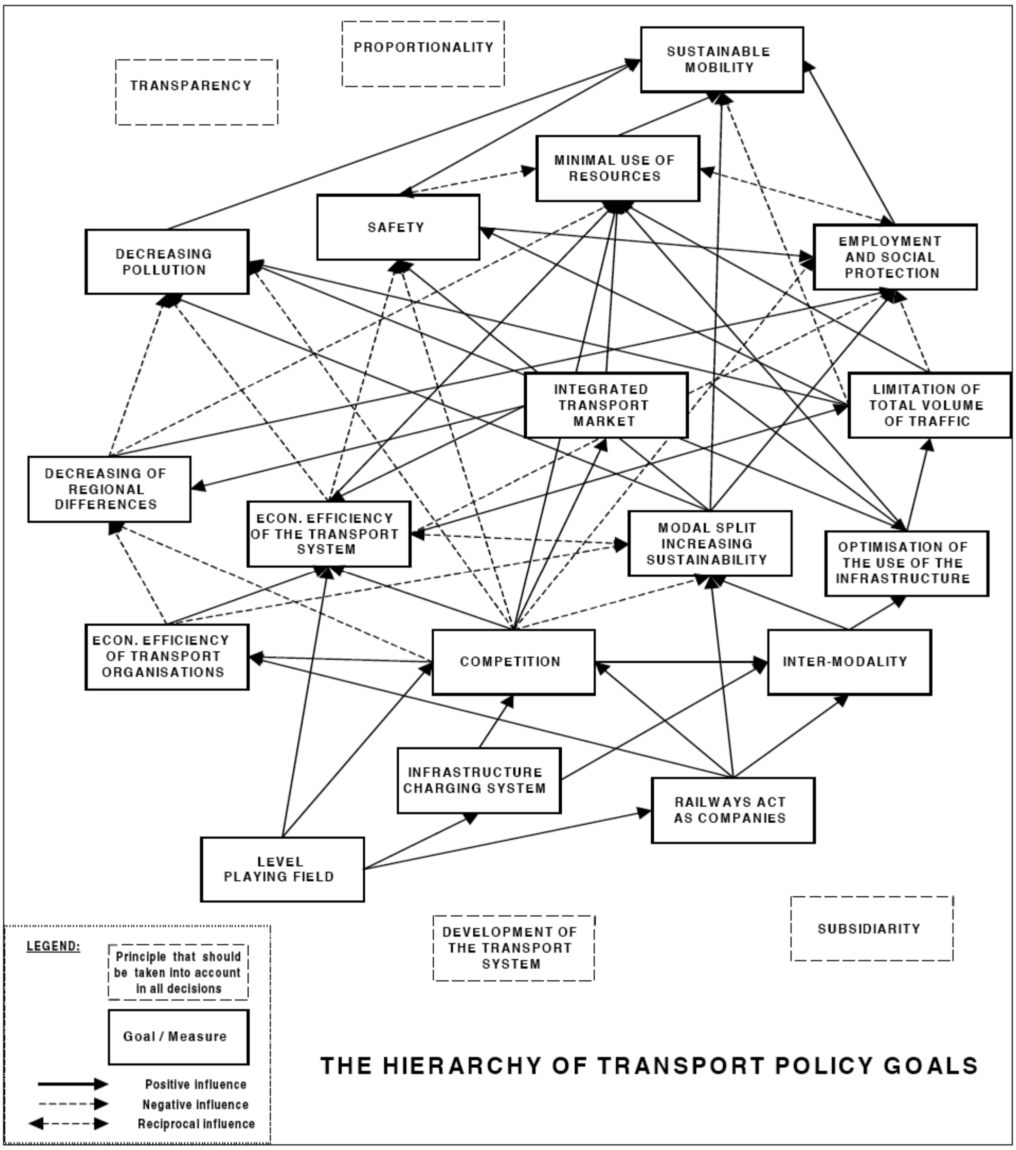
The multiplicity of decisions involved in the selection, definition and implementation of a charging scheme for the use of railway infrastructure, the strong interrelation between such decisions and other important fields of action (e.g. transport operation, use of public funding, environment, etc.) or their widespread effects on a number of institutions, actors and society at large, convert pricing in a political decision. This view is further reinforced by the existence of government's specific objectives for railways, which often require a departure from commercial pricing and decision-making as proposed by the economic theory.

The political nature of track access pricing has been openly recognized by the EU, who has seen it as a key element within the overall transport pricing policies fostered in the recent years (e.g. by publishing a White Paper and several directives or by promoting research). According to Schade and Doll (2006, p.317) "*Transport pricing constitutes one of the basic transport policies of the European Commission emphasized first with regard to fair payment of transport infrastructure and more recently adding the objective of internalization of external environmental and social cost of transport. However, a large variety of options exist to introduce transport pricing and to make reasonable use of the revenues that are generated by such pricing policies.*"

Three particularities are characteristics of pricing policies: 1) The widespread nature of their effects across the transport system; 2) Their strong interrelation with other policies (e.g. investment or market regulation policies); and 3) The indefinitions that result from these strong interrelations.

The widespread nature of its effects mainly results from its central role in the transport markets as well as from its function as instrument for the consecution of a wide number of objectives (Fig. 31). Its relevance for the introduction of competition in the rail sector has indirect effects on the efficiency of the transport system, the efficiency of transport operators, the modal share of rail, the development of a better use of the infrastructure, the environmental performance of transport or the employment and social protection policies.

Fig. 31: Hierarchy of transport policy goals in the EU



Source: Barlünd, 2000, p.24

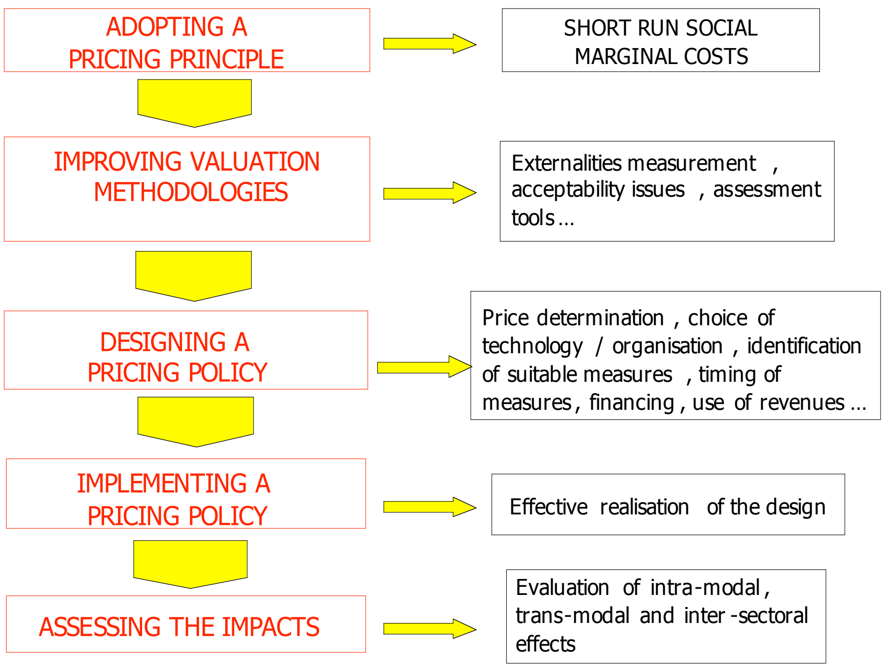
Paradoxically, pricing policies alone may have a reduced effect in the solution of specific problems detected by the infrastructure managers, as they generally need to be packaged with other policies and measures in the fields of transport regulation, revenues use, investment in infrastructure, etc. In fact, as noted by NERA et al. (1998, p.2 and p.77), "*it is important to recognise the limits of what can be achieved purely through the charging framework. Even though the correct price signals and incentives may be provided, there may be no guarantee that firms will respond appropriately*". For instance, "*it is very unlikely that the charging framework alone can provide sufficiently accurate investment incentives"*. This necessary interaction with other fields close to the pricing activity, has favoured the existence of some blurry areas as regards the elements that form part of the pricing policy and those which do not.

An example of this fact may be provided by the relation between regulation and pricing. While structural levels of regulation, as the vertical separation enforced in the rail sector, are clearly outside of the scope of pricing policy the more specific ones are no so easily distincted. This fuzziness is a frequent situation between economic-incentive price regulation and pricing principles, which may end in contradictory relations (e.g. a revenue cap and a cost based pricing principle). Another example may be provided by the need of setting priority rules in the access to railway infrastructure as a necessary complement of track access charges to guarantee non discrimination of operators under situations of scarcity.

Several conceptualizations of railway infrastructure pricing policies may be found in the literature. They basically agree in the key aspects that should be included in the infrastructure pricing policy and in the main steps of the decision-making process.

The MC-ICAM Consortium (2004, pp.6-7) identified five dimensions in pricing policies, notably: 1) *The scope and coverage of the pricing system*; 2*) The level and composition of pricing measures*; 3) *The degree of differentiation*; 4) *The use of revenues*; and 5) *Supplementary measures and actions* (including investment, non-price regulation issues and information provision services). As regards the decision-making dynamic, the MC-ICAM Consortium did not identify a number of clear-cut steps, but approached the implementation of pricing policies as a phased-in process in each of the dimensions.

Fig. 32: Basic steps of pricing policy according to Ricci et al. (2001)



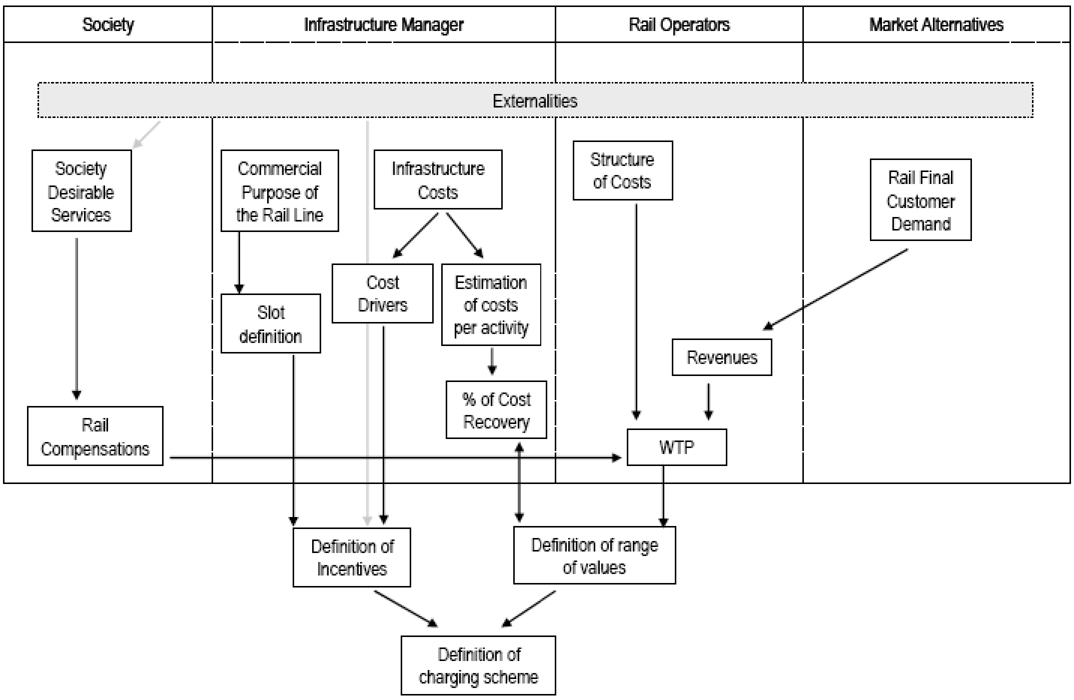
Source: Ricci et al. 2001, p.4

Ricci et al. (2001, p.4) included similar aspects in the concept of pricing policy, notably *pricing principles*, *price determination* and *use of revenues*, but also aspects related to the physical implementation of charging systems, like choice of technology or financing. They proposed a decision-making process related to pricing policies in urban transport, in which they distinguished four basic steps (adopting, designing, implementing and assessing) complemented by a specific focus on valuation methodologies (Fig. 32).

Other researchers have concentrated their attention on the particular decisions regarding the establishment of charging schemes. Their analysis is thus centred in what could be named the *charge setting procedure*, leaving outside other considerations as the revenue use or the physical implementation and financing of the charging system itself (information systems, invoicing, etc.).

Lopes (2008, p.116) examined the more relevant influences on the determination of a charging scheme and brought them together in a complex map (Fig. 33). She distinguished four categories of actors (society, rail transport users, infrastructure managers and rail operators) that interacted through cost-driven and demand-driven relevant aspects. The result of their interaction defined the final form of the charging scheme.

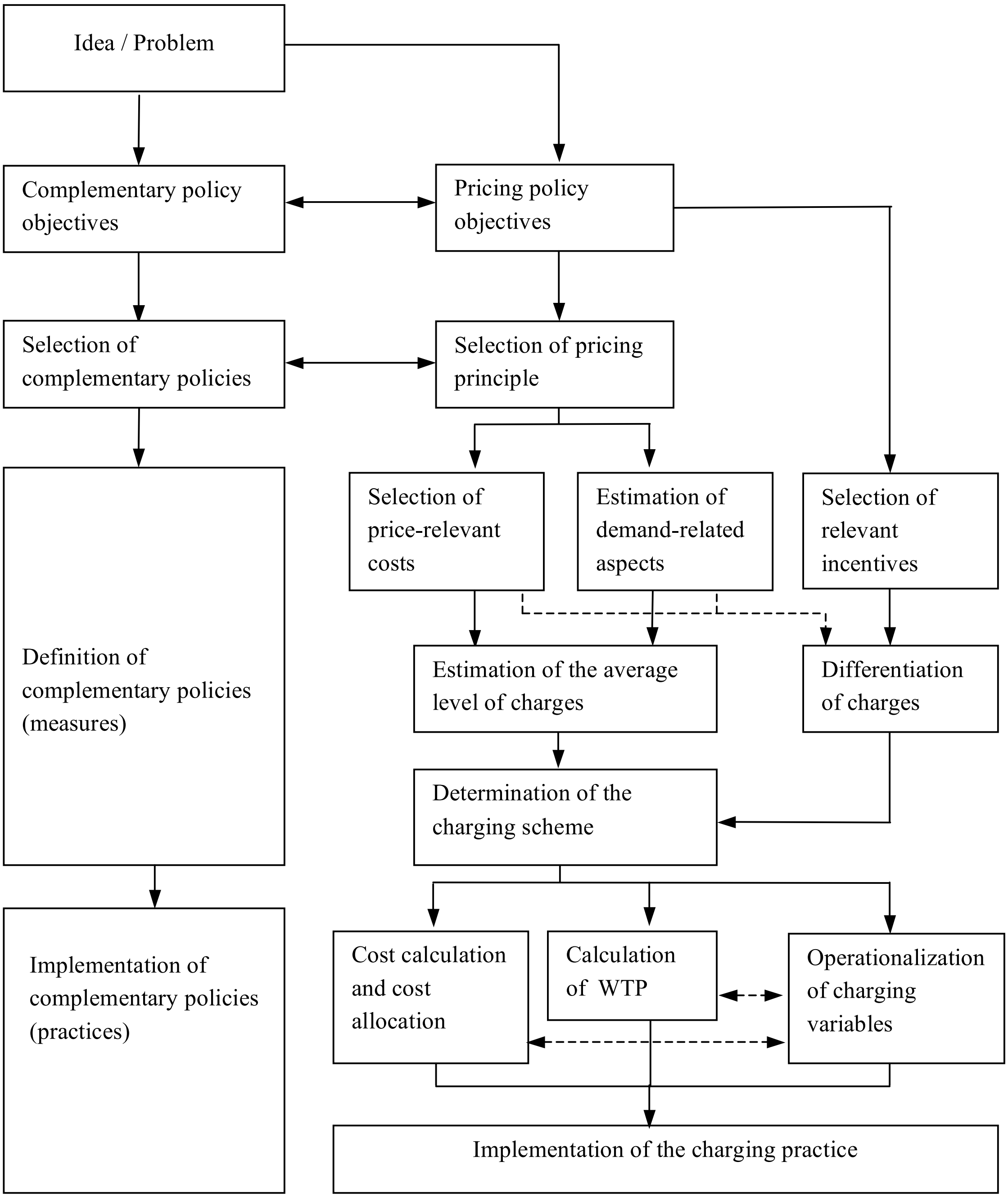
Fig. 33: Influences on the establishment of a charging scheme according to Lopes (2008)



Note: WTP – Willingness to pay.
Source: Lopes, 2008, p.116

Building on the mentioned sources on pricing policies and on the contents previously developed in sections 3.5, 3.6 and 3.7, this thesis proposes a scheme reflecting the main interactions between pricing objectives, principles, structures, levels and final implementation (Fig. 34). This scheme may also be interpreted as a conceptualization of the essential steps involved in the charge setting activity.

Fig. 34: Proposed scheme for pricing policies



Note: WTP – Willingness to pay
Source: own elaboration

The scheme takes its origin from an initial idea or problem that can be treated through the implementation of a pricing policy. From this initial point two different but related flows are developed: one focused on the definition of the pricing policy itself and the other aimed at defining the complementary policies that will side it.

The first flow starts by defining the objectives that must be fulfilled by the pricing policy in order to provide a satisfactory solution to the problem posed (e.g. cost recovery or social welfare). Depending on these objectives, policy-makers will select a *pricing principle* to be implemented (e.g. short run marginal cost pricing principle) and the relevant incentives desired for the final charge (e.g. reduction in the damage produced by heavy freight trains to the infrastructure).

The principle selected will in turn condition the approach to demand (definition of market segments) and costs (definition of costs to be included in the charge). The approaches chosen to costs and demand will influence the estimation of the average level of charges and, together with the selected incentives, their differentiation through components and variables. The combination of the average level of charges and the differentiation will determine the final *charging scheme*.

The implementation of the charging scheme will result from the interaction between the operationalization of the charging variables (its values and thresholds) and the specific methodologies adopted for calculating and allocating costs and/or for estimating the willingness to pay of the demand. The final outcome will be the *charging practice*, already able to be launched in the market.

The second flow reduces the steps involved in the determination of complementary policies to the formulation of objectives, the choice of the adequate policies and their definition. Finally, the pricing policy and the complementary policies are implemented.

The proposed scheme assumes a top-down interaction between the elements considered that is rather deterministic in its expression and that has been built on theoretical grounds. Though these characteristics may certainly limit its ability to explain a particular process of pricing policy definition in reality, they also provide a conceptualization able to bring together the basic “blocks” found in the theory. It is following this second quality and keeping in mind the first limitation, that this scheme will be used to operationalize the decision-making processes linked to pricing policies in chapter 5.

3.9 Synthesis

The setting of railway infrastructure charges involves a number of *interrelated decisions*, fundamentally concerning the selection of a pricing principle able to fulfil the objectives sought, the design of a charging structure able to transmit the appropriate signals to the market and the calculation of the charging levels finally levied to the operators.

The *pricing principles* are the foundations of the whole charging system, as they translate the wanted objectives into a limited number of guidelines. However, their selection is not an easy task, as none of the alternatives provided by the economic theory seems able to accomplish all the objectives desirable for the charge at the same time (e.g. social welfare, cost recovery, optimal investment in the network, encouragement of productivity gains, etc.). Their selection is thus linked to the specific political and regulatory objectives set for a given railway infrastructure market. The *charging structures* are responsible for the differentiation of prices in the market and the transmission of incentives to the various agents acting within it. Furthermore, its components and variables reflect specific market segmentation and reveal a particular allocation of costs to services. Together with the structure, the *charging levels* are responsible for the final form that the charge will have in the market. Their determination basically depends on the price regulation mechanisms and the pricing principles adopted, as well as on the adequate coordination with the components and variables selected for the charge.

Moreover, the centrality of infrastructure charges in the vertically restructured railway markets, makes them sensitive to a *full array of economic and political factors*, that intervene in their definition through a complex chain including the objectives set for the railway sector, the structure of the infrastructure market (i.e. type of competition, separation or ownership adopted), the regulatory regime enforced (i.e. direct, indirect or mixed regulation), the price regulation mechanisms (e.g. direct setting, revenue cap, price cap, etc.), the pricing objectives and principles (e.g. marginal costs, average costs, etc.), the charging structure, the charging levels or their final implementation in the market.

When observed for the European scenario, the whole of these factors reflects the opposed effects of *integration and differentiation dynamics*, the first ones introduced by the legislative efforts of the EU railway reform and the second ones derived from the inertia of the national railway systems and the predominance of domestic interests. On the one hand, the EU legislation has established the fundamental structure of railway infrastructure markets and determined the essential approach to their regulation, through the setting of access charges and priority rules at the interface with operators and the constitution of regulatory bodies able to supervise their application. It has set as well the pricing principles and the basic elements allowed in the charge. On the other hand, the inherited technical and operational characteristics of the national rail networks, the inertia of the existing institutional arrangements or the ambiguity embedded in the common regulations have favoured the customization of the structural and regulatory characteristics of railway markets and the implementation of tailored infrastructure charges. The result so far is a great dispersion among price regulation provisions, pricing principles, charging structures, and charging levels applied throughout the EU-27.

The multiplicity of decisions involved in the selection, definition and implementation of a charging practice for the use of railway infrastructure, the strong interrelation that can be observed between such decisions and other important fields of action (e.g. transport operation, use of public funding, environment, etc.) or their widespread effects on a number of institutions, actors and society at large, suggests that *railway infrastructure pricing may be conceptualized as political decision*. This approach seems to be justified as well by the general analysis performed on railway infrastructure pricing in Europe. Building on this evidence, this thesis has proposed a conceptualization of pricing policies able to bring together the basic "blocks" found in the theory.

Chapter 4

THE NOTION OF TRANSFERABILITY

4.1 Introduction

In the last decades, changes in economy and society have led to increasing complexity and challenged the ability of governments to promote and implement their policies. The rising level of interdependence of the political decisions, the movement towards regional integration into wider political areas or the intensification of cross-national relations are clear manifestations of this new environment in which states and national institutions seek their way forward. Private companies have been involved in similar trends and today compete in more and more globalized and customized markets.

This evolution has also offered new opportunities to both sectors. Governments have found an increasing availability of national experiences and the occasion for policy coordination, harmonization and transfer. Companies have found new sources of learning in the practices and processes of competitors and have took advantage of them in their innovation processes. New possibilities for learning, improving and transferring policies and practices have arisen.

Accordingly, it has been necessary to develop a set of concepts, tools and methodologies to guide and improve the exchange of knowledge across institutions and its application in new environments and contexts. Two distinct disciplines have undertaken this task, developing theoretical and applied approaches to the notions of transfer and transferability: comparative politics and management science. The first one has been focused on the definition of concepts such as policy transfer, policy diffusion or convergence. The second one has been concerned with the practical transfer of successful experiences between private entities.

As explained in section 1.3, the proposition of a conceptual framework for the assessment of transferability is intended to be consistent with the findings and notions elaborated by the current scientific knowledge. For that reason, the scope of this chapter is to explore and review the notion of transfer as it has been developed in other disciplines, notably in comparative politics and management science, in order to provide a sound theoretical background for the conceptual framework proposed.

Section 4.2 provides a short overview of the considerations underlying the decision of engaging in a transfer process; Section 4.3 examines the conceptualization and development of the notion of transfer performed in the field of comparative politics; Section 4.4 explores the development of benchmarking techniques in the field of management science; Section 4.5 proposes a conceptual relation between both literatures; Section 4.6 presents a synthesis of the chapter.

4.2 Looking outside

Previously to the review of the basic literatures concerned with the notion of transfer, this section seeks to provide some answers to a previous but fundamental question: Why have some disciplines focused their attention on transfer?

A first reason, purely theoretical, seems to have arisen from the evidence of strong similarities in policy across regions, which suggested the existence of transfers able to provoke a similar effect. Such finding called soon the attention of political scientists, who tried to explain the dynamics behind the convergence. This argument, referred to as the *convergence problem*, has been expressed by Bennett (1991, p.215) as "*the theoretical concern about convergence arises from the observation by specialists in comparative politics that industrialized states face similar problems and have a tendency to solve them in a similar way*".

A second reason, purely practical, could have come in the form of the wheel argument, which states that it is possible to learn from the experience of others without having to "reinvent the wheel". Hence, transfer is nothing more than a practical solution to local problems and the attention of researchers should mainly be focused on the question of how to transfer. This reasoning is aligned with the observed practice in policy-making, which in many cases relies on the experience of others as a source for policies. In the words of Patel (2006, p.35): "*It is widely accepted that the starting point for many innovations is a process of drawing on the experiences of others. Public service institutions tend to find an innovation and look at how it can be transferred*".

A third reason, underscored in the introduction to this chapter, may be found in the increasing number of available experiences as a result of the rapid growth in communications of all types since the Second World War (Dolowitz and Marsh, 1996, p.343). This trend has gone further, resulting in the development of transnational networks that operate between governmental and non governmental international organizations, establishing a global discourse against which decisions are taken (Deacon, 1997, p.60). On the economic perspective, the globalization trends have interconnected the activity of companies all around the world, enhancing the ability of transnational companies and institutions to transfer and diffuse managerial perspectives and approaches.

A fourth reason, related to the previous one, that explains the interest of researchers on the transfer process, regards the increase in the number of transfers itself. Dolowitz (2000, p.2) argues that, "*not surprisingly, the increase in the occurrence of policy transfer has led to an increased interest in the process. Certainly, as transfer is increasingly a feature of policy-making, it is important that the process be better understood*".

These reasons, and probably others, have awaken the interest for ***looking outside*** in search of new policies and practices, as well as the interest for studying the conditions under which their transfer could be carried out.

4.3 Comparative politics

4.3.1 Conceptual literature on policy transfer

Comparative politics is a branch of the political science that involves the systematic study and comparison of the world's political systems through the application of the comparative method. It seeks to explain the way in which different governments respond to a common problem, with particular attention to the differences and similarities existing between them.

Ethridge (1990, p.225) defined comparative politics as "*the cross-national study of political structures and behaviours*"; Rose (1991, p.446) further remarked "*the focus is explicitly or implicitly upon more than one country, thus following familiar political science usage in excluding within-nation comparison. Methodologically, comparison is distinguished by its use of concepts that are applicable in more than one country*".

Methodological considerations are central to this subfield of research, which defends the use of the comparative method in those cases where either experimental or statistical analysis are deemed unfeasible, which is the normal situation that arises when focusing on national States as the object of the research. This view is shared by Pennings et al. (1999, p.33), who stated that the comparative method is required in situations in which there is no possible recourse to experimental techniques or when the number of observations does not allow for the use of statistical techniques that are based on comparable cases.

The focus on methodological issues has allowed comparative politics to cover a broad range of topics and studies. Among them, attention has also been directed to *policy transfer* studies, which were originally developed in the US as a means to explain the adoption of policy and spread of diffusion throughout their federal system. Since then, and over the last twenty years, a rapidly growing literature has emerged on policy transfer and lesson-learning.

The interest of political science in this area has been to improve the understanding of policy transfer and its causes, through the clear definition of the concepts and its operationalization through appropriate frameworks. It has been however a rather contested field of knowledge and there is a widespread opinion that "*the scientific treatment of this issue is recent and to some extent is still in the process of proposing hypotheses*" (Conde Martínez, 2006, p.99).

What follows is a short insight in the conceptual literature on policy transfer.

4.3.2 Definition of transfer-related concepts

4.3.2.1 Policy transfer

The main proponents of the concept in recent times have been David Dolowitz and David Marsh, who in 1996 defined *policy transfer* as

> "*A multidimensional concept involving a process in which knowledge about policies, administrative arrangements, institutions, etc., in one time and/or place is used in the development of policies, administrative arrangements, and institutions in another time and/or place*" (Dolowitz and Marsh, 1996, p.344).

Though ambiguous in its "multidimensional nature", their definition already contained all the basic elements that are still identifying the concept: its dynamic character (it involves a process), its spatial and temporal dimensions (it involves two different realities separated by time and/or space) and its multi-level nature (it may involve policies, administrative arrangements and institutions). The concept refers to "knowledge" but from an applied perspective, as a needed condition for policy transfer is that this "knowledge" is "used" (i.e. put into practice).

The authors added more precision to their initial explanation through a second definition, much cited, which clearly identified policy transfer as a process and the realities involved within it as "political settings". The scope of the policy transfer was also extended to the "ideas" used in these "political settings".

> "*Policy transfer is a process in which knowledge about policies, administrative arrangements, institutions and ideas in one political setting (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political setting*" [27] (Dolowitz and Marsh, 2000, p.5).

Building on this definition, Dolowitz and Marsh developed the concept in four distincted areas: 1) they analyzed the growth of policy transfer; 2) they proposed a framework for the analysis of transfer; 3) they suggested a continuum for distinguishing between different types of policy transfer; and 4) they explored the relation between policy transfer and policy failure.

These developments, as well as their contribution to characterize more accurately the concept, have been the starting point for a contested and ongoing debate aimed at defining the boundaries between policy transfer and other concepts belonging to the same *semantic field* (i.e. policy change). The more relevant among them being *policy learning*, *policy convergence* and *policy diffusion*.

4.3.2.2 Policy learning

The *policy learning* concept was first proposed by Richard Rose. He first defined a "policy lesson" as

> "*A detailed cause-and-effect description of a set of actions that government can consider in the light of experience elsewhere, including a prospective evaluation of whether what is done elsewhere could someday become effective here*" (Rose, 1993, p.27).

Consequently with the nature of the "*policy lessons*", he then described the process of lesson-drawing, which included four analytically distinct stages: 1) *Searching experience* about programs that have been introduced elsewhere to deal with a similar problem; 2) *Making a model*, that is a conceptual model of how programs deal with a specific problem; 3) *Creating a lesson*, which means to design a program for adoption in the importer jurisdiction; and 4) *Prospective evaluation* across time and space, needed to estimate the consequences of adopting the lesson.

The author also enumerated the alternative ways of drawing a lesson, distinguishing *copying* (complete duplication of the experience obtained from another jurisdiction),

[27] A slightely different definition was also provided by Dolowitz in 2000: "*A process in which knowledge about policies, institutions and ideas developed in one time or place is used in the development of policies, institutions etc. in another time or place*" (Dolowitz et al. 2000, p.3). Three years later, the same author defined policy transfer as "*The process by which the policies and/or practices of one political system are fed into and utilized in the policy-making arena of another political system*" (Dolowitz, 2003, p.101).

adaptation (adjustment of the previous experience for contextual differences), *hybridization* (combination of elements from the importer and exporter jurisdictions), *synthesis* (combination of familiar elements from experiences in other jurisdictions to create a new one) and *inspiration* (use of experiences in other jurisdictions as an intellectual stimulus to develop a new one) (Rose, 1993, pp.27-34).

As defined, the "*policy learning*" and the "*policy transfer*" concepts have several points in common: both of them refer to a knowledge already experienced that travels between two different realities and is implemented in the recipient one. Maybe a first distinction arises from the fact that "*policy learning*" does not make explicit the temporal dimension present in the "*policy transfer*" and focuses directly on the spatial dimension (i.e. importer jurisdictions and elsewhere-located exporter jurisdictions).

The potential overlap and the semantic distinction between both concepts have been studied by several authors. Edward Page (2000, p.2) noticed that the emphasis of policy transfer has tended to be on understanding the process by which policies and practices move from exporter to importer jurisdictions, while the emphasis of lesson-drawing has tended to be on understanding the conditions under which policies or practices operate in exporter jurisdictions and whether and how could they work in a similar way in importer jurisdictions.

Diane Stone (2001, p.8) remarked that though both terms refer to dynamics in which knowledge is used across time or space in the development of policies, administrative arrangements and institutions, the emphasis of policy transfer is on understanding the process by which policies and practices move from exporter to importer while the lesson drawing concept is focused in using cross national experience as a source for policy-making.

4.3.2.3 Policy convergence

The *policy convergence* concept has been studied by Colin Bennet, who building on the previous comparative politics literature, noticed that countries with similar contexts and similar problems have a tendency to address them in similar ways. According to the author this similarity can be observed in different policy elements (political goals, policy instruments or policy styles, for instance).

Bennet (1991, pp.217-220) suggested as well four possible causes for policy convergence: *emulation* (importation of ideas or policies from other models or jurisdictions which are perceived as leaders in policy innovation), *elite networking*[28]

[28] Also referred to as "dissemination" (see Conde Martínez, 2006, p.101) or "transnational policy communities" (see Stone, 2001, p.7).

(sharing of knowledge and formation of common patterns of understanding within transnational networks of experts and professionals), *harmonization* (requires the authoritative action of supranational institutions – e.g. the EU) and *penetration* (implies the coercion by an external agent).

After Bennett's pioneer work, there has been an intense debate about the relation existing between policy convergence and the different mechanisms of policy transfer. While some authors see convergence as the intrinsic result of policy transfer (Conde Martínez, 2006, p.100), others consider it the consequence of broader-scope transfer resulting from structural forces like industrialization, globalization or regionalization (Stone, 2001, p.6) or the effect of parallel domestic pressures without any participation of transfer mechanisms (Hoberg, 2001, p.127).

This multiplicity of viewpoints has even led to new definitions of the concept mostly focused on the effect and not on its causes, as the one provided by Christoph Knill (2005, p.768), who after a thorough review of the previous literature defined convergence as "*any increase in the similarity between one or more characteristics of a certain policy across a given set of political jurisdictions over a given period of time*".

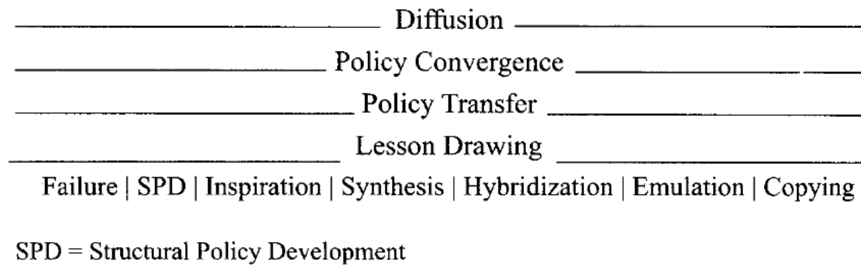
Moreover, the author clearly remarked the differences between policy convergence – *"the end result of a process of policy change*" - and policy transfer - "*a process that might, but need not, lead to cross-national policy convergence*" (Knill, 2005, pp.766-768).

4.3.2.4 Policy diffusion

The conception of *policy diffusion* is twofold. On the one hand, the concept describes the "*patterns according to which policies spread and the geographic and structural characteristics of countries which might explain them*" (Freeman and Tester, 1996 quoted by Stone). On the other hand, diffusion refers to a particular mechanism of policy transfer involving the transmission of knowledge over a long period of time, producing incremental changes in the recipient jurisdiction. Bennett (1991, p.220) suggested that diffusion refers to similar adoptions of policy without evidence of emulation, while Rogers (1995, p.13) highlighted the mediation role played by society in policy diffusion through communication and influence processes.

Newmark (2002, p.152) noted that "*diffusion research focuses on how innovations, policies, or programs spread from one government entity to another*", while policy transfer "*typically involves cases in which one nation or government imports knowledge of policies or programs that exist abroad*". He also proposed a theoretical continuum upon which varying degrees of policy diffusion occur (Fig. 35).

Fig. 35: Diffusion continuum, as proposed by Newmark (2002)



Source: Newmark, 2002, p.171

4.3.2.5 Concept discussion

As a result of the ongoing semantic debate, several authors have summed up their efforts in clarifying the concepts involved with the declared purposes of connecting their respective literatures and setting a sound basis for further empirical developments.

A first attempt was already performed by Dolowitz and Marsh (2000, p.13) through their "*policy transfer continuum*", which placed lesson-drawing as a voluntary and rational type of policy transfer (see Fig. 37).

Stone reviewed the literature in the light of a hypothetical link between the concepts of policy transfer, policy learning, policy convergence and policy diffusion. She suggested that policy learning is a voluntary process that may or may not end in policy transfer. Policy transfer, in turn, may refer to both coercive and voluntarily processes. She also remarked that policy transfer could be a causal factor in convergence, although convergence can result from other factors. These differences in meaning led the author to conclude that, in spite of a considerable overlap, these terms are not interchangeable (Stone, 2001, pp.6-14).

Drezner, while studying the relationship between policy convergence and globalization noticed that "*while diffusion and transfer are concerned with process patterns, convergence studies place a particular emphasis on effects*" (Drezner, 2001).

As it has been seen before, Knill focused its attention in clarifying the analytical relationship between policy convergence and the related concepts of policy transfer and policy diffusion. He concluded that "*convergence studies typically seek to explain changes in policy similarity over time. By contrast, transfer studies investigate the content and process of policy transfer as the dependent variable, while the focus of diffusion research is on the explanation of adoption patterns over time*" (Knill, 2005, p. 767). He summarized his view through Table 13, which also includes the concept of isomorphism[29].

Table 13: Policy convergence and related concepts according to Knill (2005)

	Policy convergence	*Isomorphism*	*Policy transfer*	*Policy diffusion*
Analytical focus	Effects	Effects	Process	Process
Empirical focus	Policy characteristics	Organizational structures	Policy characteristics	Policy characteristics
Dependent variable	Similarity change	Similarity change	Transfer content transfer process	Adoption pattern

Source: Knill, 2005, p.768

Robert Hulme, while researching on the theoretical utility of policy transfer, concluded that the policy transfer framework provides an essential linkage that allows the diverse concepts and literatures to converse. He therefore defined policy transfer as "*both a rational and an ideological strategy to deal with changing circumstance. Seeking workable, tried and tested, readily available definitions and responses from other countries and from the past is the means by which policy makers put their learning into effect*" (Hulme, 2005, p.421).

Though the debate is still open, the consulted literature seems to suggest the comprehensive scope of the policy transfer concept, which produces an overlap with concepts such us policy convergence, policy learning or policy diffusion, all integrated in the semantic field of *policy change*. The overlap between policy transfer and its related concepts is not total in any case, meaning that the related concepts seem to preserve part of their own significance *outside* of the policy transfer concept. It is also possible to suggest the existence of overlaps *between* some of the related concepts: policy diffusion may be one of the causes of policy convergence (Knill, 2005, p.767) and it may interact with the lesson-drawing mechanisms at its initial stages. None reference in the consulted literature sought to relate policy learning and policy convergence independently from policy transfer.

The consulted literature also seems to admit a distinction in the focus intrinsic to each of the concepts involved. Policy convergence is a concept clearly centered on the *effects* of policy change; Policy transfer and policy diffusion seem to be concerned with the *processes* of policy change; Policy learning is apparently focused on the conditions

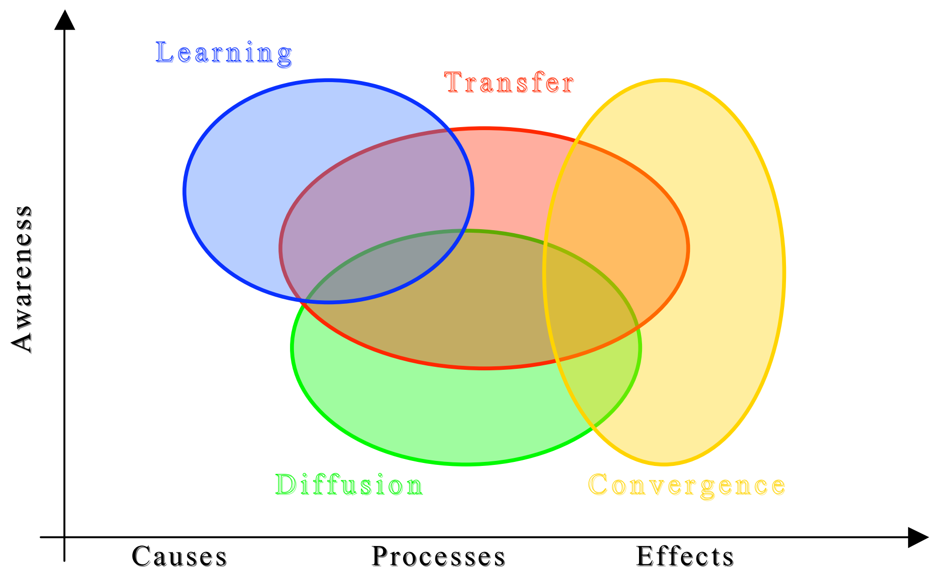
[29] Isomorphism is defined in organizational theory as a process of homogenization that "*forces one unit in a population to resemble other units that face the same set of environmental conditions*" (DiMaggio and Powell, 1991, p.66 quoted by Knill, 2005, p.768).

allowing the transfer of knowledge, what we could locate in an interface between *causes* and *processes*.

The literature also finds common points between policy transfer and lesson-drawing in the fact that both are about the transposition of policies and/or practices *already in operation* in one jurisdiction to another (Page, 2000, p.2) or in the fact that both give precedence to the actor and intention, thus assuming some rational judgment on the part of policy-makers (Stone, 2001, pp.5-6). Diffusion can also happen without a *conscious* participation of the actors involved (Newmark, 2002, p.152).

From these impressions and with the only intention of clarifying the current stage of the conceptual debate in view of the following steps of this thesis (i.e. with any intention of entering into the mentioned conceptual debate), the semantic relations between policy transfer and its related concepts can be schematically represented as in Fig. 36. The graph maps the overlapping and relations between concepts, as well as their position with respect to two axes, one related to the focus of the concept (in terms of *causes*, *processes* and *effects*) and the other related to the awareness (i.e. consciousness) of the actors involved.

Fig. 36: Mapping of policy transfer related concepts



Source: own elaboration

4.3.3 Concept development and criticism

Setting aside for a moment the implications of the *horizontal debate* related to the semantic boundaries of the policy transfer concept, attention will be driven now on the *vertical debate*, that is on the progressive definition steps undertaken with the intention of operationalizing the concept and the criticisms that it has raised.

At this stage the focus will be concentrated on the following six issues: the assumption of rationality in policy transfer processes; the role of coercion in policy transfer processes; the existence of an one-dimensional policy transfer continuum; the consideration of different degrees of transfer; the relationship between policy transfer and policy failure; and the extent of the overall explanatory power of the policy transfer concept. It will be only in a next stage that the research will tackle the conceptual frameworks and models available in the political science for the analysis of transfer processes.

4.3.3.1 The assumption of rationality in policy transfer processes

According to the developments of Dolowitz and Marsh, policy transfer processes imply rational behavior from policy-makers. In most cases this rationality is not complete (*perfect rationality*[30]), but is shaped by imperfect information and the perceptions of policy-makers upon the decision-making situation *(bounded rationality*[31]). Particularly, the authors established a link between rationality and lesson drawing, by stating that in such a case *"actors choose policy transfer as a rational response to a perceived process*" (Dolowitz and Marsh, 2000, p.14).

This view has been challenged from various angles. A first criticism arises from the implicit adoption of a *rational conception* of the policy-making process that is embedded in the assumption of rational policy transfer. Defenders of other approaches, like *incrementalism*[32] or the *garbage can model*[33], argue that policy-making entails

[30] In political science, perfect or comprehensive rationality refers to a decision-making behaviour in which: 1) Policy aims or ends are identified in terms of the values of the policy maker; 2) All means to achieve those ends are identified; 3) The best means are selected; 4) Analysis of the decision-making context is comprehensive – i.e. all relevant factors/ possibilities have been considered (Jordan and Richardson, 1987, pp.9-14 quoted in Carney 2003).

[31] The concept of bounded rationality, as stated by Herbert Simon, is based on limitations to comprehensive rationality in terms of incomplete knowledge and information of the existing situation and the consequences of policy "solutions"; cognitive inability of decision-makers to consider every possible solution; the distinction between individual and organizational rationality and the difficulty of separating facts and values (as explained in Carney, 2003).

[32] The incrementalist approach to policy-making, as defined by Lindblom, argues that policy is not made once and for all but it is the result of chronological series of choices rooted in the existing policy and tested at every step against reality.

[33] The "garbage can model" conceives the policy making process as the interaction of four streams (problems, solutions, participants and choice opportunities) within organizations. "*Each of the streams has a life of its own, largely unrelated to the others. Thus people generate and debate solutions because they have some self-interest in doing so (e.g., keeping their job or expanding their unit), not because the*

solving closely interrelated problems under conditions of great uncertainty in highly complex contexts. In this scenario, policy processes and outcomes could also be interpreted as the result of successive limited comparisons (Lindblom, 1959) or even the result of organizational anarchy (Cohen et al. 1972).

A second argument is related to the conception of policy transfer as one more of the various elements that contribute to the wider process of policy change. Under this view, other structural considerations might prevail over the hypothetic rationality of lesson drawing and policy transfer, leading to an overall irrational output as result of the political change. This argument is strongly related to the debate about the explanatory power of policy transfer, treated later in this section.

A third argument regards the contradiction arising between a rational policy transfer and the output resulting from the interaction of the opposed interests of multiple actors and governance levels. From this perspective the hypothetic rationality of policy transfer is thought to be dependent on the existence of a powerful central force or actor.

A fourth argument states that rational behavior in policy transfer requires the actors to carry a complete evaluation of policy options available to them before engaging in transfer. Supporting this view, Lodge (2003, p.161) argues that policy transfer and learning rather represent "*limited searches for templates that appear more legitimate, appropriate or successful*" than a full evaluation of all available alternatives. This argument, though clearly opposed to perfect rationality, could however be fit within the bounded rationality concept as a particular case in which decision-makers are unable to consider every possible solution because of their predisposition (i.e. they are willing to consider only a limited number or type of policy solutions).

4.3.3.2 The role of coercion in policy transfer processes

As regards the role of coercion in policy transfer, Dolowitz and Marsh (1996, pp.346-348) outlined three categories of coercion in policy transfer: 1) Voluntary transfer, as a voluntary decision of policy-makers resulting from dissatisfaction with existing domestic policy; 2) Direct coercive transfer, as the consequence of direct influence by an organization, country or supranational body; and 3) Indirect coercive transfer, meaning a transfer that is voluntary but driven by a perceived necessity to change policy (e.g. because of market forces or international policy developments).

However, the authors note that "*to establish a simple distinction between voluntary and coercive transfer is to oversimplify the process*" and admit that many cases of transfer contain both voluntary and coercive elements (Dolowitz and Marsh, 2000, pp.13-14).

solutions are generated in response to a problem or in anticipation of a particular upcoming choice." (Cohen et al., 1972, p.2)

A first point of discussion is about the recognition of coercion in policy transfer. Though it may be evident in some clear-cut cases, like pressures exerted by militarily victorious powers, the conditions imposed by international organizations in the context of development policies or the obligations derived from international law (Hoberg 1991, quoted in Lodge, 2003, p.162), the level of coercion may be not so evident in its most indirect forms (e.g. smaller or less powerful regions may perceive the need to follow the policy of their larger neighbors to avoid consequences from divergence).

This view is shared by Page (2003, pp.5-6), who states that "*numerous circumstances can be envisaged when a country has little choice but to introduce a policy, but where it is difficult to talk about coercion being exercised by another organisation or country*". This author notes that there could also be circumstances under which transfer, though not coerced, is not voluntary and concludes that "*coercion versus voluntary transfer is unlikely to be a simple variable, and not reducible to one dimension*".

A second point relates to the change over time of the coercion levels exerted on the importer jurisdictions. In fact, the perceived need to transfer may vary over time depending on internal or external circumstances, therefore reflecting the pressure to change policy in general and the existence of opposing pressures in individual political systems (Hoberg, 2001, p.128).

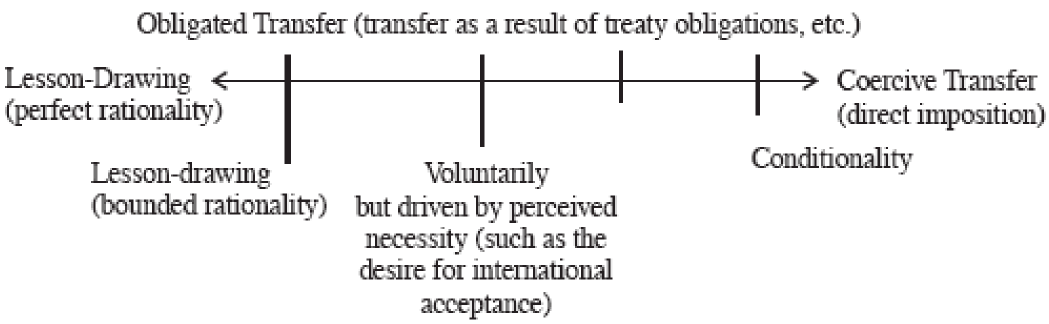
A third interesting point regards the relation between the effective level of coercion and the observed response from governments. As noted by Holzinger and Knill (2005, p.781) we should be careful about assuming a high level of coercion since e.g. there is a difference between a government being resistant to a policy transfer and a government which sees the policy as just not very high on its list of priorities. Further, the appearance of coercion may "*help governments introduce policy not favoured by its citizens*".

4.3.3.3 The existence of an unidimensional policy transfer continuum

In order to clarify the different types of policy transfer, Dolowitz and Marsh (2000, p.13) suggested conceptualizing transfer "*as lying along a continuum that runs from lesson-drawing to the direct imposition of a program, policy or institutional arrangement on one political system by another*". According to their idea, they represented perfect rationality and direct coercion as the opposite ends of a single axis over-arching the whole policy transfer concept (Fig. 37).

This concept has been strongly opposed by Oliver James and Martin Lodge (2003, pp.185-186), who argued that the policy transfer continuum collapses the previously described dimensions of rationality and coercion, obscuring relevant differences important for the approach of public policy. The authors defend the independence of both axes, that could converge only in the hypothesis of coercion exerted through the provision of information, and conclude that "*the difference between voluntary action and coercion is normally seen as not being of the same kind as that between perfect and bounded rationality*".

Fig. 37: Policy transfer continuum as defined by Dolowitz and Marsh (2000)



Source: Dolowitz and Marsh, 2000, p.13

Monder Ram et al. (2007, p.782) qualify the unidimensional continuum as "simplistic" and support the argument of James and Lodge about the collapse of differing dimensions[34], but they defend the value of this framework as a useful heuristic device.

Carney suggested that the framework proposed by Dolowitz and Marsh should be seen in the light of a particular understanding of the term "coercion", that could have been used to mean that policy transfer is voluntary but that regions may feel obliged to keep up or transfer policy to address a pressing need (Carney, 2003).

4.3.3.4 The consideration of different degrees of transfer

Dolowitz and Marsh (1996, p.351) built on Rose's alternative ways of lesson drawing to propose a range of four options: *copying, emulation, hybridization and synthesis*[35], and *inspiration*. They remarked that the type of transfer is likely to vary depending on the actors involved in the process or on the point within the policy-making process where the transfer occurs (Dolowitz and Marsh, 2000, p.13).

This categorization seems to have been well accepted in the academic community, though it has also raised debate on some points. Page (2000, p.4) noted that the classification is clear when it is seen from the "lesson-drawing" perspective (where the

[34] They note as well that associating "perfect reationality" with "voluntary" transfer is problematic, since the latter often involves, at best, "bounded rationality".

[35] Dolowitz and Marsh consider *hibridization* and *synthesis* as belonging to one single category. In their review of the policy transfer concept in 2000 they referred to it as *combinations* or *mixture* (Dolowitz and Marsh, 2000, p.9).

analyst sets out what is being borrowed), but not from the "*policy transfer*" one (where the analyst tries to ascertain precisely what was borrowed). Carney (2003) referred to the eventual inclusion of a sixth category of transfer based on the conclusions of a case study developed by Dolowitz. This new category could be described as using the information gathered to "*repackage old ideas and approaches under a new banner*"(Dolowitz, 2003, p.103).

Focusing on the effects that transfer could have on the political systems of the importer jurisdiction, Stone (2001, p.11) noted that policy transfer and lesson-drawing can occur across three orders of change: *first order* change involves *"minor adjustments in the precise settings of policy instruments*"; *second order* change involves "*re-tooling, limited experimentation and introduction of new policy techniques*" and *third order* change involves "*a radical shift in the hierarchy of goals and set of instruments employed to guide policy*".

4.3.3.5 The relationship between policy transfer and policy failure

Another relevant point treated by Dolowitz and Marsh (2000, p.17) regards failure of policy transfer processes. In their analysis the authors acknowledge the difficulties that may arise in the definition of "failure" and propose three factors able to produce to policy failure in a process of transfer: 1) *uninformed transfer* (may happen when the importer jurisdiction has insufficient information about the policy or institution transferred and how it operates in the exporter jurisdiction); 2) *incomplete transfer* (may happen when some relevant elements driving the success of the policy or institution transferred in the exporter jurisdiction are not transferred to the importer jurisdiction); and 3) *inappropriate transfer* (may happen when insufficient attention is paid to the social, economic, political and ideological differences existing between importer and exporter jurisdictions).

The subsequent literature has shared the interest for this approach and agreed on the view that the transfer of successful experiences in one jurisdiction may not automatically lead to success in a different jurisdiction.

Some theoretical points have been risen as regards the relationship between coercive policy transfer and policy failure or the limits existing between policy transfer and implementation literatures[36] (Carney 2003). James and Lodge (2003, p.188) have gone further and have criticized the categorization of Dolowitz and Marsh because it is not able to explain policy failure in terms of the process of transfer.

[36] The relevance of this debate has been pointed out by Carney through the following single question: *"If there is insufficient political will devoted to implementation, is this a failing of the transfer process?*"

Attention has also been dedicated to the analysis of cases, with the intention of gaining further knowledge on the conditions that may lead to uninformed, inappropriate or incomplete transfer.

Hulme (2005, pp.423-424), referring to several comparative case studies in welfare and education involving US and British policy, remarked that "*selectivity and partiality on the part of the transferring agent are the overriding determinants of failure in policy transfer. Those elements of policies and structures that are left behind are often as significant as what is actually transferred*".

As reported in Ram et al. (2007, p.781), Curran (2000) and Gibb (2000) analyzed the small and medium enterprises (SME) policy initiatives imported from other jurisdictions and concluded that results are poor because of a limited consideration of some of the aspects embedded in the transfer process. Furthermore, they openly criticized "*the shallowness of small business research and policy thinking in relation to these phenomena*".

In their own case study, they applied the transfer policy framework to the analysis and implementation of a transfer program related to supply diversity in the UK and concluded that "*a programme transfer cannot be reduced to a mechanical set of operations. Rather, it requires an explication of conditions, complexities and character of the context into which the programme is to be transferred*". They also remarked the importance assumed by direct engagement with actors when trying to effect change by applying research findings in a particular context (Ram et al. 2007, pp.798-801).

Some authors tackled the relation between policy transfer and policy failure from a more positive approach by proposing a number of factors affecting the likelihood of transfer and its success.

Rose (1993, p. 132) suggested six hypotheses: 1) Transfer is more likely for programs with single goals; 2) Transfer is more likely for simpler problems; 3) Transfer is more likely in situations where the relationship between the problem and the "solution" is clearly perceived; 4) The fewer the perceived side-effects of a policy the greater the possibility of transfer; 5) The more information agents have about how a program operates in another location the easier it is to transfer; and 6) Transfer is more likely for programs with predictable outcomes.

Other hypotheses found in the literature are: 1) There should be enough political, bureaucratic and economic resources to implement policy (Dolowitz and Marsh, 1999); 2) If the policy is consistent with the dominant political ideology in the exporter country (Robertson, 1991); 3) The policy should not be "unique" or depend on "inimitable" organizations; 4) The smaller the departure form original policy the better the chances of success; 5)Transfer is more likely when there is interdependence (points

3-5 quoted in Carney 2003); 6) Transfer is more likely when there is geographic proximity (Rose, 1991); 7) Transfer is more likely when already exist informal policy communities (Stone, 2001).

4.3.3.6 The extent of the overall explanatory power of the policy transfer concept

Though treated in last place, this stream of the ongoing debate moves beyond the previous points to directly question the distinctiveness and explanatory power of the policy transfer concept.

Dolowitz and Marsh (2000, pp.21-22) suggested that policy transfer could help to expand the understanding of the policy-making process as a tool to overcome some aspects of the prevailing rational-technocratic model. However, they also expressed clearly the limits of their framework:

> "*While the research presented here certainly supports the position that policy transfer is a useful explanatory variable, it clearly doesn't suggest that policy transfer is the sole explanation of any, let alone most, policy development. All we are suggesting is that an increasing amount of policy development, and particularly policy change, in contemporary polities is affected by policy transfer.*"

Page (2000, p.4) remarked the blurriness existing between policy transfer and the policy-making process, but suggested that research should not get stacked in trying to precisely identify the point of decision-making when transfer was adopted.

Carney (2003) remarks that the interaction between policy-making and policy transfer can not be thought as limited to the selection of the source of policy ideas, because the importation of these ideas will be subject to the same conditions – incrementalism, governance, agenda-setting – as any other policy, regardless of the source.

These considerations have been strongly contested by James and Lodge, who criticize both the assumption of increasing transfer in contemporary polities and the usefulness of the framework proposed by Dolowitz and Marsh. They described policy transfer as a too much ambitious framework gathering a set of diverse and conflicting theories, as a concept difficult to separate from other forms of policy-making and questioned its value to form measures of practical use. Furthermore, they attacked its distinctiveness and remarked the difficulties of gathering evidence about it (James and Lodge, 2003, pp.179-193).

Hulme (2005, p.418) shares the criticism of James and Lodge as regards its power to singly explain anything, but he defends the capacity of policy transfer to enhance the explanatory power of other perspectives and provide further insight in the processes of policy change. This view was also close to the one expressed by Evans and Davies

(1999, p.362) who conceived policy transfer as a common field able to integrate the research concerns of domestic, comparative and international politics.

4.3.3.7 Conclusions on the concept development

The review of the debate surrounding the development of the policy transfer concept offers a good basis to identify some of the relevant aspects that should be defined when building a framework to analyze a specific process of “policy / practice movement”.

First, the framework should make clear the number and nature of the actors involved in the transfer process, the object of the transfer and the transfer sources taken into account (i.e. temporal or spatial transfer, transfer within countries or across countries, transfer within the same or across policy fields).

Second, the framework should provide an assumption on the relation between the transfer and the policy-making processes. Policy transfer can be conceived as a separate process that starts and ends at given points of the policy-making process (which should then be defined) or it can be thought as belonging to the same stream (i.e. the policy transfer process can be assimilated to one specific way of making policy). Depending on the relative position chosen for both processes and on their starting and ending points the outputs and effects of the transfer will be different.

Third, the framework should hypothesize the degree of rationality involved in the transfer process. The hypothesis should include both a consideration on the rationality of the actors involved and on the boundaries constraining their action. This hypothesis should also be stated for the whole policy-making process, as it could encompass the transfer process and condition the rationality of the final outcome (depending on the assumption made in the previous point).

Fourth, the framework should take into consideration the existence of different degrees of coercion that can condition the whole transfer process. It should be able to deal with them by identifying the effects of coercion in terms of alterations to the process and in terms of the degree of discretion allowed to the actors.

Fifth, the strong criticism to the concept of policy transfer continuum makes advisable to keep coercion and rationality as two separated dimensions within the framework.

Sixth, the framework should define a criterion for transfer success / failure. This criterion could then be used as a starting point for defining a prospective analysis leading to conclusions on the transferability of different policies or on the preconditions required for transfer. In doing so it should keep in mind the aim stated for the process as well as the existence of different degrees of transfer.

4.3.4 Analytical frameworks and models

4.3.4.1 Review of analytical frameworks and models

Though some of the assumptions embedded in the policy transfer concept are still under discussion, several authors have proceeded further by developing theoretical frameworks and models intended to guide their analyzes and to support decision-makers involved in transfer processes.

A first framework was proposed by Dolowitz and Marsh in 1996 (p.344) and improved in 2000 (p.8). In its final version, their model consisted of a series of questions both describing and structuring the policy transfer process in all its main dimensions. The seven questions to be answered were:

- *Why do actors engage in policy transfer?*
- *Who are the key actors involved in the policy transfers process?*
- *What is transferred?*
- *From where are lessons drawn?*
- *What are the different degrees of transfer?*
- *What restricts or facilitates the policy transfer process?*
- *How is the process of policy transfer related to policy "success" or policy "failure"?*

The authors justified their approach as a suitable way to understand better the transfer process, viewed as a key element of the analysis with irrelevance of considering policy transfer the dependent (a process that has to be explained) or the independent variable (an explanatory variable of policy change).

Page (2000, pp.3-7) referred to this kind of framework as "*the very basic questions of who, what, why, where and how policy transfer takes place*" and enriched it with some relevant considerations:

- *Who* – Agents of policy transfer (continuum from individuals to organizations)
- *What* – Variable, several categorizations exist
- *When* – The concept of policy transfer says little about the time period. Transfer is not necessarily based on a single act.
- *Why* – The question includes several dimensions: coercive/voluntary transfer; the circumstances under which a country borrows from another; the type of objective pursued by the transfer; the exporter country selection.

- *How* - The question is only valid if the importer can exert choice. The process can be diffuse and multifaceted, perhaps even unconscious on the part of those involved. Which are the preconditions that foster the transfer of innovations? How is demand for transfer induced?

Page also remarked that the full series of questions can be seen both from a descriptive viewpoint (like a framework intended to describe transfer as a mean to highlight the policy-making process) or a normative viewpoint (like a framework intended to set the conditions that should drive the policy transfer process in a particular country).

Though recognizing that the prime object of this framework is to improve knowledge about decision-making processes, Page (2000, p.2) insisted in the practical implications of correctly understanding the process. In its own words, the theoretical framework should help to define "*which ways of transferring policies and practices are better or worse than others*".

Other scholars selected another approach to the problem, preferring to narrow the policy transfer concept through the adoption of some simplifying assumptions and gain in its operationalization. We could say that by doing so they focused on policy transfer as a dependent variable that needed to be explained in some of its dimensions (and not *all*).

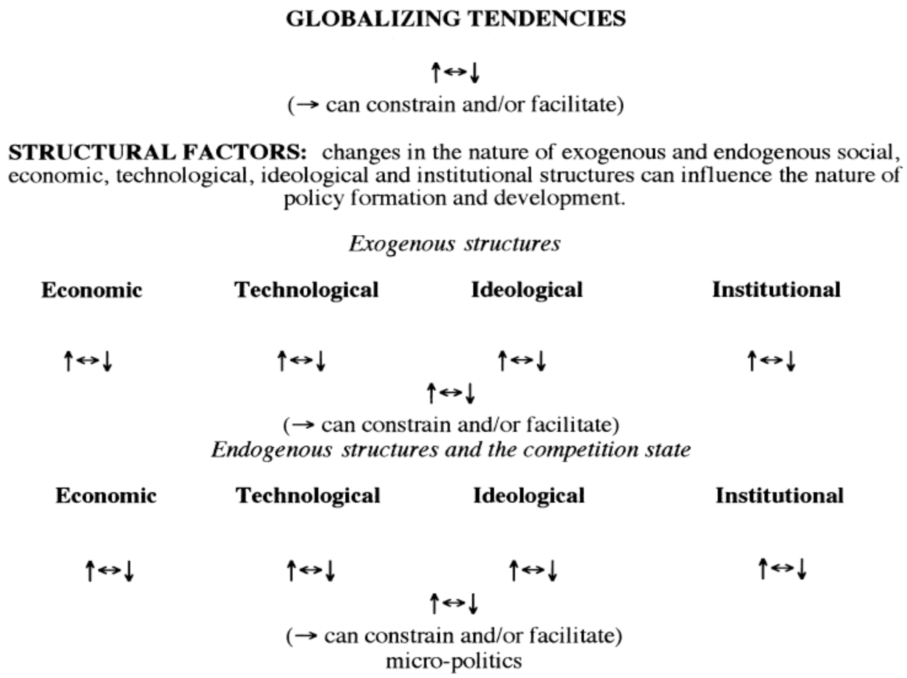
Evans and Davies (1999, p.361) built their framework on the Rose's definition which saw transfer as "*an action-oriented intentional activity that takes place within a multi-organizational setting*" – that takes place consciously and results in policy action. In doing so, they explicitly renounced to other dimensions of policy transfer as those related to the general diffusion of knowledge, its application to intra-organizational situations or its temporal dimension. Rooted in this conceptualization, the authors developed their framework, which identified three levels in the nature of policy transfer: the global / transnational / international level; the macro-state level and the interorganizational level.

On the one hand, they focused on the impact that structural processes external to the transfer process could have upon the context, strategies, intentions and actions of the agents directly involved in it. They relied on the structuration theory developed by Wendt[37] and proposed to describe the action of external processes on agents through changes in exogenous and endogenous structures (Fig. 38). On the other hand, they analyzed the transfer processes at the interorganizational level employing the notion of

[37] Wendt describes social systems as the interaction and mutual determination between "structures" (i.e. sets of internally related elements which occupy a position within a social organization - practices, technologies, ideologies, territories, etc.) and "agents" (Wendt, 1987, quoted in Evans and Davies, 1999, p.370).

policy transfer networks[38] as the mean to connect different levels of spatiality. They proposed twelve stages on the policy transfer process, all of which could be understood in the light of the development of policy transfer networks (Fig. 39).

Fig. 38: Conceptual diagram of the action of external processes as defined by Evans and Davies (1999)



Source: Evans and Davies, 1999, p. 372

Fig. 39: Conceptual diagram of the process of voluntary transfer as defined by Evans and Davies (1999)

Process of transfer

1 RECOGNITION discourse pull dissatisfaction cyclical events conflict legitimation ⇒	2 SEARCH regime international transnational national regional local ⇒	3 CONTACT ⇔	4 EMERGENCE OF INFORMATION FEEDER NETWORK ⇒	5 COGNITION & RECEPTION ⇒	6 EMERGENCE OF TRANSFER NETWORK ⇒
7 ELITE & COGNITIVE MOBILIZATION ⇒	8 INTERACTION ⇒	9 EVALUATION ⇒	10 DECISION ENTERS POLICY STREAM ⇒	11 PROCESS ⇒	12 OUTCOME

Source: Evans and Davies, 1999, p. 377

[38] Evans and Davies develop the concept of policy transfer network as a notion able to integrate previous literatures on policy networks, and epistemic communities (knowledge communities formed by experts sharing certain beliefs).

The framework resulting from the combination of both schemes understands transfer as a process happening in an interorganizational level that is framed by external processes happening at superior levels (global / transnational / international level and macro-state level). Therefore it provides a more structured basis for analyzing the interdependences and interactions arising between different levels at the occasion of policy transfer processes.

Lodge (2003, pp.160-162) proposes a framework based on an institutional perspective, which assumes that policy transfer do not constitute rational decision-making in terms of a complete evaluation of all possible policy options. Accordingly, the policy transfer process has to be conceived as "*limited searches for templates that appear more legitimate, appropriate, or successful*"[39]. The selection and adoption of templates is conceived as dependent upon institutional mechanisms, as institutions are in relation with other policy environments (thus able to incorporate practices from other domains) and are able to provide legitimacy to the process.

Lodge applied this framework to the regulatory reforms in the railway domain in Britain and Germany in order to assess the impact of three different institutional factors in the process: the presence of coercive pressures, the organization of the political – administrative nexus and the impact of societal actors.

Mossberger and Wolman (2004, p.430) also adopted a restricted view of the policy transfer concept in order to enhance its practical consideration in day-to-day situations. In fact, they suggested to assimilate cross-national policy transfer to a specific type of prospective policy evaluation[40]. By doing so, they clearly placed the policy transfer concept in the sphere of policy-making. Once "brought down to earth" the concept, the authors focused their attention on the practical methodology that should be followed by decision-makers in order to succeed in a policy transfer process.

They first hypothesized a perfectly rational approach to policy transfer made of three distincted steps: 1) Awareness (an adequate information search in both scope and accuracy); 2) Assessment (with particular regard to the similarity of problems and goals between the policies examined, their performance in their original contexts and the differences in settings between the exporter and importer contexts); and 3) Application. Then, they tested their approach against seventeen documented cases of policy transfer, noting the difficulties to match perfect rationality with the case studies in al the three steps. Finally, the authors admitted the impossibility of explaining real cases under a

[39] The author notes as well that "*policies are attractive not necessarily for performance reasons, but for their ideational content as policy instruments*".

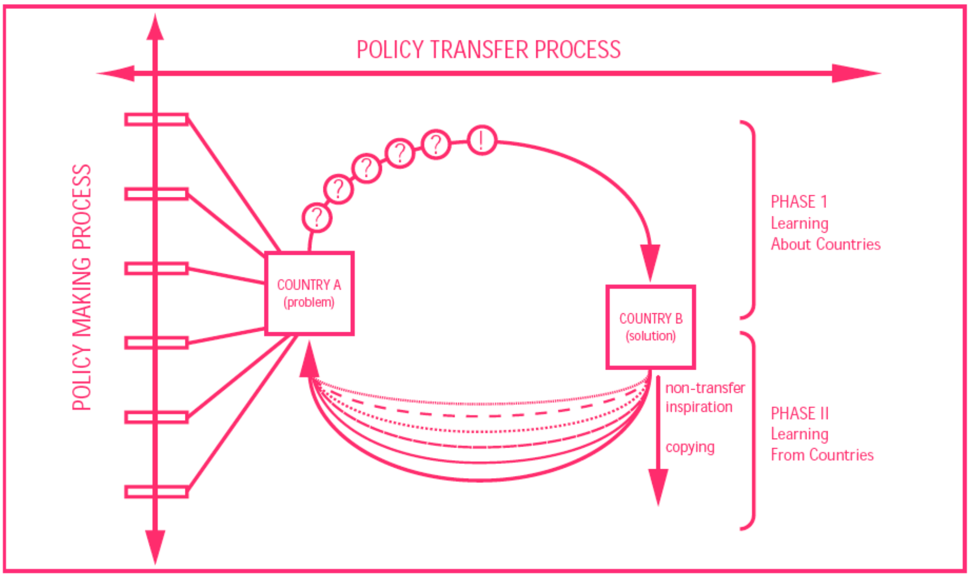
[40] Defined by the authors as the policy-makers' attempts to assess the effect of a policy or program before it is put in place (Mossberger and Wolman, 2004, p.430).

perfectly rational approach, and suggested the use of several "rationally-bounded techniques", such as directed search strategies for the first phase or heuristics for decision-making.

Even more practical approaches to policy transfer have been developed in order to provide guidance to policy-makers. Some of them are briefly referred next.

The Centre for Management and Policy Studies of the United Kingdom (CMPS) launched a project in 2000 intended to develop a methodology (a "toolkit") to learn about and apply successful policies from abroad, as a way to improve the effectiveness of domestic policy-making. They ended up by describing policy transfer as a two-phase process, the first concerned with learning *about* another country's policies or programs, and the second with learning *from* another country's policies or programs (Fig. 40). The whole transfer process could happen at any stage of the policy-making process, depending on the problem to be addressed.

Fig. 40: Conceptual diagram of the policy transfer process as defined by the CMPS (2002)



Source: Wyatt and Grimmeisen, 2002, p.2

The toolkit developed a five-step framework for policy transfer: 1) Scanning (surveying developments in a range of countries); 2) Selecting (one or more examples for detailed study); 3) Understanding (mapping the key elements of the chosen example); 4) Assessing (assess the relevance of the example to a different policy environment); 5) Recommending (recommend on the basis of the evidence: modify the policy or reject it if necessary) (Wyatt and Grimmeisen, 2002, pp.2-5).

The United Nations Department of Economic and Social Affairs (UNDESA) has devoted particular attention to the sharing of information and knowledge on innovation in government. Within this focus, it has promoted discussion among experts on the approaches and methodologies for the transfer of best practices in governance and public administration.

Building on the experience gained from a series of pilot transfers in Asia, Sing Chahl (2006, pp.124-130) identifies four steps in the transfer of innovations: 1) Matching demand with supply (the main actor is the intermediary); 2) Defining the scope of the transfer (the intermediary acts as a broker between the two parties); 3) Adapting the innovation to local conditions (the intermediary's role is that of a facilitator); and 4) Actual implementation of the transfer and its evaluation (the intermediary is an evaluator). In view of the real cases examined, he strongly recommends the elaboration of a mission statement able to define the key elements of a transfer: information dissemination and exchange, roles and responsibilities of actors/stakeholders, recognition of the innovation as a matched solution to the problem, education and adaptation, implementation plan, transfer (including a pilot demonstration) and follow-up.

The European Commission has focused its attention on policy transfer and policy learning as "soft" instruments able to improve governance and reinforce the Community action in some fields where "hard" instruments like legislation are not available. These tools have been included in the Open Method of Coordination, a framework for encouraging cooperation and the exchange of best practice in policy-making across European institutions (EC, 2001b, pp.21-22).

Among the several research projects undertaken to define such a coordination framework, the PREVALET project sought to develop a model for undertaking policy learning and transfer at the regional level. The model was called "soft open method of coordination", and distinguished two stages: the *policy learning* stage and the *policy transfer* stage. The whole process was broken down into the following steps (Federighi et al. 2007, pp.9-10):

- Policy learning
    - *Institutional motivation* (definition of the reasons that cause governments to learn from others)
    - *Selection of the pathway for policy learning* (definition of the type of relation to be established among institutional partners)
    - *Selection and analysis of measures* (identification of the subjects to be studied in view of a possible transfer)
    - *Evaluation and adaptation of measures* (evaluation of the policy measures from the viewpoint of transferring them to the destination country)
- Policy transfer

- *Creation of institutional conditions for transfer* (creation of the desire for change)
- *Choice of the process for the transfer* (activation of the decision-making process whereby transfer becomes possible)
- *Decision-making process of the transfer*
- *Implementation of the transfer* (introduction as an experimental procedure)
- *Institutionalisation and follow-up* (adoption of the innovation)

Similar schemes have also been developed in Europe to guide the increasing activity of policy learning and transfer across cities in the fields of housing, transport and urban development and renewal (Stead et al. 2008, p.62).

A good example of these initiatives in the field of transport is found in the METEOR project, an accompanying measure of the EC CIVITAS program for sustainability of European Cities[41]. The aim of the project was to monitor, evaluate and disseminate the results of transport policies implemented in the 19 cities participating in CIVITAS, with a special focus on the *transferability* of measures.

The project defined transferability as "*the ability to transfer/adopt in a given city successful measures previously adopted elsewhere, and achieve comparable results*", and sought to identify the conditions for transferability of measures within the studied cities - i.e. the conditions of applicability or context variables required for achieving comparable results (Macário et al. 2004 quoted in Macário et al. 2006, p.3).

The project identified four stages in the transfer process: 1) *Demonstration*, where a best practice is identified in the originator city; 2) *Transferability*, where the compatibility of the best practice in the receptor city is appraised; 3) *Assessment*, where specific barriers to change and factors of success are identified; and 4) *Implementation*, where the good practice is implemented in the receptor city. Moreover, it proposed 10 steps for transferring the CIVITAS' measures: 1) Diagnostic of the problems; 2) Characterization of the city; 3) Analysis of the city context and implications of problems identified; 4) Search for similar contexts; 5) Selecting examples of source urban contexts; 6) Identify measures with potential for transferring; 7) Packaging and dimensioning the measures for transferring; 8) Ex-ante assessment of measures to

[41] The CIVITAS Initiative was first launched by DGTREN from 2002 to 2005. It included the participation of 19 European cities in testing and implementing measures to achieve the objective of cleaner and better transport. They implemented a total of 212 measures on sustainable transport that contributed to relevant improvements of transport in many of them.

transfer; 9) Identify need for adjustment; and 10) Implement measures and steer results (METEOR Consortium, 2006, pp.75-76).

The project concluded that the most important driver for succeeding in a transferability process is the ability to adequately replicate the context, namely physical, cultural and institutional conditions. It also suggested the convenience of clustering different measures in order to improve their acceptability in the recipient city.

A part from European initiatives, it is also possible to find national and regional initiatives in the field of transport policy transfer. One interesting example is the study "Transferability of Best Practice in Transport Policy Delivery", commissioned by the Scottish Executive to identify best practices among a number of European regions and cities and assess its potential implementation in Scotland (Colin Buchanan and Partners, 2003).

The methodology adopted to assess the effectiveness of best practices if transferred to Scotland sought to identify *success factors* in the original practices and the *ideal pre-conditions* accompanying them. Then, it compared these *preconditions* with the Scottish case, deriving appropriate conclusions on the transferability of the practices. This methodology allowed to identify some key barriers to transfers, mainly the financial costs, the organizational cost of setting up new organizations and transferring powers to them or the need of legislative changes. The study also suggested the convenience of implementing tests in small parts of the territory.

4.3.4.2 Conclusions on the analytical framework and models

The review of the frameworks proposed by the literature undertaken in the previous section allows to obtain some preliminary conclusions that could be relevant for the definition of a policy transfer framework.

Though not extensive, the review provides examples for each level of detail, ranging from purely theoretical frameworks deduced from the conceptualization of transfer to frameworks induced from a number of practical cases. Thus, they are not likely to provide a unique and consistent lesson but various lessons that can be useful at different stages of the framework-building process.

Highly conceptual frameworks, like the ones proposed by Dolowitz and Marsh and Page seem to be oriended to further develop the notion of policy transfer through the provision of some theoretical specifications. Most of the conclusions that can be drawn from them are similar to the points already noted when discussing the development of the concept, as they regard the nature of the key issues that should be defined when building a framework (e.g. actors, object, source, coercion, rationality, etc.)

The frameworks proposed by Evans and Davies and Lodge are more precise in their determinations and provide interesting *refinements* that should be taken into consideration when defining aspects such as rationality, coercion or preconditions in a policy transfer framework.

The multi-level approach to transfer suggested by Evans and Davies represents a valuable structure for the analysis of the successive influence of external and internal processes through the international, national and domestic levels. This influence can be understood in terms of coercion (as it limits the *range of action* of the actors involved at each level), but also in terms of bounded rationality (as the external influences may limit the *range of knowledge* available to the actors involved) or preconditions (as these ranges may be very dissimilar in importer and exporter jurisdictions).

The institutional approach suggested by Lodge fits well in such a scheme, as the limitations framing the search for templates to transfer are to be found in the transversal role of institutions,which are able to exert their influence through different levels or policy domains.

When we move into more *experimental* frameworks, arising from theoretical propositions but then tested against a number of cases, the lessons regard the *contents* that should be included in the framework. The examination of the samples seem to suggest three issues common to many of them, if not to all.

The first issue regards the open refusal of comprehensive rationality, which finds support on the evidence of the strong requirements embedded in this assumption (e.g. searching and assessing all the potential policies to transfer, conducting a complete assessment and identification of the potential implementation difficulties, etc.) and on the evidence of the heavy dependency of transfer on the more general political situation and decision-making process. This coincidence in the negative evaluation of the perfect rationality hypothesis seems to discard it for consideration in a policy transfer framework.

The second issue concerns the identification of the main stages of the policy transfer process. Although the frameworks examined suggest a different number of steps, it is possible to find three phases or stages common to all of them: an *information phase*, an *evaluation/adaptation phase* and finally a *decision/implementation phase*. As in the previous case, this coincidence seems to suggest that the proposition of a new framework should at least include these three stages.

The third issue is related to the process of constructing a *model* as a mean to work with different policies in terms of comparison between them, identification of preconditions, prospective assessment of their success or adaptation. This model is based on a set of synthesis and mapping procedures that are usually applied at the end of the information phase. When defining a new framework, this construction of a model should be kept actively in mind, with a particular attention to two aspects: its capacity to enhance the focus on the main issues to be addressed and the risk of over-simplification, that could jeopardize the whole process.

4.4 Benchmarking theory

4.4.1 Conceptual literature of management science

Management science emerged as a body of literature during the period 1890-1930, reporting the ideas and theories of engineers concerned with such problems as job definition, incentive systems, and selection and training. They conceived the idea of achieving a *scientific management*, understood as the application of the scientific method to labor, management and cooperation issues.

These first reflections took form in what is considered the first statement of a general theory of management, the *Administrative Industrielle et Générale* published by Henri Fayol in 1916. For the first time management was thought as a separate body of knowledge that could be applied in any type of organization and therefore as a theory that could be taught and learned.

From these classical and deterministic approaches, management science has evolved steadily, producing relevant achievements in the organization and control of businesses, resources and people through the continuous development of concepts, practices and techniques. Two characteristics have been constantly present across all this path, its focus on problem-solving and decision-making processes and its holistic approach to them.

Management science has provided insight in planning and decision-making activities (e.g. setting organizational goals and plans, driving innovation and change, providing decision aids, etc.), organizational activities (e.g. organization design, human resource management, etc.), leadership (e.g. managerial communication, motivation, etc.), or control activities (e.g. operations management, managerial control methods, information systems, etc.).

However, our attention will be directed to a small part of it, to a specific concept, *benchmarking*, which first appeared in the private industry at the end of the 70s[42]. Since then, the successful application of benchmarking has gradually spread within the

[42] The benchmarking concept was first developed by the American company Xerox in 1979, as a way of improving its shrinking competitiveness against Japanese firms.

industry but also outside of it, reaching fields like public sector management or governance.

In few words, benchmarking could be defined as a process of organizational learning involving the comparison with external organizations oriented to the implementation of some selected processes and practices. Conceptually, it has been considered a performance management technique related to the goal-setting activity, though it is meant to be more inclusive and has also been portrayed as part of total quality management (Luthans, 2005, p.499). It has also been considered a component of the formal planning process of an organization (Camp, 1989) or as a management philosophy related to the search of continuous improvement.

Besides its particular classification in a particular branch of management, benchmarking theory seems to offer a potential link to the policy learning and transfer theories, opening the door to synergies and complementary approaches between them. For this reason, this section is devoted to review the most relevant contributions produced within the benchmarking theory and to explore the potential links between this concept and the policy learning and policy transfer theories that could be useful in the definition of a transfer framework.

4.4.2 Definition of benchmarking

Benchmarking could be defined as the process of comparing the performance or capacity of any organization with that of best-in-class organizations. However, it must be noted that there is no universally accepted definition of benchmarking, but a number of them. This fact is probably the result of the dynamic and evolutive nature of the concept, which is used to refer to an increasing number of practical exercises.

Scholars, consultants and practitioners have developed their own definitions and methodologies of benchmarking according to their knowledge and experiences. Some of the most quoted definitions found in the literature are:

- *“The search for industry best practices that will lead to superior performance*” (Camp, 1989, p.28).
- *“A continuous, systematic process for comparing your own efficiency in terms of productivity, quality and practices with those companies and organizations that represent excellence”* (Karlöf et al. 1992, p.ix).
- “*The pursuit by organisations of enhanced performance by learning from the successful practices of others*” (Holloway et al. 1999).

- "*The analysis of internal practices and processes in systematic comparison with those of others in order to identify and implement best practice*" (Arrowsmith et al. 2004, p.312).

- "*The process of identifying, learning, and adapting outstanding practices and processes from any organization, anywhere in the world, to help an organization improve its performance*" (APQC, 2008, p.1).

These and other definitions found in the literature share some essential elements that distinctively frame the concept of benchmarking: 1) They all refer to processes that require the comparison between one organization and other organizations external to it. 2) The external organizations involved in the comparison are best in class (e.g. "*superior performance*", "*excellence*", "*successful practice*", "*best practice*" or *"outstanding practices and processes*"); 3) The process is conscious and follows a definite and structured path (e.g. "*continuous, systematic process*" or "*systematic comparison*"). This fact suggests the application of rational methodologies to guide the benchmarking process from beginning to end; 4) the whole process is oriented to drive practical actions for performance improvement (e.g. "*implement*" or "*adapting*"); and 5) Benchmarking seems to be understood as a *continuous* process. Consequently, it does not end after the learning and adaptation of external processes or practices has been done, but it starts again on the new grounds.

Nevertheless, the concept is still undefined about a number of relevant questions: 1) It is not clear which is its scope of application. Though the majority of authors in the literature regards benchmarking as a tool for increased competitiveness and improvement in private companies, there are also examples of its use in public entities or in broader contexts and levels (e.g. sector or national comparisons); 2) The best-in-class or the best practice are relative notions. There is no single "best practice" because best is not best for everyone. Differences in organizational contexts, missions, cultures and technologies result in the selection of different practices and entities for comparison; 3) The same remark is valid for the aim of the benchmarking exercise, as the notion of "performance" will depend upon the objectives predefined by the management of the organization in view of the problems and environment faced; and 4) The variability in scope and objectives inevitably leads to different methodologies, as they will be designed and suited for a particular scope and objective.

In a similar way to the policy transfer literature, the management literature also faces problems in the definition of the semantic field linked to the notion of benchmarking (horizontal analysis), though in this case the difficulties seem to come from the dynamic nature and extended application of the process and not from a direct conflict with previous concepts.

In spite of this indetermination, the essential elements common to the various definitions of benchmarking offer an undubious value for the construction of a policy transfer framework. First of all because benchmarking shares the focus on the comparison and transfer of elements across different entities, which is central to any policy transfer framework. Second, because it provides a strong practical experience derived from its constant test against reality. In fact, while the policy transfer concept has been proposed as a means to *better understand* some policy processes seen in the real world (a kind of *top-down* approach to the transfer problem), the benchmarking notion has been proposed as a tool to modify reality (that is, a *bottom-up* approach to the transfer problem). Third, because the evolving and active nature of the concept has facilitated the development of several practical methodologies and models, proven in many cases by their successful implementation.

In view of this potential interest, the next sections are dedicated to examine the "vertical development" of the benchmarking concept. Given the variability in scope and objectives of application for the benchmarking concept and the intention of searching a potential link to the policy transfer and learning literatures, this thesis distinguishes two broad fields of application: the private sector and the public sector.

4.4.3 Benchmarking in the private sector

4.4.3.1 Development of benchmarking

According to several authors (Watson, 1993, p.5; Keegan, 1998; Arrowsmith et al. 2004, p.312), the comparison of work processes across the industry has been a common practice since World War II in the form of "*reverse engineering*" and "*comparative statistical activity*".

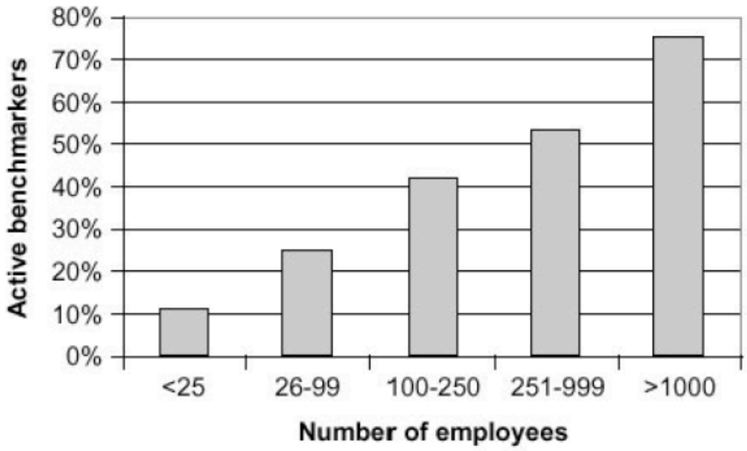
However, it was not until the late 1980s[43] that the first formal methodology for benchmarking was made public by Xerox Corporation, after its implementation in the production department of the company (Xerox Manufacturing Operations) in 1976. This first exercise was a form of competitive benchmarking seeking to match the quality and performance of Japanese competitors and resulted in the introduction of total quality management (TQM) methods, leading the firm to a lasting success.

Since then, benchmarking has deserved growing attention from scholars and practitioners, being implemented by an increasing number of companies all around the world. By 1992, 65% of Fortune 1000 companies were using some form of

[43] The concept was first explained by the Xerox engineer Robert Camp in its groundbreaking essay *Benchmarking: the search for industry best practices that lead to superior performance*.

benchmarking. Such companies include AT&T, Du Pont, Ford Motor, IBM, Eastman Kodak, Milliken and Motorola (Bartol et al. quoted in IMPROVERAIL Consortium, 2003, p.13). In 1993, the MIT's Commission on Industrial Productivity found that almost all successful US companies were doing so (Karlöf et al. 1993, p.2). According to Hinton et al. (2000, p.56), the majority of UK companies with more than 500 employees applied some kind of benchmarking (Fig. 41). This increasing interest has also found its manifestation in the literature. A review conducted by Dorsch and Yasin (1998, p.96) refers 415 publications on benchmarking between 1986 and 1995, while a review conducted by Dattakumar and Jagadeesh (2003, p.176) refers more than 350 publications as of June 2002.

Fig. 41: Relationship between benchmarkers and industry type in the UK. 2000



Source: Hinton et al. 2000, p.56

All this activity has resulted in a quick development of the benchmarking concept and applications since the first Xerox's exercise. It is possible to trace an evolution from "competitive benchmarking" (1976-1986) to "process benchmarking" or "generic benchmarking" (1982-1986) and then to "strategic benchmarking" (1990s), with the view in a future step leading to the concept of "global benchmarking" (Watson, 1994, p.6; Arrowsmith et al. 2004, pp.312-313).

Anderson and Camp (1995, p.21) remarked two fundamental aspects in this evolution: the increasing use of "computer-based benchmarking" (i.e. based on well documented databases of best practices) and the change in focus of the benchmarking process. As remarked by the authors, "*In early studies, the focus tended to be on performance measures, often of competitors, and for the purpose of setting more ambitious targets. Recent studies have examined how non-competitors and industrial outsiders learn how to improve business processes. Comparison of performance measures has developed into learning about best practices*".

4.4.3.2 Categories of benchmarking

The increasing interest of firms in the continuous improvement of their practices has favored the development of a set of concepts and a number of methodologies able to provide answers to a wide range of management problems, all of them under the label "benchmarking". This multiplicity of cases has motivated the definition of several categorizations aimed at describing the contents, the scope or the relationships developed within the benchmarking exercise.

The most common distinction refers to the contents of the benchmarking process. According to it, three types of benchmarking should be differentiated: 1) *Performance benchmarking* - aimed to identify the relative quality of the organization and to suggest means of improvement; 2) *Process benchmarking* - aimed to assist in improving specific processes within the organization; and 3) *Strategic benchmarking* – aimed to improve the overall performance of the organization by examining the long-term structures, management practices and business strategies that have enabled high performers to succeed.

A second distinction relates to the referents adopted for comparison, which can fall in the following four categories: 1) *Internal benchmarking* - when comparisons are made between departments/divisions of the same organization; 2) *Competitive benchmarking* – when comparisons are made against organizations that deliver the same output to compare performance, processes, organization and results; 3) *Functional benchmarking* – when comparisons are made against partners drawn from different business sectors or areas of activity to find ways of improving similar functions or work processes; and 4) *Generic benchmarking* - when comparisons are made against partners drawn from different business sectors or areas of activity to address issues such as organization and strategy (Camp, 1995).

A third distinction refers to the overall approach to benchmarking at company level, which can be done in three ways: 1) A *bottom-up* process of networking and experience sharing; 2) A *top-down* approach, used by large (often multinational) companies, which may be focused internally as well as externally as a means of control and not just learning; and 3) A *global approach*, seeking for a global model of continuous learning and improvement (Arrowsmith et al. 2004, p.313).

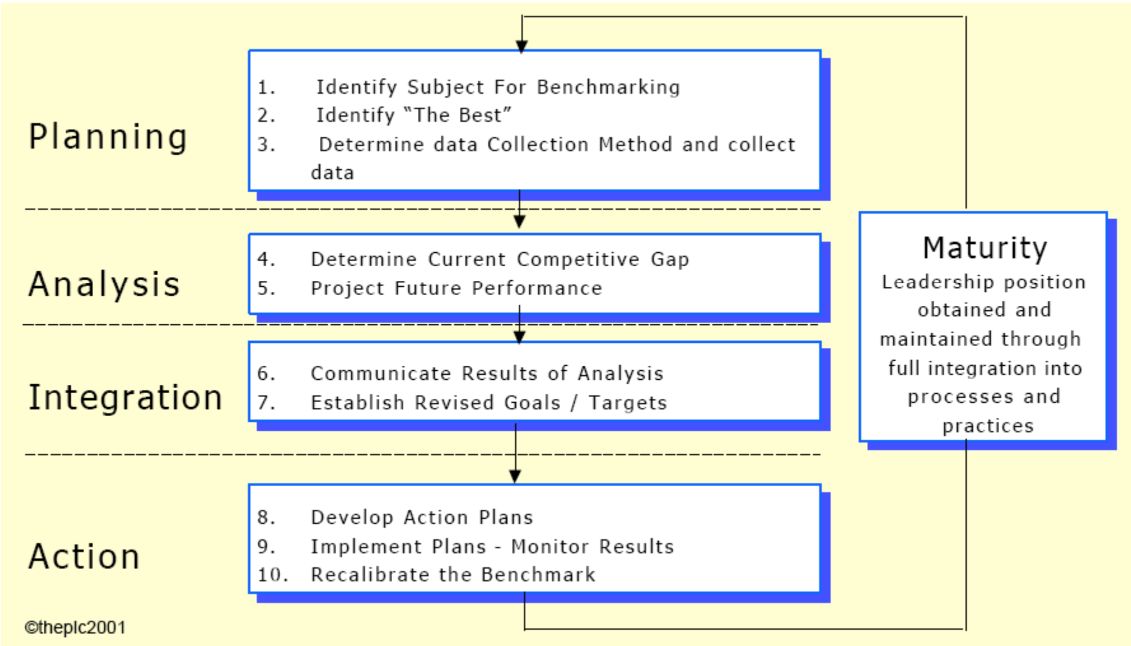
4.4.3.3 Benchmarking in the private sector - Models

With independence of the type of exercise selected, benchmarking involves a systematic process able to cope with the search of excellence outside and inside the organization, with the learning and adoption of operative contents and processes, and with their implementation.

This structured approach has been treated by benchmarking theory through the formulation of several sequential models able to guide the whole process. Watson (1994, pp.3-4) noted that most of the models proposed were built on the basis of the Deming cycle, that is a continuous looping composed of four functional elements*: plan, do, check* and *act*. On the top of this basic structure, the models available have suggested a different number of stages and steps.

Robert C. Camp (1989, p.32) defined a process that distinguished four main activities: 1) *Planning* – aimed at defining the objective of the benchmarking, selecting an appropriate process, selecting the most suitable benchmarking partners and collecting the data needed; 2) *Analysis* – devoted to understand the competitive gap with the benchmarking partners in present and future conditions; 3) *Integration* – aimed at communicating and building acceptance of the results within the organization; and 4) *Action* – devoted to implement the selected practices and monitor the results (Fig. 42).

Fig. 42: Conceptual diagram of the benchmarking process as defined by Camp (1989)

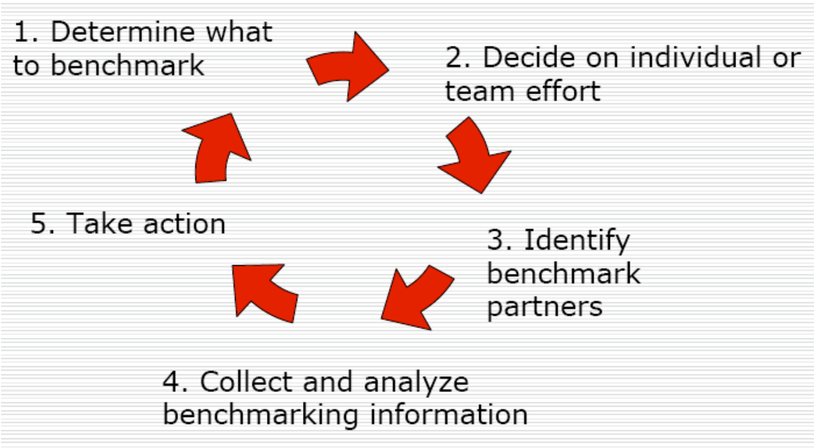


Source: Leonard, 2001, p.9

Karlöf and Östblom (1993, p.65) arrived to a five-stage sequence, which they described as follows: 1) *Decide what to benchmark* – that is, to identify what needs to be benchmarked and what method should be applied; 2) *Identify benchmarking partners* – also includes establishing contact and interfaces with the benchmarked entities; 3) *Gather information* – this phase should supply the information needed, both internal and external; 4) *Analyze* – this is to understand the performance gap, as well as the operative contents and work processes which lead benchmarked partners to achieve excellence and 5) *Implement for effect* – Comprises the work of closing the gap identified by the analytical stage.

Spendolini (1992, p.11) after "benchmark the benchmarkings" (i.e. comparing several benchmarking processes) proposed a five-step sequence: 1) *Define what is going to be benchmarked* – includes defining the needs of the organization, establishing the internal information needs and identifying the critical success factors; 2) *Formation of a benchmarking team*; 3) *Identification of benchmarking partners*; 4) *Collection and analysis of the benchmarking data*; and 5) *Action* – includes the reporting of the process to the organization and the identification of possible improvements for products and processes (Fig. 43).

Fig. 43: Conceptual diagram of the benchmarking process as defined by Spendolini (1992)



Source: Spendolini, 1992, p.48 adapted by D.Simon and A. Franklin

Freytag and Hollensen (2001, p.26) divided the process of benchmarking into seven phases: 1) *which functions to benchmark*; 2) *importance of each subject area*; 3) *whom to benchmark against*; 4) *gather the benchmarking information*; 5) *identify performance gaps*; 6) *how to learn from the "best-in-class"* (benchlearning); and 7) *implementation of the changes* (benchaction).

The literature shows many other sequences for the whole benchmarking process, differing in the number of steps proposed and the focus of each of the phases. However it is possible to identify some similar points in the paths proposed, what suggests the existence of some "core steps" able to define the particularity of the benchmarking sequential model:

- First, they all start from the definition of the scope that should be covered by the benchmarking process (a performance target, an operational process, a strategical decision).

- Second, they build up a model able to describe the item analyzed in quantitative terms (generally through the identification of critical success factors[44] and the selection of quantitative indicators linked to them). It is this model which is used to properly identify the processes, practices and entities deserving attention in the comparison.

- Third, they initiate a learning stage, in which they seek to find and understand the underlying causes of the differences between the processes, practices or entities compared.

- Fourth, they analyze the potential for implementation of the relevant lessons in the organization. They are faced to issues such as the feasibility of their implementation, their more likely consequences on the organization and their eventual modifications or improvements.

- Fifth, the lessons are implemented and monitored.

Additionally to the description of the process, the industry has defined through self-regulation the conditions that should be respected when conducting a benchmarking process. The most well-known initiative is the widely used APQC / SPI Code of Conduct promoted by the International Benchmarking Clearinghouse, which establishes principles such us legality, exchange (provision of value to all stakeholders), confidentiality, limited use (information should be used with the only purpose of improving processes within a company), preparation (perform all the preparatory work required), completion of the study, etc. (Watson, 1994, pp.50-54). Europe has followed this path by the approval of the European Code of Conduct to guide benchmarking encounters and to advance the professionalism of benchmarking. It is a document shaped in a similar way, formulating similar principles as the APQC but adapted to the European Competition Law (IMPROVERAIL Consortium, 2003, pp.126-129)

4.4.3.4 Benchmarking in the private sector- Benefits

The appeal and widespread adoption of benchmarking in the private sector may be found in its ability to address several relevant issues related to organizational learning, internal control or strategic management of the companies.

On the one side, benchmarking offers an appropriate framework and methodology to

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[44] "*Quantitative measures for effectiveness, economy and efficiency; those few activities where satisfactory performance is essential in order for a business to succeed; characteristics, conditions or variables that have a direct influence on a customer's satisfaction with a specific business process; the set of things that must be right if a vision is to be achieved*" (Watson, 1994, p.260).

structure organizational learning. In fact, benchmarking provides an adequate tool to define customers' requirements, to learn about the organization's internal processes, to learn about competitors or to find out outstanding practices and processes through dynamic comparisons with others.

On the other side, benchmarking can be a valuable mean of internal control for the organization, as it provides a deep understanding of processes through the identification of success factors and true measures of productivity. The comparison of indicators with internal and external organizations may be used to monitor inhouse performance. Moreover, the continuous nature of the benchmarking process provides a framework for a permanent evaluation.

Furthermore, benchmarking may be used as a strategical planning tool able to identify effective goals and objectives, to quantify them in challenging target values and to drive change through a strong focus on processes. It may serve to find new areas of development. It may be of help in building a future-oriented vision centered in quality, excellence and worldwide competitiveness. It may even be adopted as a relevant ingredient of the corporative culture or to force cultural change.

4.4.3.5 Benchmarking railway companies

Recent years have seen an increasing production of benchmarking projects within the railway sector as a mean to improve their operational, commercial and managerial performance. This boom is related to both, the fact that railways have traditionally been an isolated sector (with low interest for comparing or even sharing information) and the strong political action towards performance improvement and harmonization.

The latest review of benchmarking projects in the railway sector was conducted in 2003 by the EC-funded project IMPROVERAIL, which examined ten relevant projects[45] as a basis to propose its own benchmarking methodology adapted to the rail sector.

Their review found two categories of benchmarking projects: 1) Projects oriented towards the definition and selection of indicators and data collection; and 2) Projects aimed at comparing processes. They remarked that the first category of projects found difficulties in completing the benchmarking process and often remained blocked at the data collection phase. Furthermore, they pointed out the eventual unsuitability of

[45] The main projects examined by IMPROVERAIL were EQUIP (Extending the Quality of Public Transport), PRORATA (Profitability of rail transport and adaptability of railways), CoMET (Community of METros), Nova (community of medium sized metro systems), EUROPE TRIP (European Railways Optimization Planning Environment - Transportation Railways Integrated Planning), RAILBENCH (performed by FS), benchmarking initiatives from REFER EP and NS, BEST(Benchmarking European Sustainable Transport) and BOB (Benchmarking of Benchmarking).

available data and statistics for comparison purposes and the lack of co-operation from benchmarking partners as barriers found in some of the projects reviewed.

As regards the nature of the benchmarking processes applied, they found that railway companies prefer to remain focused on *competitive benchmarking* instead of undertaking *generic benchmarkings*, a fact that seems to suggest that there is still ample room for learning from same-sector companies. With respect to the methodologies applied, they noted that the reviewed projects "*in one way or another draw on the basic benchmarking methodology but all develop their own specific steps and points of gravity*" (IMPROVERAIL Consortium, 2003, pp.78-79).

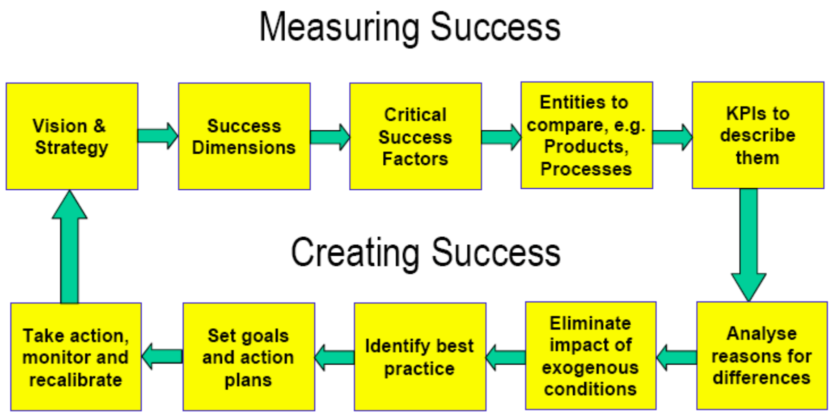
When defining their own benchmarking methodology, the researchers of IMPROVERAIL noted the specificity of railway infrastructure companies and network operators in terms of size and complexity. They remarked the difficulties relative to their sometimes low comparability (different organization of business units as well as different classification of functions and outputs, different technical or accounting standards, etc.).

They distinguished two approaches to benchmarking railway infrastructure companies or network operators: a *unitary* approach, focused on the railway network as a whole, and a *segmented* approach, which tries to select more comparable entities, organizational units or processes for benchmarking with similar entities in other railways. The first approach was retained good for carrying out a strategic benchmarking (e.g. focused on the definition of a vision and/or strategy for the whole entity) or analyzing processes driven at a network-wide level (e.g. commercial arrangements with external parties), but no benchmarking operational performance. On the opposite, the second approach was retained more suited to benchmark performance and processes.

With these *caveats* in mind (i.e. complexity and low comparability of railway companies and multiplicity of approaches), the IMPROVERAIL team suggested the ten-step methodology depicted in Fig. 44.

The benchmarking sequence proposed by IMPROVERAIL involves two consecutive processes. The first one, focused on the definition and metrics of the benchmarking exercise, starts by defining the vision and strategy of the railway company in terms of *success dimensions* (e.g. delivering service quality, railway safety, etc.). Critical success factors are identified and benchmarking partners searched accordingly. Products and processes involved in the consecution of critical success factors are then described through an appropriate set of KPIs. The second, aimed at analyzing and implementing external lessons or practices, starts with a careful study of the differences detected, identifying and eliminating external factors affecting performance which escape to the railway company's control. Best practices and processes under the control of management can then be identified and implementation plans elaborated. Once put into action, their results should be monitored, closing the whole cycle.

Fig. 44: Benchmarking methodology proposed in the IMPROVERAIL project.



Note: KPI – Key Performance Indicator.
Source: Anderson et al. 2003, p.6

Anderson et al. (2003, pp.4-5) further developed these concepts for their specific application to infrastructure management companies. They noted a number of specific motivations, other than improving performance, that could make benchmarking desirable for these entities[46]. They also remarked the great variability of the mechanisms for measuring performance across different European railways and the risk that the effects of superior practices could end up hidden by the influence of differences in geography and local economy conditions.

4.4.3.6 Benchmarking in the private sector - Conclusions

The private sector has undertaken the application of benchmarking driven by a strong result-oriented mentality. Accordingly, benchmarking has been primarily employed as a practical tool to identify and achieve quantifiable targets, avoiding less direct purposes as, for instance, building consensus or influencing other participants. This practical view, together with the adaptability and flexibility of the benchmarking concept, has been successfully used to pursue and attain different objectives (e.g. internal control, operational improvement, strategic planning, etc.).

The frameworks and models adopted have evolved consequently, proving their

[46] They included: 1) Explaining the situation to stakeholders (e.g. regulator, financiers, government); 2) Justifying an appropriate level of financing from the government; 3) Justifying an appropriate level of track charges from the regulator; 4) Providing a better understanding and forecasting of costs and revenues, leading to better project predictability; 5) Setting target cost levels; and 6) Monitoring contractual performance (e.g. train operating companies, maintenance suppliers, etc.).

applicability to a wide range of entities (from other business units of the same company to organizations in completely different industries), their ability to draw useful lessons for every organizational level (corporative, business and operational levels) and their leverage to steer change in corporate's visions and culture.

All frameworks and models encountered in the benchmarking literature are built around two cyclical steps, *learning* and *transfer*, which irremediably suggest a link to the policy transfer and policy learning literatures. However, it is necessary to keep in mind that the objectives, scopes and approaches of benchmarking may not be the same as those found in such fields. Moreover, the benchmarking process applied in the private sector is rather clear-cut: it is a *rational process voluntarily undertaken* by a company with the scope of driving changes that will only affect the organization and will be implemented in its limited and defined context. These characteristics are probably adequate for the analysis of practices in the *management sphere*, but may be not so suitable for its application in the policy-making sphere.

Nevertheless, the frameworks and models arising from the vertical development of the benchmarking concept in the private sector provide some relevant elements that, a priori, would be worth of consideration when proposing a policy transfer framework. They are: 1) The specific attention devoted to the monitoring and understanding of *internal practices* as a pre-requisite for the whole process of comparison, learning and transfer; 2) The ordered and *formal approach* of the comparison process. Although the definition of indicators and the calculation of quantitative values would certainly be difficult in the policy sphere, a similar structure would certainly be helpful for the framework; 3) The *temporal dimension* of the comparison. In fact, the evaluation performed within the benchmarking exercise may go ahead the present moment, providing a dynamic approach to indicators and comparisons; 4) The strong orientation of the whole process towards a *clear objective* (best performance), which provides a strong consistency through all the steps.

As already said, given the problems that may pose their transfer from a *management* sphere to a *policy-making* sphere, they should not be interpreted as specifications but as desirable characteristics of the new framework.

4.4.4 Benchmarking in the public sector

4.4.4.1 Development of benchmarking

Since the early 1990s, the ability of benchmarking to manage organizations and improve their performance has received attention from the public sector, who has increasingly adopted this tool.

The UK recognized formally its relevance as a practical means of improving efficiency in the 1994 White Paper *The Public Service: Continuity and Change* and has since then engaged in a broad range of initiatives to benchmark government departments and agencies. Some of them were the performance benchmarking of the central government Executive Agencies against the private sector and similar entities in other countries; the elaboration of standards for the quality of public service (e.g. the 1991 Citizen's Charte); the elaboration and publication of performance tables for individual schools, hospitals and ambulance trusts, local authority and emergency services; and the development of process benchmarking in some key areas of the public sector like human resource management or value for money studies (Cowper et al. 1997, pp.3-15).

Also in the 1990s, Sweden established a rating system for the financial management of its government agencies, benchmarked its budget process against international partners, compared its public support for families against eight OECD Member Countries and implemented an annual benchmarking plan for local government authorities (Dahlberg et al. 1997, pp.23-33).

Benchmarking gained further momentum in 1996, when the European Commission delivered the Communication *Benchmarking the Competitiveness of European Industry* in which defined it as "*an instrument to promote change and continuous improvement of Europe's competitive performance*" (EC, 1996b, p.3).

One year later, the Commission proposed the use of benchmarking as a valid instrument to optimize policies affecting competitiveness, with particular regard to the European employment strategy. Benchmarking was then seen as a relevant help with respect to two elements: 1) "*The comparison of societal behaviour, commercial practice, market structures and public institutions across countries, regions, sectors and enterprises in order to identify best practice*"; and 2) "*applying reference to best practice as an instrument to identify changes required and to mobilise all actors of the economy and society to evolve in this direction*" (EC, 1997, p.3).

This view of benchmarking, conceived as a management tool that policy-makers could use to foster competitiveness, was expanded at the end of the decade with the development of the Open Method of Coordination (OMC), a governance alternative based on mutual learning and transfer of best practice across Member States.

The OMC was first specified for the European Employment Strategy (EES), and then extended to other fields like the implementation of national action plans for employment, the use of regional and structural funds or the consultation on macroeconomic policy between the European Central Bank, the social partners and the European Commission. The concept was formally consolidated by the European

Council held in Lisbon in March 2000 as "*a mean to help Member States to progressively develop their own policies by*:

- *"Fixing guidelines for the Union with specific timetables in the short, medium and long terms for achieving the goals which they set.*
- *Establishing, where appropriate, quantitative and qualitative indicators and benchmarks against the best in the world and tailored to the needs of different Member States and sectors as a means of comparing best practice.*
- *Translating these European guidelines into national and regional policies by setting specific targets and adopting measures, taking into account national and regional differences.*
- *Periodic monitoring, evaluation and peer review organised as a mutual learning processes."* (European Council, 2000, § 37).

Within this new approach benchmarking attains the status of a driver of EU policy (Arrowsmith et al. 2004, p.318). To say it in other words, benchmarking becomes the nucleus of a more complex and comprehensive strategy conceived as a "*learning process for all*" cooperative and respectful with national diversity. A strategy that has its own logic and can be seen as "*a compromise between a logic of pure integration and a logic of simple cooperation*" (De la Porte et al. 2001, p.4).

Therefore, benchmarking has largely overcome its initial steps as a tool to improve performance in public sector units and has grown to be a tool for policy formulation and assessment. It is this latter aspect the more relevant for the objective of this thesis.

4.4.4.2 Benchmarking in the public sector – Categories of benchmarking

As already happened in the private sector, in the public sector the term "benchmarking" includes a wide set of concepts and methods that can be applied to different scopes and with different objectives in mind.

The first distinction to be done regards the level of the public sector at which the benchmarking exercise take place, thus distinguishing 1) *International level* – when the exercise involves public entities from different countries (e.g. the EU); 2) *National level* – when the exercise involves public entities within the same country; and 3) *Sub-national level* – when the exercise involves public entities within a particular region or local administration.

As regards the EU level, in its 1997 Communication, the Commission distinguished three possible levels of benchmarking: the *enterprise level* (as treated in the previous section 4.4.3), the *sectoral level* (concentrated on specific factors of the sector concerned) and the *level of framework* conditions (as a full evaluation of industry's competitive situation and a diagnostic of the areas to be examined). It also noted the interest of conducting the latter type of exercise in the field of logistics and transport (EC, 1997, p.4).

When it comes to the approaches related to the introduction of benchmarking into the public sector, the literature distinguishes two cases: 1) A *top-down approach*, where benchmarking is imposed externally, usually by a central department or management agency; and 2) a *bottom-up approach*, where individual organizations develop their own benchmarking projects and try to find relevant benchmarking partners (Helgason, 1997, p.3).

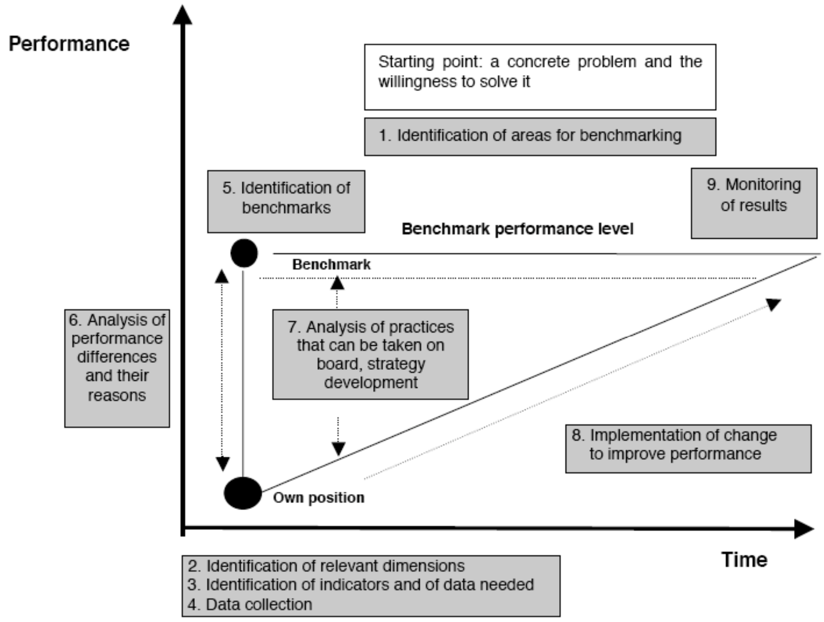
This classification has been enlarged to three when it is referred to EU-level benchmarking: 1) the *surveillance approach*, used to seek and verify compliance at national and sub-national levels with Community policies or regulations; 2) the *learning approach*, used to analyze problems and make comparative assessment as a step towards best practice identification and building political consensus; and 3) the *improvement approach*, conceived as a combination of analytic and action orientation with "*measurement sticks for self-evaluation*" and "*learning possibilities for improvement and adaptation*"(HLGB, 1999, p.23).

4.4.4.3 Benchmarking in the public sector –Theoretical frameworks and models

Dorsch and Yasin (1998, p.104), after conducting an extensive review of benchmarking frameworks, noted that the literature contained few examples of benchmarking initiatives in the public sector. Furthermore, they draw attention on the general lack of advanced models and frameworks able to explain the many facets of organizational benchmarking.

In fact, most of the benchmarking frameworks and models proposed for the public sector are adaptations of those developed for the private sector. One example of this kind of frameworks can be found in Trosa and Williams (1996, pp.48-49), who proposed the following five-step sequence: 1) *Understanding existing processes*; 2) *Selecting indicators*; 3) *Choosing benchmarking partners*; 4*) Relating process benchmarking and outcomes*; and 5*) Creating links between benchmarking, continuous improvement and evaluation*. Another example is the nine-step sequence proposed by the European Commission (Fig. 45).

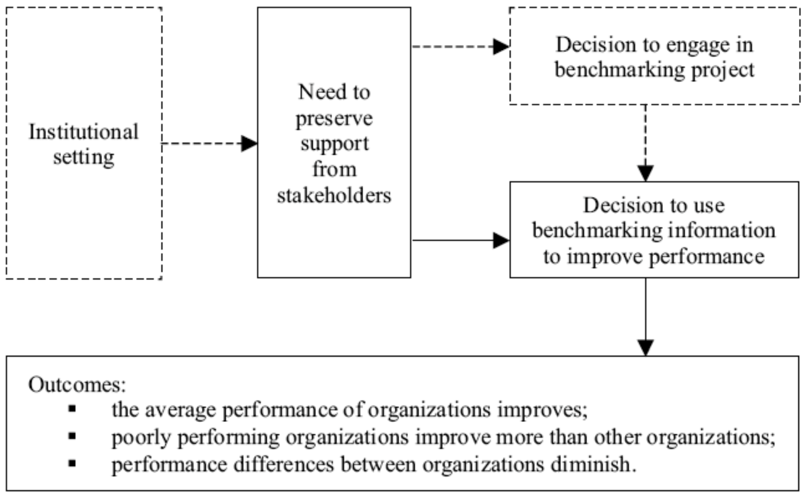
Fig. 45: Benchmarking sequence proposed by the European Commission



Source: Deiss, 2000, p.63

However, the literature also provides some innovative developments. Helden and Tillema (2005, pp.337-345) proposed a theoretical framework to investigate public sector benchmarking, built on a combination of economic and institutional reasoning (Fig. 46).

Fig. 46: Theoretical framework for benchmarking in the public sector proposed by Helden et al. (2005)



Source: Helden et al. 2005, p.342

The economic reasoning was used by the authors to approach the effects of the benchmarking process. They suggested that benchmarking could be viewed as a substitute for market forces able to drive effectiveness and efficiency in the public sector. They tested this assumption against several policy documents and proposed three economic hypothesis for the framework: 1) *"benchmarking will improve the average performance of organizations*"; 2) "*benchmarking is a stronger incentive to improve performance for poorly performing organizations than for better performing organizations*"; and 3) "*benchmarking will diminish performance differences between organizations*".

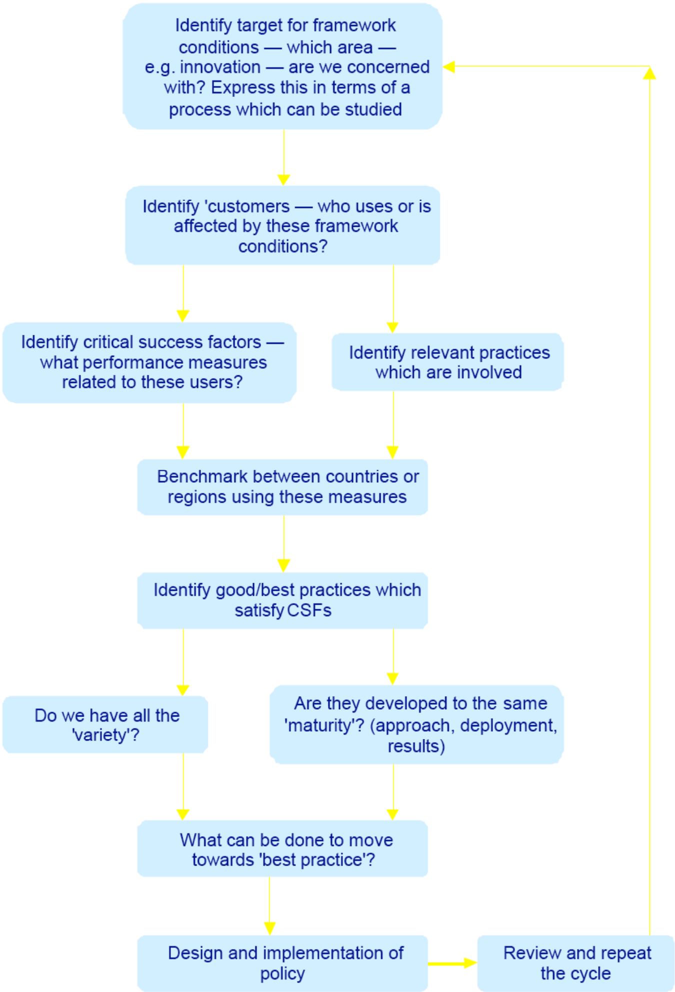
The institutional reasoning was used to approach the reasons why public sector organizations take decisions that are related to benchmarking. In this case the authors suggested the role played by institutional pressures and the organization's response to that pressures[47]. Building on previous works, they suggested a complete set of factors related to the engagement of a public organization in a benchmarking project. The public organization will be more likely to engage in a benchmarking project: 1) the higher the degree of social legitimacy and/or economic gain perceived to be attainable; 2) the lower the disagreement from its stakeholders; 3) the higher its dependency upon stakeholders exerting pressure to engage in a benchmarking project; 4) the lower the degree of conflict with its organizational goals; 5) the smaller the extent of discretionary constraints imposed on it by a pressure to engage in benchmarking; 6) the more a higher governmental authority or the legislator plays a part in a pressure to engage in benchmarking; 7) the higher the number of organizations within its organizational field that have decided voluntarily to engage in benchmarking; 8) the higher the level of uncertainty in its environment; 9) the higher the degree of interconnectedness among the organizations within its organizational field.

The authors refined their model with empirical research on the waste-water treatment benchmarking and concluded that "*economic reasoning can only address particular explanations for response patterns of public sector organizations to benchmarking. It turned out to be useful to include complementary explanations that were derived from institutional reasoning*".

Bessant and Rush (1999, p.8) proposed a methodology for benchmarking framework conditions, based on a Delphi survey promoted in 1999 by the European Commission. They acknowledged the differences between company activity and governmental policy benchmarking and stated that, though the essential process is common, "*working with framework conditions may pose problems of focus and measurement*". The authors proposed a six stage methodology for benchmarking framework conditions (Fig. 47).

[47] Helden and Tillema based their model on two branches of the institutional theory (neoinstitutional theory and resource dependence theory) that presuppose that the behaviour of organizations is determined by different types of institutional pressures and responses to these pressures. The differences arise in the interpretation of the responses to institutional pressures: the neoinstitutional theory emphasizes the importance of compliance with external rules and standards, while the resource dependence theory stresses organizations' abilities to influence their environments.

Fig. 47: Methodology proposed for benchmarking framework conditions by Bessant et al. (1999)



Note: CSF – Critical Success Factor.

Source: Bessant et al. 1999, p.8

4.4.4.4 Benchmarking in the public sector - Benefits

Though in a first time the public sector was mainly attracted by the benefits reported by benchmarking techniques in the private sector, it has been able to adapt and evolve this management tool in the pursuit of new specific goals and benefits. The introduction of benchmarking in the public sector has contributed to the questioning of existing experiences and to the enhancement of a problem-solving approach in the public administration, presenting itself as a valuable aid in the political decision-making process.

At the operational level, the public sector has adopted benchmarking as a means to improve the learning abilities of public agencies through permanent comparison with similar entities. It has also taken advantage of benchmarking as a tool to control performance and delivery of public services and, in a second step, as a method to introduce competitive pressure in non-market regulated activities through the linkage of incentives to the values of relevant indicators tested against the private sector or similar agencies.

At the strategical level, the benchmarking tool has been integrated in the policy-making process as a way to identify areas for improvement, to provide assessment on policy options and to set quantitative targets for policy inputs, outputs and processes. Thanks to its structured approach, benchmarking has been able to improve not only the efficiency, but also the transparency and contestability of the policy-making process.

Furthermore, its participative nature has enabled it as a framework for discussion, agreement and making of policies far more open and flexible than other approaches (e.g. based on coercive legislation). The participation of every stakeholder in the elaboration of goals and targets, the identification of best performers, and the scrutiny of progress acts as a source of legitimacy for the outcoming policies.

The structured approach and the participative nature of benchmarking have also promoted its use as a powerful communication instrument able to justify and gain support for specific policies.

4.4.4.5 Benchmarking transport policies

Transport policy is a new area of application for benchmarking. In this field, benchmarking is aimed at understanding how other transport policies work in terms of inputs, processes and outcomes in order to improve transport policies currently applied.

A first reference to the potential use of benchmarking to help setting policy in the transport sector can be found in the 1999 ECMT Conference *"Transport Benchmarking. Methodologies, Applications and Data needs*". It concluded that "*Benchmarking in its most complex 'comparative analysis' version*[48] *really can be used to define policy*" and remarked the need of formulating concrete, measurable, clear, quantified objectives, as well as the precondition of a high involvement of politicians in the process (ECMT, 2000, p.191).

Until now, few research projects have been produced in this field. The main European contributions on transport benchmarking in a policy context have been delivered by the BEST (Benchmarking European Sustainable Transport), BOB (Benchmarking Of Benchmarking) and NATCYP (National Cycling Policy Benchmarking Program)

[48] This "version" is defined as "*a multi-layer strategy to achieve greater effectiveness and higher quality services and encourage change*" (Wobbe, 2000, p.10).

projects. Another relevant project in this field is the European Best Practice in Delivering Integrated Transport, commissioned by the CfIT in the UK.

The BEST project (2000-2003) was conceived as a thematic network bringing together European policy-makers, professionals and stakeholders working in the transport sector with a threefold objective: 1) To produce recommendations for the EC on the development of benchmarking as a practical tool to improve the implementation of sustainable transport policies throughout Europe; 2) To create an innovative dynamic of exchange of experience between the different transport sectors and sub-sectors; and 3) To build consensus, at a European level, on the key requirements for a successful benchmarking process and on the benefits of applying benchmarking in the transport sector.

The project underscored the potential role of benchmarking as a means for developing, implementing and evaluating policy in the transport sector. It first provided a general framework for analyzing the interaction between benchmarking and public policy, which distinguished five types of relations (BEST Consortium, 2003, pp.3-12):

- *Policy on benchmarking* – Development of political initiatives to support and promote the use of benchmarking. This approach focuses on the promotion of top-down driven benchmarking activities within the industry.

- *Benchmarking into policy* – Refers to procedures to most effectively bring existing benchmarking data into the processes of policy formulation and implementation. This approach concentrates on the conditions under which the policy lessons already obtained from one administrative or operational context can be transferred to another.

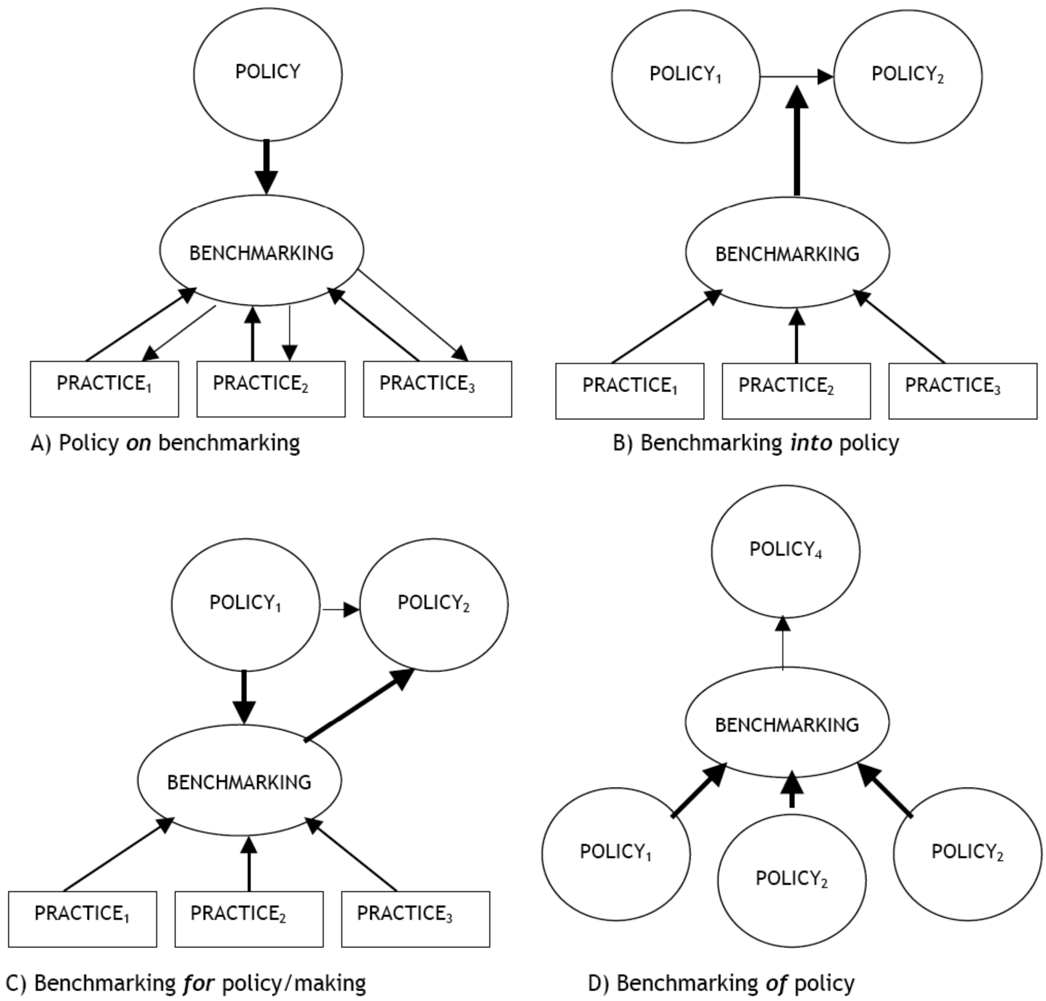
- *Benchmarking for policy* – Development of new benchmarking projects in particular areas in order to directly exploit and learn from them in the development of policies. This approach seeks to understand the framework conditions and processes existing in the industry and suggest areas for improvement through political action.

- *Benchmarking of policy* – Application of benchmarking to compare the performance of different policies adopted by different administrations. This approach focuses on the evaluation of policies. As noted in the project, it is not clear the particular role of the *"essentially managerial methodologies of benchmarking*" with respect to the "*well-established discipline of policy evaluation*". It is even suggested to "*re-frame any questions about policy* *benchmarking in terms of the comparative evaluation of particular policies or policy instruments*".

- *Benchmarking of policy-making* – Application of benchmarking to compare the processes of policy-making in different administrations. This approach is concerned with the identification and dissemination of best practice in policy-making.

Fig. 48 provides a schematical representation of the abovementioned relations.

Fig. 48: Different roles of benchmarking in relation to policy



Source: BEST Consortium, 2003, p.15

The BEST project concluded that benchmarking is a suitable tool for policy-makers to develop, formulate, implement and evaluate transport policies at different levels - international, national, sub-national. Among the recommendations that should be considered when using benchmarking in this context, they noted the following (BEST Consortium, 2002, pp.1-12):

- The meaning of the term *transport policy* should be clearly defined, as well as the specific aspects to be benchmarked (e.g. policy-making process, policy objectives, policy instruments, policy outcomes, etc.) and the level of detail (e.g. policy, policy and programs, etc.).
- Comparing the policy measures proposed is not a valuable process in itself. The benchmarking exercise should better *concentrate* on the impact of certain policy measures or instruments (relating these to objectives and outcomes) or on the process that leads to certain results in the area to which the policy applies.
- The benchmarking exercise should start simply with *limited objectives* and a few indicators based on already available or easily available data. Only later it would be gradually able to develop the process to include other areas and issues.
- The *scope and level* (international, national, sub-national) of the benchmarking exercise should be set in relation to the objectives to be achieved.
- Cross-national comparison of transport policies must take into account differing *external conditions* and *policy objectives*, particularly as regards the assessment of the impact of policy measures in another context. Geographical, demographic, economic, institutional, social and cultural differences between countries need to be properly understood when identifying benchmarks and good practices.
- The complexity of transport policy may also require a *qualitative* assessment of policy and performance in addition to quantitative measures.

The BOB project was launched to provide practical support to the BEST project through the testing of use of benchmarking methods in relation to transport policy issues. Its work consisted in the development of three pilot studies, one of them related to passenger transport in rail, another to airport accessibility and a third one related to road safety.

The BOB railway pilot carried out a detailed analysis on causes of delays through a nine-step benchmarking methodology[49] focused on two main areas: *institutional relations*

[49] 1) Identification of areas for benchmarking; 2) Identification of relevant dimensions; 3) Identification of indicators and of data needed; 4) Collection and collation of data; 5) Identification of benchmarks and choice of indicators; 6) Analysis of the reasons for performance differences. 7) Analysis of possible

– exploring the effects of the relation between administration, infrastructure provider and operators in punctuality – and *performance criteria* – exploring the effects of some operational aspects on punctuality.

As regards the benchmarking exercise within the area of *institutional relations*, the project acknowledged the difficulty of identifying appropriate dimensions within it and the impossibility of defining ideal models as regards the structure of the railway sector (given the absence of consensus in this field). Concerning the identification of best practices, the project stated that "*effective policymaking depends fundamentally on the national and regional settings and framework conditions in different countries. Although a common framework of rules is agreed upon in the EU, national and regional circumstances differ too much for easy identification of one single 'best practice'*." (NEA, 2003, p.21).

The NATCYP project (2001) was promoted by the association Vélo Mondial with the twofold objective of providing good quality data on cycling policies and promoting / improving cycling policies worldwide. The project selected a number of issues to be addressed and proposed quantitative and qualitative indicators for each of them (targets and performance, policy-making process, tools and measures and barriers and support). The project acknowledged the value of benchmarking national cycling policies and remarked its added value in terms of sharing of information, identification of strengths and weaknesses of current policies and a better understanding of national practices as part of a wider political action. The exercise was also perceived by stakeholders as a good starting point for policy formulation and renewal (Vélo Mondial, 2001, pp.22-27).

The UK White Paper *A New Deal for Transport Better for Everyone* (1998) recognized the value of improving transport policy through learning from best practice and declared it one of the objectives of the newly created CfIT - Commission for Integrated Transport (Dft, 1998, p.81).

In 2001 this institution promoted the project *European Best Practice in Delivering Integrated Transport*, a comprehensive comparison of the UK's approach to all modes of transport with that of the rest of Europe. The project involved the comparison of transport performance and policies at the national and local levels, the development of case studies on certain European cities and the assessment of the potential transferability of the best practices identified in these case studies to the UK.

It concluded that the variation in progress towards attaining policy objectives, both between countries and within countries, were due to a number of influences, namely: 1)

remedial measures; 8) Proposals for action and continuous improvement programmes; and 9) Monitoring of results (NEA, 2003, pp.9-10).

background factors that may well be beyond the influence of transport policies (e.g. contextual and cultural factors); 2) differences in the magnitude and treatment of *common threats* that are affecting all European countries (e.g. increasing car ownership, urban sprawl, etc.); and 3) *integrated transport policy factors* (e.g. policies effectively implemented) (WS Atkins, 2001, pp.67-75).

4.4.4.6 Benchmarking in the public sector – Conclusions

From the consulted literature, the application of benchmarking to the public sector seems to be twofold. In fact a clear distinction is drawn between benchmarking understood as a *management tool* imported from the private sector in order to enhance the learning processes, controllability and performance of public agencies, and benchmarking understood as a *policy-making tool*. While the first area faces similar considerations as those already made for the use of benchmarking in the private sector, it is at the policy-making level where the specificity of its use in the public sector lies.

The addition of this new sphere of action to the idea of benchmarking has enlarged even more the range of fields, purposes and levels that may be included within this notion, leading to a further diversity of exercises and to a greater indefinition of the concept.

As a management tool, benchmarking has progressively gained support in public administration as a way to improve performance, improve performance information, reproduce competitive conditions or assess performance of companies and services contracted by the Administration.

In this case, the practical frameworks and models which are applied have been constructed on those already formulated by the private sector, though with a greater focus on "competitive benchmarking" as a way to enhance the comparability of indicators across agencies[50]. However, the application of benchmarking as a management tool in the public sector seems to go against greater difficulties than in the private sector. This is the case, for instance, of the selection of appropriate indicators to measure performance, since public sector's activity is less likely to be described through simple and univocal indicators (e.g. as financial indicators in the private industry).

As a policy-making tool, benchmarking has recently been incorporated to the public sector as a new way to explore different policy options, to gain political support to new ideas, to document and control the decision-making processes or to promote commitment through peer-to-peer pressure. This kind of application has received uneven attention from countries and supranational organizations, with some among them

[50] Thus avoiding other forms like functional or generic benchmarking that could be much more difficult to apply to the public sector.

ignoring its possibilities and others enhancing it to the level of policy-driver. Its application has also been different depending on the field, with greater presence in the areas of employment, education or economic policies and lower in others, like transport policy.

The methodological frameworks adopted for its application in the policy-making field seem to be somehow undefined. Although they are frequently built on the "classical sequences" proposed within the private sector, the frameworks are challenged by the new questions posed by the connection between the benchmarking tool and the policy-making process, as the involvement of the stakeholders, the use of qualitative methods as a complement to the quantification of indicators or the link to policy assessment procedures. An example of this new situation is provided by the problematic definition of "best practices" in the field of policy-making. The presence of several and potentially conflicting policy goals, the difficulties to reach agreement among several stakeholders as regards the indicators to be used or the low comparability of data may impede the consensus on the identification of successful practices, hindering the whole of the process.

In both cases, benchmarking preserves the *learning* and *transfer* steps in a distinct manner. As a management tool these steps certainly allow for a link to the policy transfer and policy learning concepts; as a policy-making tool, the relation between benchmarking and the mentioned literatures becomes a matter of overlapping. In fact, there seems to be a blurry area in which policy evaluation, policy learning, policy transfer, policy-making and policy benchmarking overlap. However, it is necessary to still keep in mind that the objectives, models and approaches adopted in a benchmarking exercise may not be the same as those found in such fields.

Globally speaking, the benchmarking process that is being applied in the public sector is not so clear-cut as the exercises seen in the private sector. On the one side it is still a *rational* process *voluntarily* undertaken by a public organization with the scope of driving changes. On the other it is also becoming a new arena for political interaction, a softer way of policy-making, a communication tool or a means to exert indirect pressure on some stakeholders. Moreover, given the particular role of the public administration, the outputs and results of the benchmarking process are likely to spread across society, particularly when applied to policies.

Though its application to the policy-making processes is still at an early stage, some valuable lessons can be already obtained as regards the construction of a policy transport framework. All of them arise from the difficulties and shortcomings identified when trying to apply the benchmarking tool to the policy-making sphere and therefore draw the current limitations of the methodology. They are: 1) the need of a clear definition for the term *policy* and the aspects included in the comparison (e.g. goals, processes, outcomes, etc.); 2) the need of a clear focus for the whole benchmarking process; 3) the need to take into account strong differences among the original contexts of the practices analyzed; 4) the difficulty of finding univocal indicators and quantitative values for them; 5) the difficulty of defining best practice in an univocal way.

4.5 Link between both literatures

Once concluded the horizontal and vertical analysis of the key concepts proposed by the policy transfer and the benchmarking literatures, this section will elaborate on the nature and characteristics of the link that can be established between them. This step is not only undertaken to connect the nature and the steps specific to each of them, but mainly to:

1) Evaluate their potential as foundations of a framework for the analysis of policy transfer; and
2) Relate within a consistent approach the specifications and lessons obtained from each literature in view of the definition of such a framework.

It has been previously noted that both literatures may be understood as different approaches to the same "*transfer problem*", with the view arising from the comparative politics being a "top-down" approach and the view arising from management science being a "bottom-up" approach. It has also been noted that learning and transfer are two cyclical steps present in the benchmarking sequences studied, which seems to suggest a relation between the literatures in terms of *processes*.

To further explore these potential links and others that may arise, the analysis has been focused in two areas – the *concept* and the *process* – and has differentiated four concepts related to the mentioned literatures: *policy learning*, *policy transfer*, *benchmarking (policy-making tool)* and *benchmarking (management tool)*.

Building on the consulted literature, each concept has been defined for a number of categories included in each area, so to provide a one-sight view on their more relevant characteristics (Table 14).

Table 14: Comparison between benchmarking and policy transfer literatures

	Policy learning	Policy transfer	Benchmarking: Policy-making tool	Benchmarking: Management tool
1) Concept				
Sphere	Political	Political	Political	Management
Relation to policy-making	Source for policy-making	Process of policy-making	Process of policy-making	Tool for policy-making
Object	Policies, programs	Policies, administrative arrangements, institutions and ideas	Policies, measures	Practices, processes, strategies
Specific focus	Understanding the *conditions* under which policies operate	Understanding the *process* by which policies move	Implementing best practice; continuous improvement	Implementing best practice; continuous improvement
Scope	Spatial / temporal	Spatial / temporal	Spatial	Spatial
Character	Voluntary; Rational	Voluntary / Coercive; Rational / Non rational	Voluntary; Rational	Voluntary Rational
2) Process				
1) Definition	Problem driven	Several causes (coercion, international pressures, convergence...)	Competition driven – performance gap	Competition driven– performance gap
2) Selection (criterion)	Used to deal with similar problem	Several (geographical or ideological proximity, policy characteristics...)	Excellence	Excellence
2) Selection (methodology)	Limited search for templates	Limited search for templates	Indicators (quantitative and also qualitative)	Indicators (quantitative)
3) Learning	Create a lesson (detailed cause and effect description of a set of actions)	Understand the key elements	Understand the causes beneath the "gap"	Understand the causes beneath the "gap"
4) Adaptation	Prospective evaluation	Preconditions, differences in context factors (actors, institutions, performance)	"Translation" taking into account national and regional differences	Specification for the recipient company
5) Action	Not specified	Development of policies, administrative arrangements, institutions and ideas	Setting of specific policy targets and adoption of measures	Practical actions for performance improvement

Source: own elaboration

Logically, this approach builds on an implicit interpretation of the concepts at the time of selecting a given definition or approach stated in the consulted literature.

The four notions examined are related to the importation of elements from external entities. This common interest bridges both literatures at the conceptual level and makes them relevant for the definition of a transfer framework. However, any insight digging further in this common statement will find substantial differences across them.

Benchmarking (management) is clearly outside of the political sphere. Therefore it may provide an adequate framework to import elements that fall within the management sphere, but it seems less useful to treat policies. Benchmarking (policy-making), policy learning and policy transfer are inside the policy sphere, thus related to the policy-making process. They all interact with the decisions involved in policy-making, either acting as a source of new ideas (particularly policy learning) or being part of the evaluation, selection or implementation steps of policy. However, their contributions are different in focus: the policy learning approach stresses on the *conditions* under which the policy operates, the policy transfer approach on the *process* by which it moves and the benchmarking approach on the policy elements responsible for *excellence*.

All the four notions are interested in the spatial dimension of the problem (i.e. importer elements from other places), but the policy learning and policy transfer concepts encompass it and also take into account the temporal dimension (i.e. importing elements from past experiences). As regards their “character”, policy learning and benchmarking (policy-making and management) are mainly conceived as voluntary processes driven by rationality (bounded or not), while the policy transfer concept seems able to apply as well to non-rational or / and compulsory processes.

When the analysis is performed on the processes proposed by the literatures, it shows that they share five stages: *definition*, *selection*, *learning*, *adapting* and *action*. There are however differences in the approach and contents of every step depending on the concept studied.

Benchmarking (policy-making and management) and policy transfer are dependent upon the action stage, as it is necessary for studying the transfer process or to effectively drive improvements in the importer entity. Policy learning is less interested on this stage, as it concentrates on the conditions of the transfer and treats action as a kind of scenario for prospective evaluation. Similarly, the focus of policy transfer on the transfer process itself diminishes its interest in the learning stage, while it is relevant for the others.

The definition and selection stages seem to be more defined in benchmarking (policy-making and management) as a result of a univocal criterion and method for selecting external experiences (excellence and evaluation of indicators). Policy transfer and policy learning follow a less systematic approach, which on the other side may be more suitable for treating the complexity of policy-making.

The approach to the learning stage reflects variations among the four concepts, suggesting fundamental differences in the construction of models able to understand and work with reality. Benchmarking (policy-making and management) models the external experience in terms of processes and factors contributing to excellence and learns from them only in the measure that they can add value to the importer entity. Policy learning models the external experience in terms of conditions and causal relations between actions and effects. The learning process is comprehensive and is already interested in the limits and potential applications of the lessons drawn. Policy transfer understands the external experience in its core elements, those which are distinctive, in order to establish their transferability.

Nonetheless, it is probably at the adaptation stage where the differences in definition among the concepts are the more visible, ranging from a clear-cut *specification* in the case of benchmarking (management) to an undefined prospective *evaluation* in the case of policy learning. In this case the greater sharpness found in benchmarking (management) can be explained as a result of the management environment, which allows a greater power for straightforward implementation, which is not the case in the political sphere, where debate and agreement are a requirement.

From these evidences it arises that there are affinities between both literatures as regards the concepts and processes they propose for the search and application of lessons obtained from external experience. However, it is important to distinguish their scope of application according to three axes.

The first one is the *sphere* where the transfer question lies. Here we should distinguish between the management and policy-making spheres, though they are not separated by a clear-cut and impermeable boundary between them[51]. The management sphere is clearly within the scope benchmarking literature and hardly admits any consideration from the policy transfer and learning literatures.

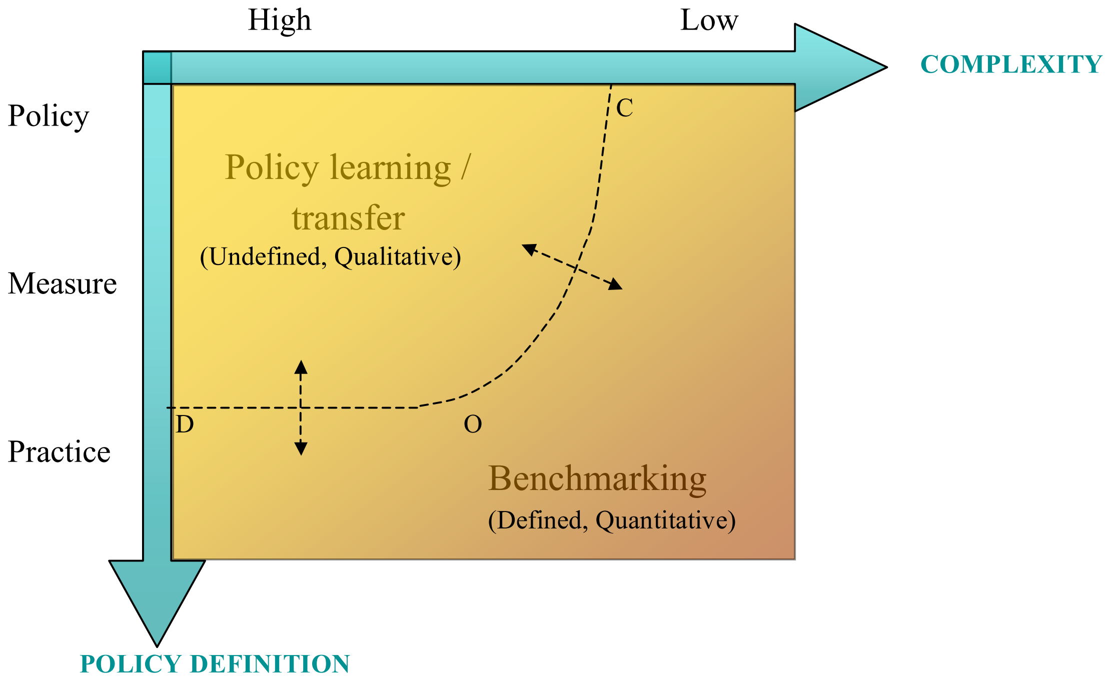
Once in the policy-making sphere, the scope for each literature will be determined by the *policy definition* dimension and the *complexity* dimension. The policy definition dimension refers to the point of the political process at which the transfer problem has arisen. It may be understood as a continuum going from policy to practice. The

[51] Wyatt (2002, p.4) states this boundary in the following terms: "*we can differentiate in broad terms between, on the one hand, policy making which involves the exercise of decision-making powers by politicians who are electorally accountable for their acts, and on the other hand managerial decisions by those with delegated responsibility for the operation of public services*".

complexity dimension makes reference to the specific complication of the transfer problem. It may be understood in terms of the number of levels, actors and interactions involved, the relevance of the specific policy field tackled and the uncertainty present in the decision-making system.

According to these two dimensions, the relation between both literatures in the policy-making sphere can be described as represented in Fig. 49. The scope of benchmarking literature is preferently located in well-defined and lowly complex steps of policy, while the scope of the policy transfer literature is complementary[52]. However, the boundaries between them are not clearly defined, as represented by the dashed interface.

Fig. 49: Conceptual diagram relating policy transfer and benchmarking literatures in the policy-making sphere



Source: own elaboration

This proposition supports the view of the comparative politics being a "top-down" approach and the view arising from management science being a "bottom-up" approach. This view is in harmony with the development of the benchmarking concept, eminently practical, which reached the policy sphere only after succeeding in the private and public sectors as a management tool.

[52] This approach, somehow places in a second level the specific focus of each literature (centered in conditions and transfer processes in the policy transfer literature and related to the search of excellence in the benchmarking literature). This decision has been taken in order to better focus on the methodological aspects of the transfer problem, in view of the objective set for this thesis.

Coming now back to the question posed (i.e. the evaluation of their potential to back a framework for the analysis of policy transfer with consistent specifications and lessons), its answer greatly lies on the definition of the interface DOC (see diagram). In particular, the evaluation of the complexity linked to the specific policy examined (point C) and its stage of development (point D) will orient it towards one, another, or both literatures.

4.6 Synthesis

In the last decades, changes in the economy and society have led to increasing complexity and challenged the ability of governments and corporations to promote and implement their policies. This evolution has also offered new opportunities in both sectors. Governments have found an increasing availability of national experiences and the occasion for policy coordination, harmonization and transfer. Companies have found new sources of learning in the practices and processes of competitors and have took advantage of them in their innovation processes. New possibilities for learning, improving and transferring policies and practices have arisen. Accordingly, it has been necessary to develop a set of concepts, tools and methodologies to guide and improve the exchange of knowledge across institutions and its application in new environments and contexts. Two distinct disciplines have undertaken this task, developing theoretical and applied approaches to the notions of transfer and transferability: comparative politics and management science.

The efforts of *comparative politics* have been focused on the development of the policy transfer concept, still open as regards its relation to similar notions like policy learning, policy diffusion or convergence. The review of the ongoing debate provides a valuable input for the conceptual framework proposed in this thesis concerning the relation between transfer and policy-making, the consideration of rationality and coercion in the transfer process or the causes of transfer failure. The review of the frameworks proposed by the policy transfer literature presents a number of lessons that can be useful at different stages of the framework-building process. The most important ideas regard the *multi-level approach* to transfer, understood as the successive influence of external and internal processes, the open *refusal of comprehensive rationality*, the three *basic steps of policy transfer* (information, evaluation/adaptation and decision /implementation) or the key role played by *synthesis and mapping procedures* throughout the transfer process.

Management science has produced the notion of *benchmarking*, also subject to debate because of its dynamic nature and increasingly extended application. In the private sector, benchmarking has been primarily employed as a practical tool to identify and achieve quantifiable targets, but also to steer change in corporate's visions and culture. A large number of frameworks and models has been developed, with common characteristics, as the cyclical steps of *learning and transfer*, the specific attention devoted to the monitoring and *understanding of internal practices*, the ordered and *formal approach* of the comparison process or the *strong orientation towards a clear objective*, certainly worth of consideration when proposing a policy transfer framework. In the public sector benchmarking has assumed a twofold function, as a management tool oriented to reproduce competitive conditions and as a policy-making tool able to explore different policy options, gain political support to new ideas, control decision processes or promote commitment through peer-to-peer pressure. It is in this second role where the notion of benchmarking explores its own limits with respect to the policy-making process, the multiplicity of stakeholders, the introduction of qualitative methods as a complement to quantification or its relation to policy assessment procedures.

The presence of the learning and transfer steps in the benchmarking literature and the apparent overlapping of concepts such as policy learning, policy transfer and policy benchmarking suggests a *link between the two literatures* considered. This research proposes that both literatures may be understood as different approaches to the same "transfer problem", with the view arising from the comparative politics being a "top-down" approach and the view arising from management science being a "bottom-up" approach. Furthermore it defines the fields of application of each literature according to three dimensions. The first one is the *sphere* where the transfer question lies. Here it is necessary to distinguish between the management and policy-making spheres, with the management sphere clearly within the scope of the benchmarking literature. Once in the policy-making sphere, the scope for each literature is determined by the *policy definition dimension*, referred to the point of the process going from policy to practice where the transfer problem arises, and the *complexity dimension*, related to the specific complication of the transfer problem in terms of the number of levels, actors and interactions involved, the relevance of the specific policy field tackled and the uncertainty present in the decision-making system. According to these two dimensions, the scope of benchmarking literature in the policy-making sphere is preferently located in well-defined and lowly complex steps of policy, while the scope of the policy transfer literature is complementary. This view is in harmony with the development of the benchmarking concept, eminently practical, which reached the policy-making sphere only after succeeding in the private and public sectors as a management tool.

Chapter

5

A CONCEPTUAL FRAMEWORK FOR THE ASSESSMENT OF TRANSFERABILITY

5.1 Introduction

Building on the assumption that policies and practices can be effectively transferred, this chapter proposes a general framework to assess the transferability of policies and/or practices from one jurisdiction (exporter jurisdiction) to another (importer jurisdiction). In a second step, the general framework will be particularized for the specific analysis of railway infrastructure pricing policies and practices.

Section 5.2 proposes and discusses the basic hypotheses and structures of a conceptual model valid for the analysis of the transferability of policies and practices; Section 5.3 operationalizes this basic structure, identifying the most relevant issues to be included in the model and providing a practical approach to their assessment in the field of railway infrastructure pricing policies; Finally, section 5.4 summarizes the main findings of the chapter.

5.2 Definition of a general framework for the assessment of transferability

5.2.1 Introduction

By framework this thesis understands a set of ideas and principles that provides the basis for the analysis of transferability. It is a conceptual structure that lies between the theoretical foundations of the policy transfer and benchmarking literatures and a real life simulation model. Accordingly, the framework proposed treats the key elements of the transferability problem although it does not arrive to the detail of a true real-world simulation model. Furthermore, the framework focuses on a given aspect of the transfer problem, transferability, but ignores some other aspects of it that could also be of interest from other approaches.

By transferability we refer to the condition of being transferable from the exporter to the importer jurisdiction. The exact meaning and implications of such condition will be further defined, but at this stage the fact of a policy and/or practice “being transferable” can be explained as a combination of the feasibility of its adequate importation from the exporter jurisdiction and its applicability to the local context of the importer jurisdiction.

In simpler words, given a policy and/or practice likely to be transferred to the importer jurisdiction, the framework should provide the basic elements as to answer the following questions:

- Could the policy or practice be transferred here?
- Could it work here?
- If not, what would it take to make it work here?

This task is not a simple one. As it has been noted by Macário and Viegas (2006, p.3), performing a transferability exercise in the political sphere is not at all a deterministic exercise that can be described in a definite and detailed way. Indeed, complexity is inherent to the political sphere, often characterized by undefined objectives, criteria and procedures, in turn subject to political discussion themselves. Also for such reason, the conceptual and methodological considerations that will be developed here adopt the form of a framework.

To build the general transferability framework, this thesis will take advantage of the potential embedded in the existing benchmarking and policy transfer literatures, already reviewed in the previous chapter. According to its concluding remarks, the benchmarking literature seems to be of greater relevance for the transfer of practices and policies in situations with a low level of complexity, while the policy transfer literature presumably should be better applied in highly complex and less defined situations.

The resulting general framework is conceived as a first step able to promote discussion on transferability. Its particularization to the field of railway infrastructure pricing policies and practices will try to find further application as a tool able to assist the importer entities through the decisions involved in a transfer process.

5.2.2 Objective of the framework

The point of departure for the analysis is what may be called the *transfer problem*: An entity wants to transfer and implement a policy or practice in its jurisdiction which has already been successfully applied by another entity in another jurisdiction where different conditions exist. In view of the existing differences, the entity would like to know whether that policy or practice has the potential to be successfully implemented under its own local conditions. If the policy or practice effectively has that potential, then it is said to be *transferable*. Accordingly, the assessment of transferability is conceived as a prospective exercise that tries to determine *a priori* how likely is a policy or practice of being *successfully* implemented in the importer jurisdiction by the importer entity.

The general framework proposed in this section is aimed at elaborating the concepts and principles that should frame the transferability assessment of policies and/or practices.

To further clarify the objective, it seems useful to describe as well what questions fall outside the scope of the transfer framework proposed. More precisely, the framework:

1) It is not intended to provide guidance on best practice selection. In fact, such approach entails strong assumptions and heavy methodological requirements that are already embedded in the “best practice” notion. Actually, defining a practice as “best” implies that there is one best way to achieve the objectives pursued whereas in the policy field it is frequent that different practices succeed in similar goals in different contexts. Furthermore, it presupposes that the best practice has been compared with a wide set of similar practices at the national and international level. Consequently, the framework proposed here could be also used to assess the transferability of “bad” or “worst” practices.

2) It is not intended to provide guidance on the adaptation of policies and/or practices to conditions different than those prevailing in the exporter jurisdiction. Indeed, such approach requires not only to identify the elements of the policy and/or practice that are not compatible with the local conditions, but to explore the alternatives to these elements and assess the effects of those alternatives on the overall behavior of the policy and/or practice.

3) It is not intended to provide guidance on the implementation of policies and/or practices transferred from other jurisdictions. Answering to that question would certainly require a much more detailed insight on the local conditions of the importer jurisdiction.

5.2.3 Relation to the literature

As explained in the previous chapter, two literatures have been identified as potentially useful to root the present framework, as both are concerned with the transfer problem: the policy transfer literature (within the field of comparative policies) and the benchmarking literature (connected with management sciences).

From their analysis, it has been possible to identify two particularities that could be able to condition their relevance for the proposed framework. First, they take different perspectives and approaches to the transfer problem within the political sphere. Second, they are both involved in a definition process, as illustrated by the wide amount of discussion produced in the last years, which sometimes achieves contrasting views on the same elements. Thus it appears necessary to clarify the criteria adopted when building the framework with respect to these two aspects.

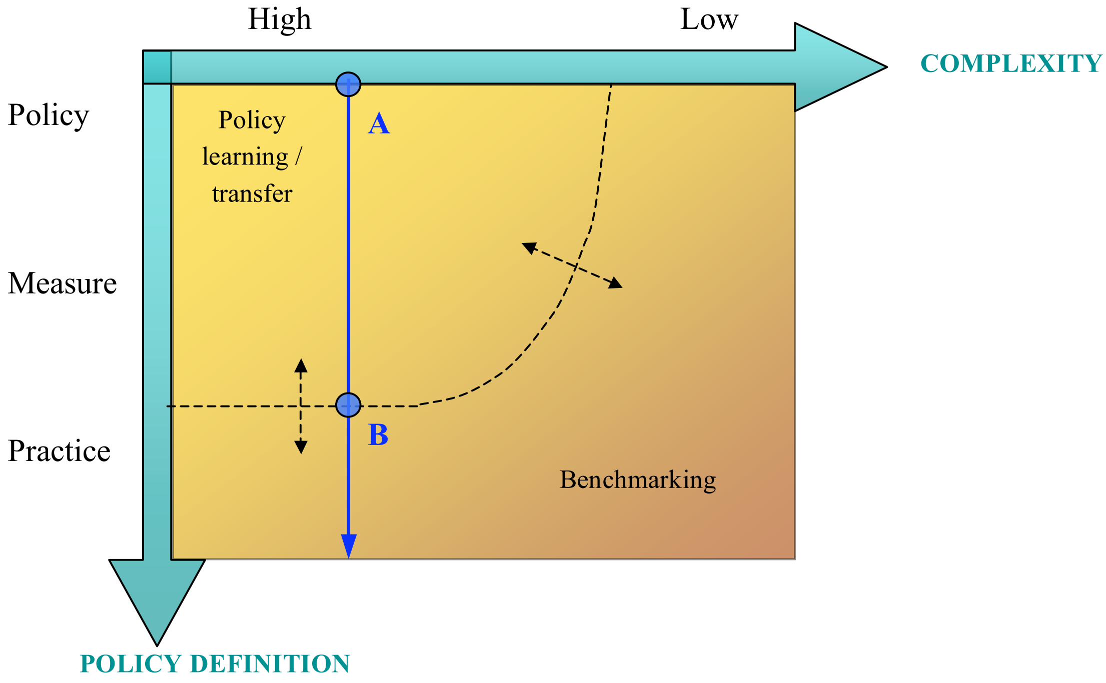
As regards the existence of different approaches, the previous section concluded that the relation to both literatures should be defined with respect to the dimensions of complexity and policy definition.

For the general framework, that later on will be particularized for pricing policies, a high degree of *complexity* is assumed. This assumption considers that the transfer exercise: 1) will be extremely non-standardized and context-dependent; 2) will be closely interrelated with problems arising in other areas of policy-making; 3) will be subject to conditions of great uncertainty, both in the problem definition and the selection of the instruments to be employed; and 4) will take place in an environment populated by multiple stakeholders with potentially incompatible interests. In these circumstances, the quantitative and defined approach of the benchmarking literature will be mainly limited to the “practice” level, while the qualitative an undefined approach of the policy transfer literature will prevail at the “policy” and “measure” levels.

As to the *policy definition* dimension, the general framework seeks to cover the whole decision-making path which links policy to practice, as a means to contain within it all the levels involved in the transferability assessment. In fact, assessing the transferability of a given policy necessarily requires taking into account its definition through programs and its application through practices in reality. Moreover, this approach will allow the framework to provide guidance at every step of the policy-making process.

Those two assumptions may be graphically represented as in Fig. 50, which shows the scope of the framework in terms of complexity (point A) and definition (blue arrow) as well as its relation to the literatures examined (point B).

Fig. 50: Conceptual diagram showing the relation between the literature and the conceptual framework proposed



Source: own elaboration

As regards the *diversity of opinions and positions* with respect to the concepts involved in each of the treated literatures, the framework proposed will necessarily select some of them, abandoning the others. The choice will be primarily justified on the grounds of suitability to the objective posed and practicability.

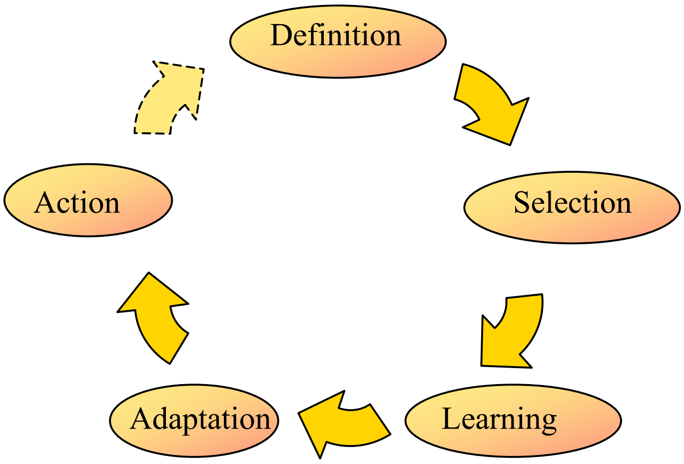
It must be said that this criterion may produce an oversimplification of some concepts and some loss of consistency with respect to the ongoing debate. It should not be interpreted in any case as a selection of position or a criticism to some of the opinions present in the conceptual discussion, but only as practical choice in view of an easier operationalization of the framework proposed.

5.2.4 Relation to the transfer process

The assessment of transferability cannot be thought without connection to a transfer process, ongoing or potential. Therefore it seems necessary, as a previous step to its formulation, to clarify the relation existing between the proposed framework and the transfer process. In turn, this requires first to make explicit a conceptualization of the transfer process.

The transfer process is conceived here as an ordered succession of five stages*: definition, selection, learning, adaptation* and *action* (Fig. 51).

Fig. 51: Graphical scheme of the transfer process



Source: own elaboration

The *definition* phase includes the identification and characterization of a problem affecting the importer jurisdiction that has the potential to be solved through the importation of a policy and/or practice implemented in another jurisdiction. Consequently the transfer process is understood as a method whose aim is to solve an existing problem[53].

The *selection* phase performs the identification of a set of policies and/or practices applied by other entities that could be used to solve the problem. It then gathers preliminary information on the policies / practices so as to assess them and select the one that will be transferred.

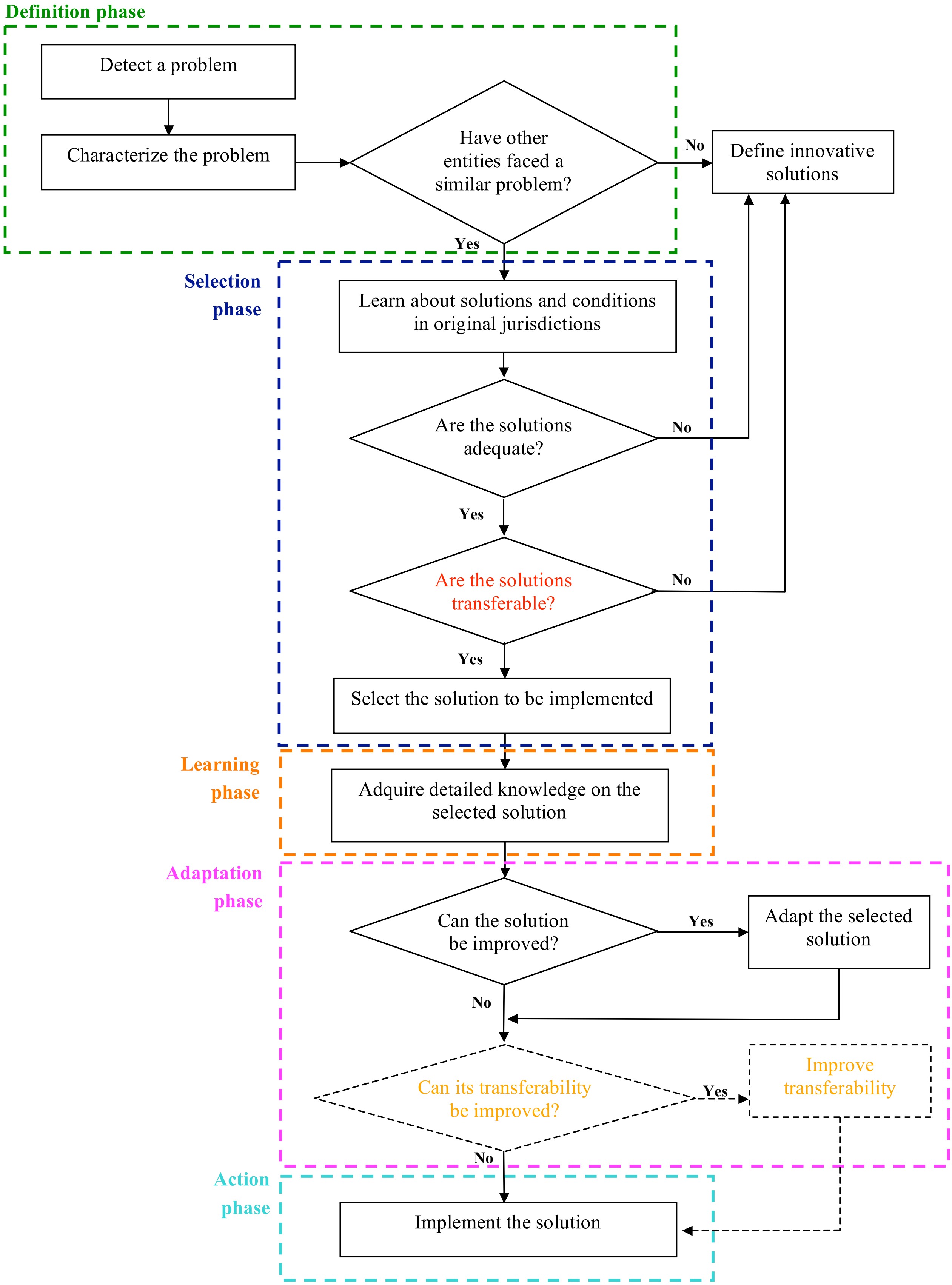
The *learning* phase produces a detailed knowledge on the selected policy/practice as regards its basic elements, its functioning in the exporter jurisdiction, its implementation and the conditions required for it to work. In doing so, this phase basically builds up a model of what the policy/practice is, how does it work and what does it need to work.

The *adaptation* phase introduces changes in the basic elements of the policy/practice in order to improve its chances of success in the importer jurisdiction. Such modifications require a wide knowledge of the conditions prevailing in the importer jurisdiction.

Finally, the *implementation* phase introduces the adapted policy and/or practice in the importer jurisdiction. This phase ends up the transfer process, though it can act as the starting point of other loops.

[53] The term *problem* is used here in its wider sense. For instance, it may also include the lack of benefits due to competitive pressure from best performing entities or the demands of a supranational entity for greater harmonization.

Fig. 52: Relation between the general framework for the assessment of the transferability and the transfer process



Source: own elaboration

The interaction between the proposed framework and the transfer process happens at the selection phase (Fig. 52), where it provides the assessment of the transferability of the policies / practices. At this stage of the process, transferability is a necessary condition that must be fulfilled by the policies / practices in order to continue through the next stages of the process (further learning, adaptation and implementation). Within this view, it must be noted that transferability is not considered a sufficient condition for a policy/practice to be selected for transfer.

When the proposed framework enters into action, the problem to be solved has been perfectly characterized and an exploratory search has produced relevant information on the policies/practices and their contexts. The output of the proposed framework is the evaluation of the transferability of the policies/practices examined from their original jurisdiction to the importer jurisdiction. This evaluation may result in the exclusion of a number of policies/practices assessed as non-transferable.

In addition to this interaction, that should explicitly or implicitly be done in every transfer process, it is possible to conceive a second point of the process where the framework could be of utility. This is at the modification phase, where the availability of a deeper knowledge of the policy / practice that is going to be transferred may be used to evaluate the possibility of improving its transferability. At this point, the framework may be used to test different alternatives to improve the transferability, either through modifications to the policy/practice or through modifications of the context conditions.

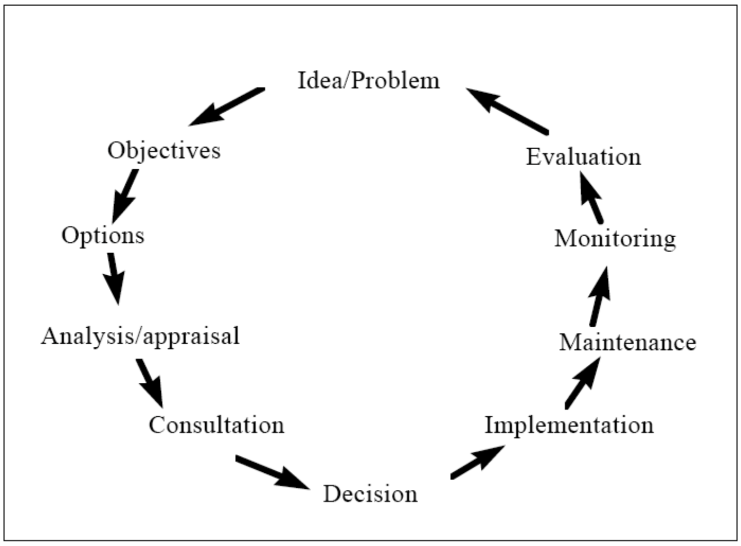
Therefore, the proposed framework has the potential to add value to the transfer process both directly, at the selection phase, and indirectly, through an enhanced overall knowledge of the practice and the improvement of the modification phase.

5.2.5 Relation to the policy-making process

As it has been already said, the framework proposed to assess transferability seeks to be useful for any level of definition within the continuum ranging from policy to practice. This broad scope of action requires a previous clarification of the policy-making concept and sequence.

Policy-making is understood here as a process able to convert the vision and goals of the political actors into actions and outcomes in reality. As a process, policy-making can be described as a sequence of activities. However, as it has been already the case for the concepts of benchmarking and policy transfer, the literature has not attained consensus on the stages that should be included.

Fig. 53: Basic policy-making sequence assumed for the definition of the general framework



Source: Wyatt, 2002, p.5

Building on the work performed by the CMPS, the framework will assume the basic policy-making sequence proposed by the UK Civil Service College (as quoted in Wyatt, 2002, pp.4-7). This sequence can be represented as in Fig. 53, and consists of the following steps:

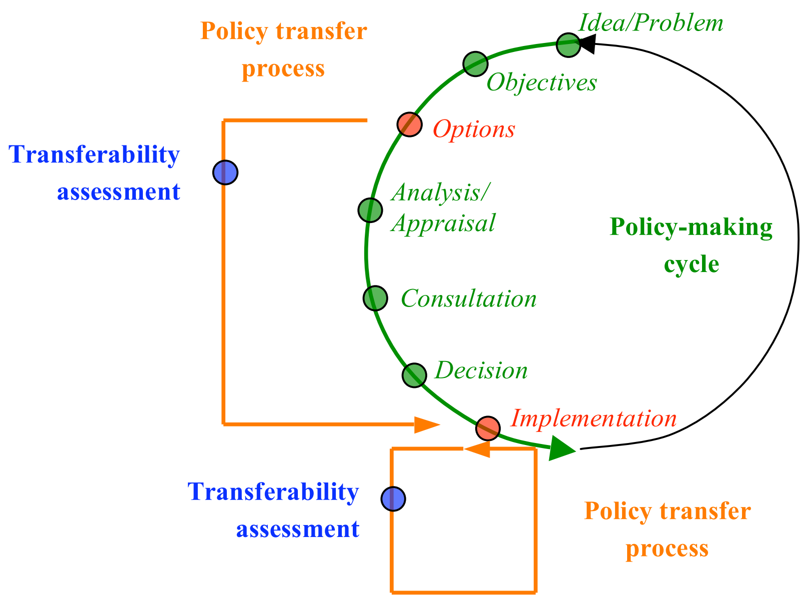
- *Idea / problem*: a new cycle of policy-making may be initiated by the identification of a problem or, proactively, by the formulation of a new idea.
- *Setting of objectives*: this step establishes explicit objectives for the initiative concerned.
- *Definition of options*: this step generates alternative courses of action aligned with the formulated objectives. This stage may also include a preselection of options.
- *Analysis/Appraisal*: this step evaluates the most likely consequences of the alternative courses of action proposed, including their economic impact.
- *Consultation*: this step gathers external feedback on the alternatives under study through the use of techniques ranging from formal public consultation to sondage of opinion in less formal contexts.
- *Decision*: a decision is made by political actors.
- *Implementation*: this step includes a wide range of possible activities oriented to give effect to the selected policy initiative. They may range from issuing a new position to the physical implementation of the measures needed.

- *Maintenance*: this step gathers all those functions and activities undertaken by policy-makers to maintain the implemented policy at work.
- *Monitoring*: this step provides an ongoing supervision on the functioning of the policy implemented.
- *Evaluation*: this step is aimed at determining whether or not, or to what extent, the policy has delivered the intended outcomes according to the time and budget foreseen.

The relation between the policy-making process described through this sequence and the policy transfer framework happens in two different ways.

The first one takes place through the policy transfer process. At some step of the policy-making process, decision-makers resolve to engage in a policy transfer process. This is more likely to happen in the first part of the policy-making cycle, from the formulation of an idea/problem to the implementation of policy, and particularly at the steps of *definition of options* and *implementation*. The assessment of transferability is one of the steps of policy transfer.

Fig. 54: Conceptual diagram of the relation between policy-making, policy transfer and transferability assessment



Source: own elaboration

This first type of relation is depicted in Fig. 54, which shows the relation between the policy-making cycle and the transfer processes starting at the steps of *definition of options* (and ending at the implementation stage) and *implementation* (which provides a loop within this same step for different levels of implementation).

The second type of relation is embedded in the assessment of transferability, which needs a policy-making reference model in order to perform its evaluation on the policy /practice being transferred. This point will be developed later in the framework (section 5.2.7).

5.2.6 Elements of the transfer framework

The general framework proposed to assess the transferability of policies and / or practices is built on the assumption of a particular understanding of the transfer process, which is conceived from a set of *elements*.

The *elements* are the basic inputs that should be available in order to assess transferability. The general framework proposed contains the following six elements:

1) Jurisdictions and entities involved
2) Aim of the transfer process
3) Object being transferred
4) Sources of policy transfer
5) External influences
6) Context conditions

5.2.6.1 Jurisdictions and entities involved

As a first input, the framework proposed needs to identify the entities and jurisdictions involved in the transfer process. An entity may be defined as an organization that has a decision-making power related to the particular policy field where the transfer occurs. A jurisdiction may be defined as the area and policy field over which the entity can exert its decision power and wants to execute the transfer[54].

In its simpler version, the transfer process only requires the participation of a single entity, the importer entity. As a response to a problem detected in its own jurisdiction, the importer entity decides to engage in a transfer process that will push it to select a relevant policy or practice applied in another jurisdiction. Then, the entity will learn about the policy / practice, will eventually modify it and finally will implement it in its

[54] In fact, though the entity may be capable of exerting its decision power over a larger policy field or area, it can foresee the transfer only for a part of it. The term jurisdiction will be used in the framework referred to this restricted meaning.

own jurisdiction. All along this process, the importer entity will not need to interact with the entity or entities that were responsible for implementing the policy or practice in its original context.

The transfer process may also be engaged with an active participation of the entity or entities that were responsible for the implementation of the selected policy/practice in the exporter jurisdiction. This involvement would possibly result in a more accurate learning about the policy/practice that is being transferred.

However, depending on the policy field and the degree of complexity of the object being transferred, there may be more than a single importer entity. For example, the transfer of policies against congestion in an urban area may require the participation of national, regional and metropolitan agencies as importer entities, given that the three networks are present in that area.

The framework proposed assumes that an importer entity is able to perform by itself all the stages identified for the transfer process. So, it will have the ability to define, select, learn from, modify and implement a policy or practice previously applied in another jurisdiction. As well, the framework assumes that the importer entity is already in possession of a complete knowledge on the conditions present in its own jurisdiction.

5.2.6.2 Aim of the transfer process

The framework proposed needs a clear definition of the aim of the transfer process, which will be a central element to the whole assessment of transferability.

According to the sequence assumed for the transfer process, this aim may be identified in general terms with the solution of the problem detected in the importer jurisdiction. Therefore its degree of concretion will be greatly dependent on the characterization of the problem, which can be done at different levels of definition. The concretion of the problem will spread through all the process of transferability assessment, constraining in turn its level of definition. This process of characterization may entail the breaking down of the initial problem in secondary problems, each of which can be at the origin of new transfer processes

For instance, a metropolitan authority may identify congestion as relevant problem to be addressed. However, it will be able to characterize it at different levels of definition: as “congestion”, as “congestion in peak hours”, as “congestion in the trunk network in peak hours” or as “congestion in the West accesses to the city centre in the morning peak hour”. The level of detail achieved in the characterization of the problem will determine the degree of concretion of the policy transfer process and of the transferability assessment.

Furthermore, once characterized the problem and before starting the selection phase, the transfer process produces a search of entities that have faced a similar problem. The framework assumes that this search defines a number of cases related to a similar problem in the same policy field. This assumption excludes from the transferability assessment the policies/practices originated in other policy fields or related to a different problem. Though it could be certainly possible to formulate some preliminary considerations about their transferability, a sound assessment would require a much more detailed knowledge than the one produced in a preliminary search. Moreover, the specific difficulties related to their modification and implementation is thought to fall in the domain of innovation.

5.2.6.3 Object being transferred

The framework proposed seeks to be useful for any level of definition within the continuum ranging from policy to practice. This statement means that the transfer process may be initiated at any point of the policy definition process.

In order to operationalize this continuum, the framework distinguishes three types of objects that can be involved in a transfer process, each resulting from a different level of definition. These objects are *policies*, *measures* and *practices*:

- A *policy* is defined as a course of action by which an entity seeks to solve a problem or reach an objective. It generally results from a process in which the entity translates its understanding of the problem into general objectives, proposes various alternatives and selects one.
- A *measure* is defined as any of the actions undertaken by the entity in order to implement a given policy. A policy may be implemented through one or more measures, normally obtained through a selection process.
- A *practice* is defined as the result of implementing a measure in the real world. The application of a measure to reality entails the choice of a wide number of technical, informational and managerial details that may lead to different practices. Contrary to policies and measures, which remain in a theoretical level, a practice can be observed in reality.

For example, a metropolitan agency confronted to heavy congestion in the accesses to the city centre in peak hours, could seek to transfer a successful policy from abroad. In its search the agency could find different policy alternatives, like “increasing the offer of public transport along the corridors involved”; “promoting a higher occupancy of private vehicles traveling along the corridors involved”; “introducing a toll scheme in the accesses to the city centre” or a combination of them. In this case, the transferability assessment of the alternatives would be conducted over the object *policy*.

If the metropolitan agency had already defined or selected a policy (e.g. “promoting a higher occupancy of private vehicles traveling along the corridors involved"), it could seek to transfer successful measures already applied in other jurisdictions, among alternatives such as "building new HOV lanes", "converting some lanes of the accesses into HOV lanes"; "provide economic incentives for car sharing"; "collaborating with companies generating demand on the corridors involved to define mobility plans" or a combined solution. In this case, the transferability assessment of the alternatives would be conducted over the object *measure*.

If the metropolitan agency already knows what measure it wants to implement (e.g. "convert some lanes of the accesses into HOV lanes"), then several practices can be found in other jurisdictions. They would be differentiated by the number of lanes reserved for HOV, the occupancy rate of the vehicle giving access to these lanes, the physical segregation or not from the rest of the traffic flow, the control system avoiding misuse of the HOV lanes, etc.

The nature of these three types of object likely to be transferred, *policies*, *measures* and *practices*, will be further clarified at the time of defining the levels involved in the policy transfer (section 5.2.7)

5.2.6.4 Sources of transfer

The framework proposed assesses the transferability of policies, measures or practices that have been previously preselected. The objects included in this set of preselected items are referred to as *sources of transfer*.

The sources of transfer are policies, measures or practices that already exist, that have already been implemented somewhere and have proven feasible (I.e. the framework does not apply to objects never adopted before). Furthermore, the transfer process foresees two additional criteria to propose an object as a source of transfer.

The first criterion limits the objects of transfer to those that have been implemented by other entities in order to solve *similar problems*. As previously explained, this criterion restricts the sources of transfer to those policies/practices that share a similar aim.

The second criterion restricts the sources of transfer to those objects considered *adequate* by the importer entity. This criterion may involve several considerations from the importer entity. It may produce an assessment on existing policies/practices to detect best or successful practices; it may limit the sources of transfer to those originated in jurisdictions which share some basic characteristics with the importer jurisdiction; it may select them following the inertia of previous transfers (i.e. if the entity has already borrowed policies / practices from another entity, it will be more likely to consider policies / practices implemented by this jurisdiction); it may focus the search of policies/practices on ideologically similar jurisdictions, etc.

Depending on the conditions set by the importer entity to find *adequate* policies/practices, the sources of transfers will result from a rational process (more or less bounded), from an incremental approach to policy or from a decision taken with low or no relation to the problem posed.

5.2.6.5 External influences

The framework proposed acknowledges the presence of external influences that may condition the transferability of the different policies/practices preselected as sources of transfer. By *external*, the framework refers to influences originated outside the institutional environment of the importer entity and jurisdiction. According to this characteristic, the importer entity may accommodate or resist the external influences, but it has no direct or indirect power to change them.

The external influences may act at various levels of the transfer process. They can drive the definition step, through a particular characterization of the problem, they may condition the preselection step, by imposing selection criteria to the importer entity, but they can also condition the possibilities of success for a policy/practice when it is implemented in the importer jurisdiction, thus its transferability.

The form adopted by the external influences may vary, involving different degrees of coercion and definition. Sometimes they are expressed in the form of legislation applicable to the importer entity, while in other occasions their action is less defined and more vague (e.g. a convergence trend resulting from globalization).

Not infrequently, a transfer process makes part of a policy-making process happening at a wider level, which may shape and influence the transfer process itself. An example of such external influence may be represented by the effects of decisions, recommendations and directives of the European Union on the transfer processes that may be undertaken by national governments.

5.2.6.6 Context conditions

Finally, there is a need to understand the local context in order to fully assess the opportunities and constraints embedded in a given transfer. Accordingly, the framework proposed must take into account the conditions and limitations to the transfer that may arise from the particular context existing in the importer jurisdiction.

Context conditions are clearly distinguished from external influence because they shape *internally* the characteristics of the importer jurisdiction. In fact, context conditions may be related to the nature and characteristics of the importer entity, to the policy-making process or to the technological, institutional, economic or social settings prevailing in the importer jurisdiction.

When one or more of these conditions are openly incompatible with the implementation and/or functioning of the object being transferred, they become *limitations* to the transfer, which may be finally overcome or end up by excluding the transfer of the object. Examples of such limitations could be the absence of social and/or political support; the resistance to changes in legislation, policy or institutional frameworks; the absence of appropriate technology or management systems; potential environmental impacts; absence of resources for the transfer and the maintenance of the policy transferred, etc.

5.2.7 Levels of analysis

The general framework proposed seeks to cover the whole decision-making path that links policy to practice. To operationalize this continuum, three types of objects likely to be transferred have been already defined: *policies*, *measures* and *practices* (section 5.2.6.3).

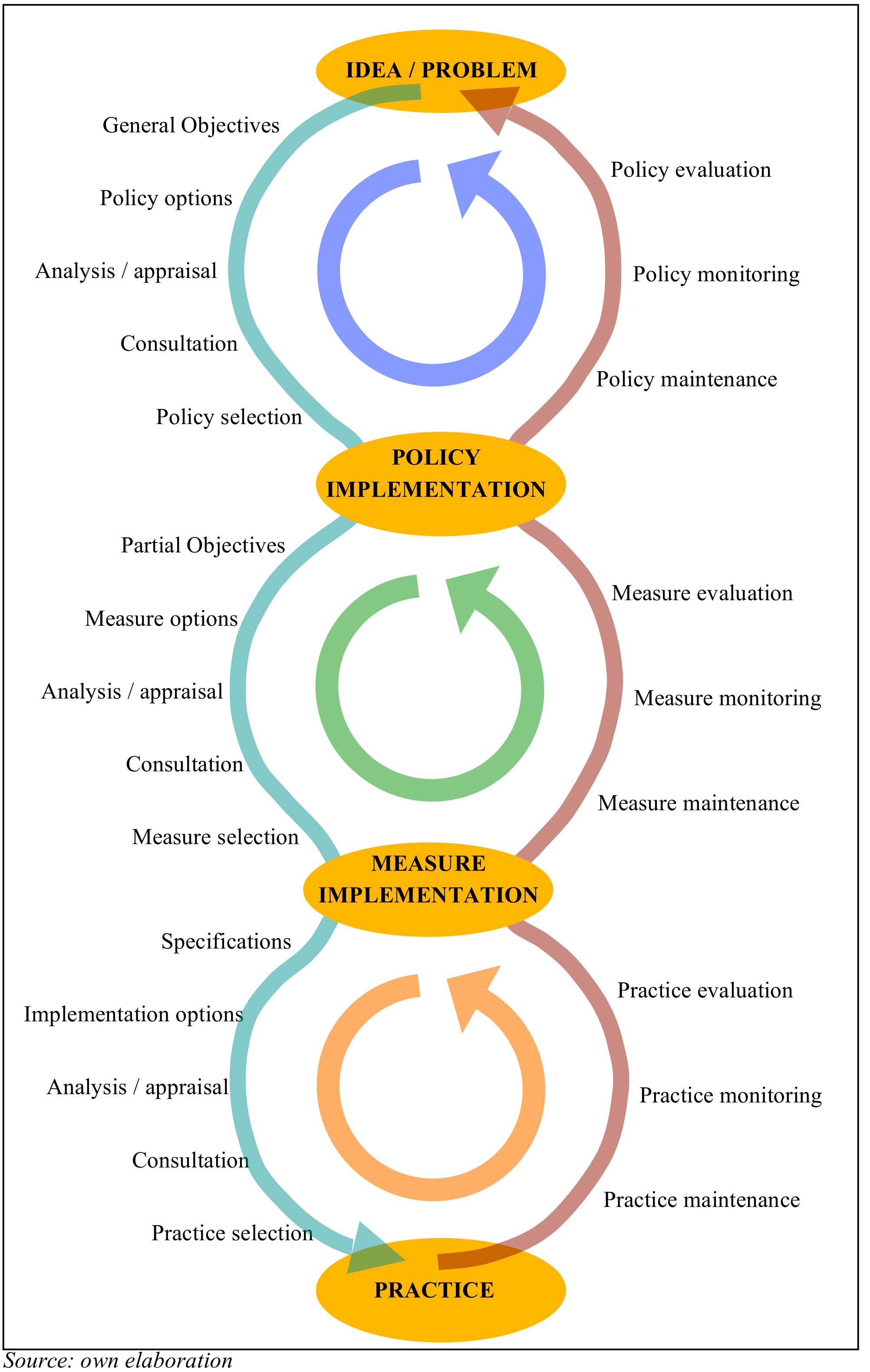
This section will first provide a description of the decision-making process that connects these three objects and then, building on it, will define the levels of analysis to be considered in the assessment of transferability.

According to their characterization *measures* and *practices* can be conceived as different levels of implementation of *policies*. Consequently, they should form part of the *implementation* step of the basic policy-making sequence (section 5.2.5).

However the formulation of measures in order to implement a policy and their conversion into practices in the real world are not straightforward steps, but decision–making processes in themselves. Once the policy has been decided, it is necessary to formulate, discuss and select the more appropriate measures to implement it. In turn, once the measure has been determined, a similar process will follow in order to delineate the details of its application to reality. For that reason, the *implementation* step of the basic policy-making sequence has been expanded to characterize the implementation of *policies* through *measures* until they become *practices*. This expansion has been conceived as a replication of the basic policy-making sequence for every level of definition (*policy*, *measure* and *practice*). As a result of that, the decision-making process linking policy to practice can be represented as a series of three decision-making cycles linked by their *implementation* steps (Fig. 55).

The decision-making process can be conceived as a self-standing structure at every level of implementation (circular arrows in Fig. 55) or as continuous flow connecting policy and practice through a *definition/implementation stream* (light blue arrow) and a *feedback stream* (purple arrow). At every level the steps of the basic decision-making cycle are repeated, though with a higher level of concretion. For instance, the *formulation of* *objectives* evolves from the general objectives of the policy to the partial objectives of the measure and then to the specifications of the practice. The *consultation* phase may probably evolve from a wide scope formal consultation to the local discussion of implementation issues with local stakeholders.

Fig. 55: Expanded policy-making sequence adopted in the conceptual framework proposed

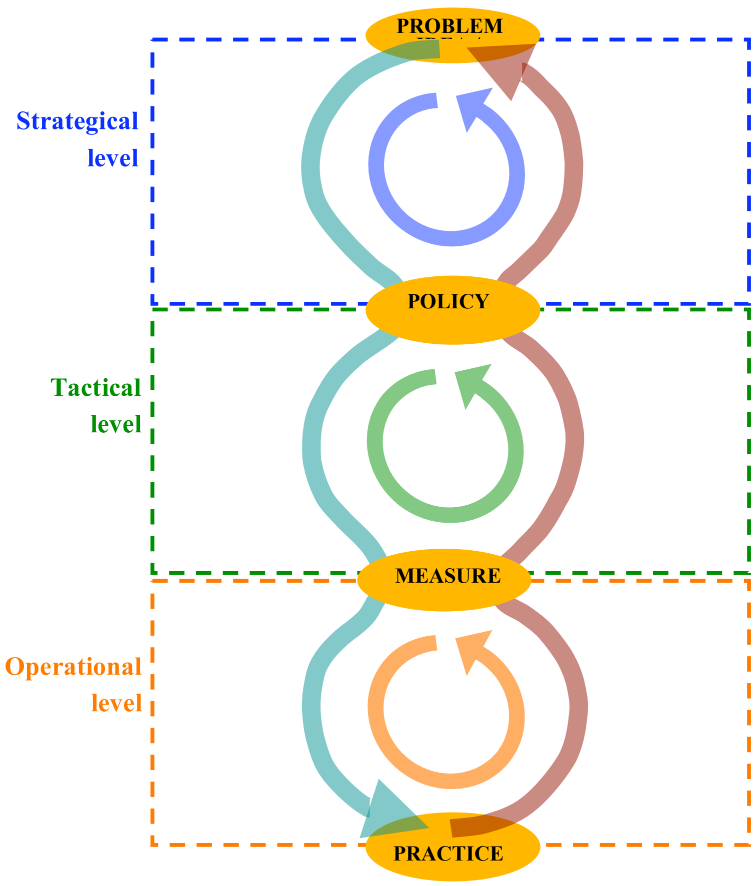


Source: own elaboration

Coming back now to the analysis of transferability, it should be reminded here that its aim is to define whether a given policy, measure or practice is transferable or not to the importer jurisdiction. This assessment seeks to determine if the object transferred has the potential of being *successfully implemented* in the importer jurisdiction.

The definition of three types of objects has been motivated by the need of reflecting different implementation levels in the policy-making process, each connected to a specific level of definition. The *policy* is related to the formulation of general objectives and wide courses of action, the *measure* is related to the translation of the general objectives into specific actions and the *practice* is their application to reality.

Fig. 56: Multilevel structure proposed for the conceptual framework



Source: own elaboration

According to a classical distinction present in the literature[55], these levels can also be referred to as the *strategical level*, the *tactical level* and the *operational level*.

This diversity between the possible objects of transfer as regards the point of the policy-making process where they act, their degree of definition with respect to the reality and their effects (strategical, tactical or operational) suggest that the criteria

[55] See for instance Macário (2005, p.22).

adopted to assess if their eventual implementation in the importer jurisdiction will be successful should also be different.

For this reason the general framework for the assessment of transferability distinguishes three levels of analysis (Fig. 56):

- A *strategical level*: it includes the assessment of transferability of policies and the analysis of the decision-making process involved in their definition.
- A *tactical level*: it includes the assessment of transferability of measures and the analysis of the decision-making process involved in their definition.
- An *operational level*: it includes the assessment of transferability of real practices and the analysis of the decision-making process involved in their implementation.

5.2.8 Transferability criteria

The general framework proposed is aimed at elaborating the principles that should frame the transferability assessment of policies and practices. This section will define with greater accuracy the notion of transferability and will propose a number of criteria that should be necessarily fulfilled to evaluate a policy, measure or practice as transferable.

5.2.8.1 Implications of transferability

Transferability has been defined in this thesis as the potential of a policy, measure or practice to be successfully implemented in the importer jurisdiction.

In general terms, a policy, measure or practice will be successfully implemented in the importer jurisdiction if it is able to achieve there the outcomes that it has already attained in the exporter jurisdiction. In doing so it will be able to fulfill the aim of the transfer process, namely to solve the problem at the origin of the process. This statement can also be expressed in other words by saying that a policy, measure or practice should be considered transferable only as far as it maintains its ability to produce the selected outcomes through the transfer and implementation processes. In fact, such ability can be affected and limited along the transfer and implementation processes by a number of elements like the action of external influences or the limitations imposed by the particular context of the importer jurisdiction.

It should be noticed from now that according to this definition, transferability by itself does not guarantee the success of a transfer process. Indeed, the transfer process can fail because of the lack of transferability of the original policy or practice, but also as a result of a bad characterization of the context conditions in the importer jurisdiction, as a result of mistakes during the adaptation or implementation stages, etc. Consequently, though a policy or practice may be effectively transferable (i.e. may have the *potential* for being successfully implemented), it can also end up in an unsuccessful implementation because of a poor transfer. Therefore transferability is understood in this framework as a condition necessary but not sufficient for a successful transfer.

The relation between policy success and transfer has been treated in the literature by Dolowitz and Marsh (section 4.3.3.5), who pointed out three types of failure in a transfer process: *uninformed transfer* (when the importer entity has insufficient information about the policy/practice transferred), *incomplete transfer* (when crucial elements of the policy/practice in the original jurisdiction have not been introduced) and *inappropriate transfer* (when the differences in contexts have not been taken sufficiently into consideration).

This classification can be further refined, as the *incomplete transfer* of a policy or practice can be interpreted as the result of either a lack of adequate information on the object transferred, a poor execution of the transfer process or the resistances to change existing in the importer jurisdiction. Hence, the types of failure in a transfer process could be referred to as *uninformed transfer* (arising from impediments to the flow of information), *ill-performed transfer* (resulting from poor execution of the transfer process) and *inappropriate transfer* (resulting from mismatch between the conditions prevailing in the importer and exporter jurisdictions).

Following the second classification, it can be said that transferability is concerned about the *appropriateness* of a given transfer. Accordingly its assessment will determine whether a given transfer is appropriate or not (i.e. whether a policy, measure or practice is transferable or not), but will not conclude anything on the final result of the transfer process.

5.2.8.2 Transferability criteria

A *transferability criterion* is a necessary condition to be fulfilled by the policy, measure or practice under study in order to be suitable for transfer to the importer jurisdiction. If the criterion is not fulfilled, then the transfer proposed will certainly be inappropriate and lead to the unsuccessful implementation of the policy, measure or practice in the importer jurisdiction.

The general framework defined here proposes four transferability criteria:

1) Indifference to context variation
2) Indifference to external influences
3) Horizontal compatibility

4) Multi-level compatibility

The first criterion, ***indifference to context variations***, means that the potential outcomes of the object transferred should not be impeded by the differences existing between the original context in the exporter jurisdiction and the context in the importer jurisdiction.

As it has been previously noted (section 5.2.6.6), the notion of context embraces a large number of aspects, including technological, institutional, financial, economic or social features. Consequently, it is certain that the contextual conditions in the importer and exporter jurisdiction will not be the same, diverging in a wide number of points. However, at the moment of assessing transferability the resources available for the information search will be limited. It is thus necessary to focus the evaluation of this first criterion on the most distinctive context variations that could affect the implementation of the object transferred.

For example, the appraisal of this criterion for the transfer of a policy aimed at increasing the occupancy rate of private vehicles in metropolitan areas, should probably consider the relevant differences between the exporter and importer jurisdictions as regards transport legislation, number of municipalities involved, coordination procedures between municipalities, available financial resources, car ownership, mobility patterns, social perception of the private vehicle, etc. Maybe between the importer and exporter metropolitan areas there will also be divergences in the number of taxi licenses, weather conditions or demographic structures, but *a priori* they do not seem relevant for the success of the policy transferred. At this stage, they should be excluded from the analysis.

Once the more important context variations have been identified, the evaluation of the criterion should assess if they are relevant enough as to threat the outcomes of the object transferred. If this is the case, then it should also explore if their negative effects are likely to be overcome through adaptation of the object transferred or the local context conditions. At the end of this assessment, the object transferred will be considered *indifferent to context variations* (when there are not relevant context variations threatening its successful implementation or when they can be overcome through adaptations) or discarded as non-transferable.

Following the previous example, the analysis could find relevant differences in the metropolitan mobility patterns that strongly diminish the potential beneficiaries of the policy in the importer metropolitan area, preventing the success of the policy in reducing congestion. If, additionally, no adaptation of the policy or the mobility patterns is feasible then the policy should be assessed as non-transferable between the two metropolitan areas.

The second criterion, ***indifference to external influences***, means that the potential outcomes of the object transferred should not be impeded by influences external to the control of the importer entity.

The external influences (section 5.2.6.5) may impede the successful implementation of the object transferred. To appraise this criterion, first it is necessary to identify those external influences able to condition the transfer of the object, then it has to be assessed if they are strong enough as to menace the outcomes of the object transferred and lastly if there is any possibility of adapting the object as to overcome the critical conditionings. At the end of this assessment, the object transferred will be considered *indifferent to external influences* (when there are not relevant external influences avoiding its successful implementation or when their effects can be overcome through adaptations) or discarded as non-transferable.

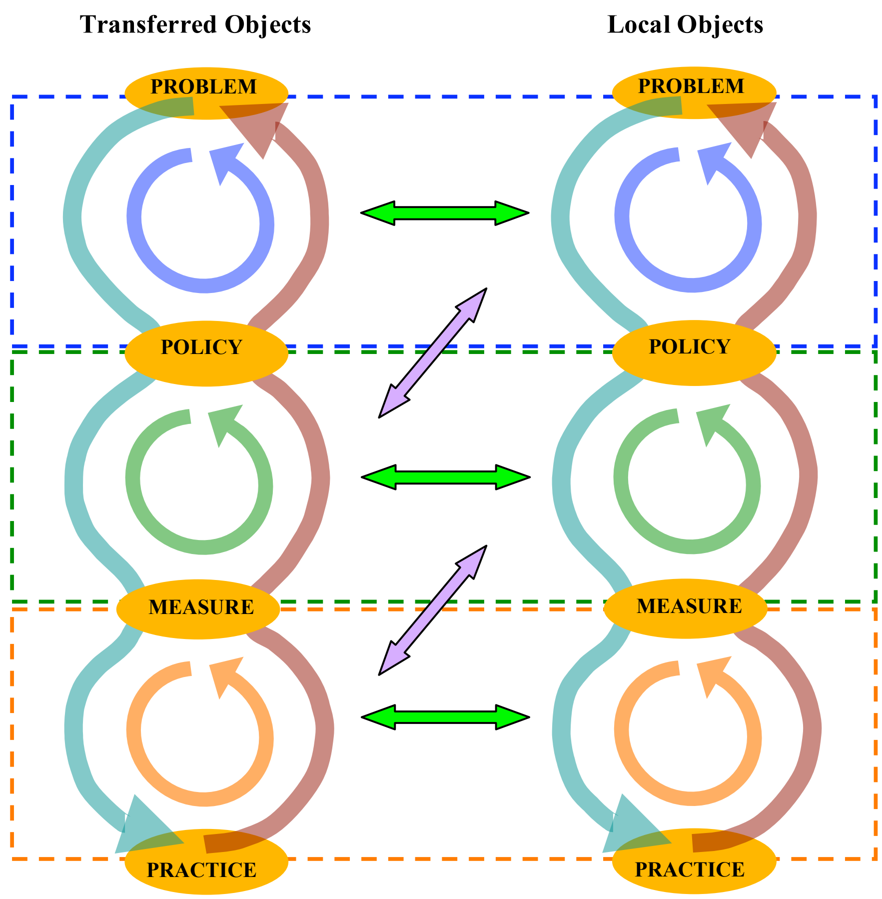
In the example, the national government may be promoting the adoption of charging schemes as the solution to urban congestion. Several metropolitan areas may have already followed these guidelines with significant success. In this case, if the metropolitan agency pushes for the measure "construction of new HOV lanes", following the experience of a foreign metropolitan agency, it may go against a strong external influence in favor of the adoption of charging schemes. The central government could put more pressure on the metropolitan entity through financial incentives for the adoption of the other solution, finally making the measure unfeasible.

The third criterion, ***horizontal compatibility***, means that the object transferred should not enter in open conflict with those objects already existing at its same level of definition (policies, measures or practices). Thus if the object being transferred is a policy, it should not be in open conflict with other policies already at work in the importer jurisdiction.

To assess this criterion, it is necessary to identify the objects at the same level of definition (policies, measures or practices) that are currently at work or being implemented in the importer jurisdiction that could potentially conflict with the object transferred: objects related to the same problem, applied in the same physical area or on the same users, sharing the same resources, etc. Once identified, it should be verified that their objectives and resources are not incompatible (i.e. that implementing the object transferred is not contrary to the already implemented ones). If incompatibilities are detected, then it should be assessed if they can be avoided through adaptation of the object being transferred or the objects already implemented. If there are not incompatibilities or if they can be solved through adaptation, then the object transferred will be deemed *horizontally compatible*.

If the importer metropolitan agency of the example seeks to import a policy restricting the use of private transport so as to divert it to public transport, it should evaluate if its compatible or not with other already approved policies as building new road infrastructure to alleviate congestion.

Fig. 57: Compatibility requirements resulting from the multilevel structure



Source: own elaboration

The fourth criterion, ***multilevel compatibility***, means that the object transferred should not enter in open conflict with objects already existing at superior levels of definitions. Hence, the measure transferred should not be in open conflict with the policies already at work in the importer jurisdiction.

The assessment of this criterion requires to identify the objects at superior levels of definition (policies if the object transferred is a measure, policies and measures if the object transferred is a practice) that are currently at work in the importer jurisdiction and that could potentially conflict with the object transferred: policies or measures applied in the same field, affecting the same users, etc. Once identified, it should be verified that their objectives and resources are not incompatible (i.e. that implementing the object transferred is not contrary to those already implemented at superior levels). If incompatibilities are detected, then it should be assessed if they can be avoided through adaptation of the object being transferred or the objects already implemented. If there are not incompatibilities or if they can be solved through adaptation, then the object transferred will be considered *vertically compatible*.

If the importer metropolitan agency of the example seeks to apply a cordon toll in the city centre with a very high fare (measure), it may go against the objectives of other policies promoting the social integration between central and peripheral areas (policy).

The horizontal and vertical compatibility requirements are represented in the scheme of Fig. 57 through green and lavender arrows.

If the assessment of transferability concludes that the object evaluated is *indifferent to context variations* (i.e. the contextual differences between the importer and the exporter jurisdiction do not affect its outcomes), *indifferent to external influences* (i.e. the external influences do not prevent its implementation), *horizontally compatible* (i.e. it does not enter in conflict with other objects located at its same level) and *vertically compatible* (i.e. it does not enter in conflict with other objects located in superior levels), then it should be qualified as transferable to the importer jurisdiction.

5.2.8.3 Additional considerations

To further clarify the extent and implications of the transferability criteria, some additional considerations follow as regards the level of detail of the assessment, the inclusion of the temporal dimension, the interdependencies between factors and criteria and the formulation of preconditions for transfer.

Level of detail – The assessment of transferability has been characterized as a screening step generally performed at an early stage of the transfer process. Given that transferability is a necessary condition for transfer (i.e. it suffice with a single unmet criterion to discard the transfer of the object under study), its assessment should be conducted in an iterative way so as to maximize its efficiency.

At the beginning the information available would consist of a preliminary characterization of the policy, measure or practice as implemented in its original context. Building on it, the assessment should examine first the more evident barriers and limitations to transfer and detect areas where further information would be needed. If after this first round, the transferability of the practice seems positive or not clear, then it will be necessary to understand further aspects related to the object and jurisdictions involved through a more detailed learning and conduct a second loop on the criteria. In some cases this search of information will surely bring forward part of the work included in the learning phase of the transfer process. The increasing-detail loops should be iterated until a reasonable security on the transferability of the policy, measure or practice is achieved.

This deeper knowledge should be sought particularly when it seems that there could be a margin for the adaptation of the objects transferred in order to facilitate their fulfillment of the transferability criteria. If doubts on the result of adaptations persist, it could be advisable to come back on the transferability issue at the adaptation phase.

Temporal dimension – The assessment of transferability should be aware of the temporal dimension involved in its analysis. The timings of policy-making may set the deadlines for the eventual implementation of the object transferred, thus providing a first reference for dynamic considerations. Based on it, the evaluation of transferability should also try to reflect on the evolution of the local policies and contexts or external influences to foresee if the limitations to transferability will still be valid at the moment of implementation.

Interdependencies – Though the criteria proposed in the framework have been presented separately, in reality there will be strong interdependencies among them. In fact, the external influences and the local policies and measures will certainly play a role in shaping context conditions in the importer jurisdiction. In turn, the different context elements will be interrelated, as well as the local policies or the local measures. When the level of interrelation is high and there are not outstanding factors contrary to the transfer of the object studied, then the assessment of transferability may become increasingly complex (even unable to conclude on the transferability of the object).

Preconditions for transfer – Contrary to the previous case of interdependency, other cases may show the existence of specific characteristics in the importer jurisdiction heavy enough as to justify only by themselves the inappropriateness of transfer, except for those objects able to meet some severe preconditions. The identification of such preconditions may be of great help in the assessment of transferability, but they should be treated always with an eye on their possible change over time.

5.2.8.4 A cost-benefit perspective

Though too complex to be operationalized, it is also possible to explain the evaluation of transferability in terms of costs and benefits.

In fact, there is a strong economic rationale behind transfer. The importer entity has detected a problem that can be solved through policies and measures able to produce greater benefits than costs to society. In this circumstance, the importer entity can choose between different sources of transfer and the development of new policies and practices. Each possible alternative will be characterized by the benefits and costs that it is able to generate to society.

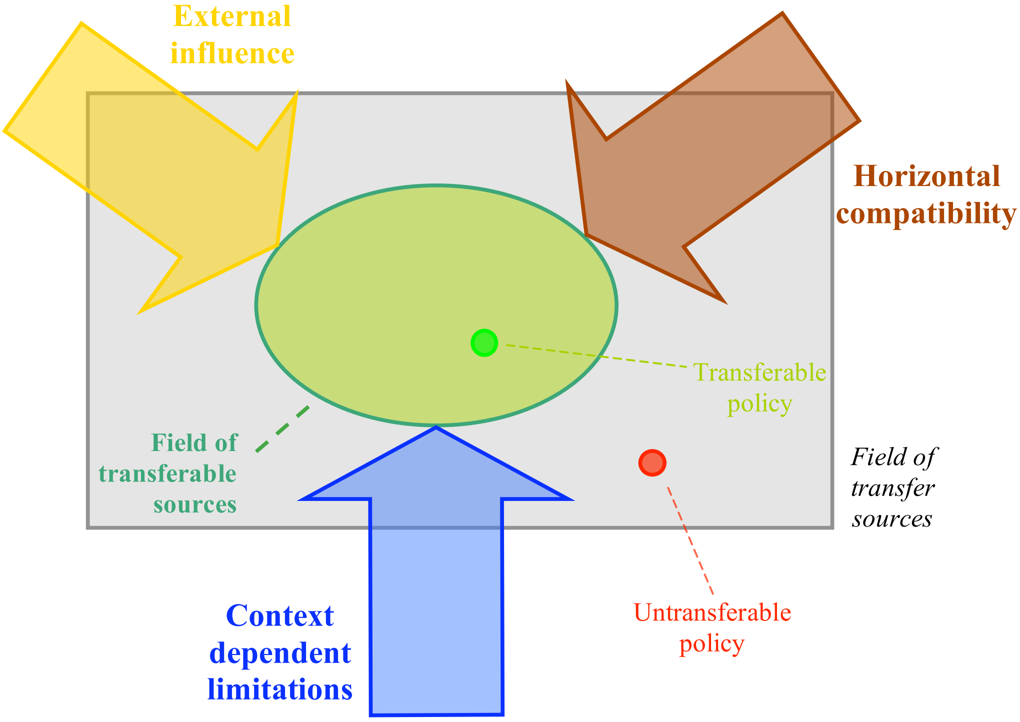
In the case of transfers, their benefits will include the solution of the initial problem (if successfully implemented), while their costs will arise from the transfer process, including the adaptation of the policies and practices transferred, the adaptation of local conditions (either context features or local policies, measures and practices), and the opposition to external tendencies.

Within this logic, an object should be classified as transferable only in the measure in which it generates greater benefits than costs. Accordingly, the modifications of a policy or practice being transferable should be considered acceptable only in the measure in which they maintain a net benefit to society.

5.2.9 Synthetic representation of the framework proposed

From the perspective of an entity that has already detected and characterized a problem and that is looking forward to transfer to its own jurisdiction a policy that has already been successful abroad, the notion of transferability and its assessment could be characterized as represented in Fig. 58.

Fig. 58: Conceptual diagram of the transferability assessment (policy level)



Source: own elaboration

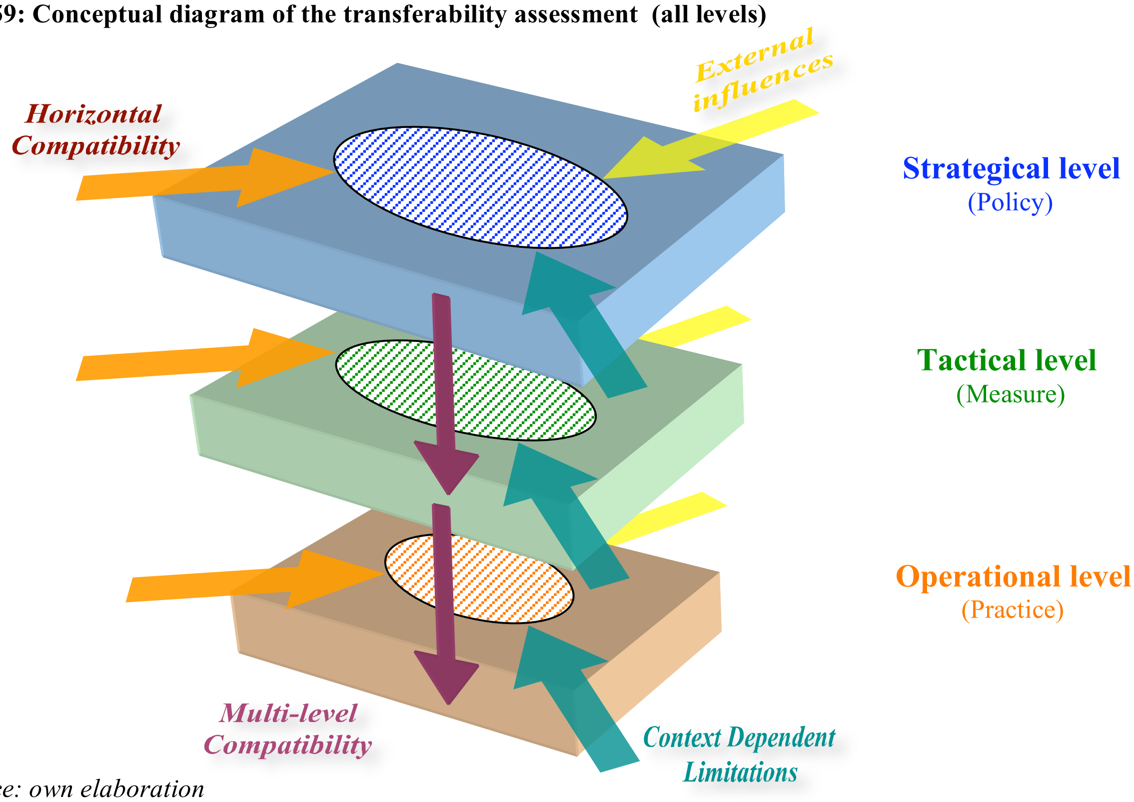
The entity has already preselected a number of policies already implemented in other jurisdictions that could be adequate to solve the problem detected. The criteria adopted by the entity to preselect them could be whatever and are considered irrelevant for the assessment of their transferability. The preselected policies are represented in the figure as a grey rectangle (*field of transfer sources*).

The transferability assessment of the preselected policies is performed through the application of three criteria: *indifference to context conditions*, *indifference to external influences* and *horizontal compatibility* (in this case the *multi-level compatibility* does not apply, because the object being transferred is a policy and thus is not confronted with objects of "superior" levels). They are represented as three independent arrows that act on the field of transfer sources.

As a result of the transferability assessment, only few of the preselected policies will fulfill the three criteria and thus be potentially transferable. The set of these policies is represented in the figure as a green ellipse (*field of transferable sources*). Logically, all the policies located within the ellipse (like the green point) are deemed transferable, while all of them located outside (like the red point) should be excluded from further steps of the transfer process.

If the entity has already defined a policy, and is concerned about importing a measure or a practice from an external jurisdiction, then the assessment of transferability should also include the *multilevel compatibility* criterion, which reflects the link connecting policies, measures and practices through the different levels of decision-making.

Fig. 59: Conceptual diagram of the transferability assessment (all levels)



Source: own elaboration

In this case, the graphical representation of the transferability assessment (Fig. 59) has to include an additional dimension containing the three levels of analysis defined (*strategical*, *tactical* and *operational*) and the vertical criterion (violet arrow in the figure).

5.3 Particularization of the general framework to the field of railway infrastructure pricing

5.3.1 Introduction

This section is aimed at particularizing the general framework for the assessment of transferability to the specific case of railway infrastructure pricing policies and practices. This task requires to specify the nature and characteristics of the basic inputs defined in the general framework, to identify each of the levels of analysis there proposed and to adapt the four transferability criteria to the restricted field of railway infrastructure pricing.

Though grounded on a specific knowledge about railway infrastructure pricing (see chapter 3), the level of detail attained in the particularization will remain at a rather theoretical level. It must be remembered here that the scope of this step is to particularize the framework, but not to develop a comprehensive model including all the possible variables of the problem. The next chapters will provide further validation to the framework through the development of case studies in which some relevant aspects will be also analyzed in more detail.

The structure adopted for this section replicates the one already used for the general framework (see section 5.2), to make clearer the particularization of elements, levels of analysis and transferability criteria.

5.3.2 Objective of the framework

The application of the framework to railway infrastructure pricing, is driven by the existence of a *transfer problem* in that specific field: an entity with ability to take or directly influence decisions related to pricing policies on a given railway infrastructure, wants to transfer and implement a pricing policy, measure or practice that has already been successfully applied by another entity on another railway infrastructure.

The decision to engage in the transfer process may result from many causes, as the inefficiency or unsustainability of a charging scheme already at work on the infrastructure, by external coercion to import that practice, by the opening of the railway infrastructure to on-track competition, etc. As a possible solution to this problem, the importer entity or entities have identified a pricing principle, scheme or practice applied in another network that could be of interest if implemented in the local infrastructure. This entity would like to know if it is feasible to implement successfully such a policy or practice on the railway infrastructure under its control.

5.3.3 Elements of the transfer framework

The framework proposed to assess the transferability of policies and practices in the field of railway infrastructure pricing, requires a number of basic inputs in order to assess transferability. They were referred to as *elements* in the general framework and they are necessary for the assessment of transferability in the particular case treated here– i.e. the lack of any of them will left the assessment deprived of sufficient definition to conclude anything on the transferability of railway infrastructure policies and / or practices.

The elements, as specified in the general framework, are: 1) *Jurisdictions and entities involved*; 2) *Aim of the transfer process*; 3) *Object being transferred*; 4) *Sources of policy transfer*; 5) *External influences*; and 6) *Context conditions*.

Each of them is described next for the particular field of railway infrastructure pricing.

5.3.3.1 Jurisdictions and entities involved

The assessment of transferability has to be defined in relation to the entities and jurisdictions involved in the transfer process. Within the field of railway infrastructure pricing, the entity or entities intervening in the transfer process may be any among those having decision power at any stage of the process that goes from the definition of pricing policies to their implementation in the real world. In the European scene, such entities could be government ministries or agencies, regulators, charging bodies and/or infrastructure managers.

On the other side, the jurisdiction over which the entity or entities exert their decision power and want to execute the transfer can be roughly described as a combination of services and railway infrastructure.

The infrastructure services are rendered by the infrastructure manager to the operators running or willing to run on the network. Given their particular nature, the price of these services is regulated, opening a whole field over which pricing policies or practices can be enforced by decision-makers. All infrastructure services share the characteristic of being related to physical assets, the infrastructure. Examples of infrastructure services are the access to the track or to other facilities (stations, marshalling yards, refueling facilities, etc.), the traffic control, the provision of energy, the supply of communication services, etc. The railway infrastructure may be a link, a facility, a part of the network, the whole railway network, etc. It may refer to physical assets already existing at the present moment or that will be added to the current infrastructure in the future.

The importer entity can undertake the trasfer process alone, gathering as many information as possible on the policy or practice that is to be transferred, or through collaboration with the infrastructure managers or governments responsible for its implementation in the original jurisdiction.

5.3.3.2 Aim of the transfer process

The second input required to assess transferability in the field of railway infrastructure pricing is a clear definition of the aim of the transfer process, which according to the general framework may be identified as solving a given problem detected in the importer jurisdiction.

In the field of railway infrastructure pricing, there can be several reasons behind the transfer. It may arise from the need of coordination with a neighboring network, the search of a greater incentivization of transport operators, the need to raise revenues without compromising the overall efficiency of the system, etc.

5.3.3.3 Object being transferred

According to the scope stated in the general framework, the transfer process can be initiated at any point of the definition process going from policy to practice. More specifically, the general framework distinguished three types of objects: *policies*, *measures* and *practices*.

In its particularization for the field of railway infrastructure pricing, these three levels are still valid and can be directly linked to the *pricing principles*, the *charging schemes* and the *charging practices*:

- A *pricing principle* is the basic element of the pricing policy by which the entity seeks to solve a problem or reach an objective (see section 3.5). It is aimed at achieving some objectives and not others and generally results from a process in which the entity translates its understanding of the problem into general objectives, examines various alternatives and selects one.
- A *charging scheme* is defined as the set of elements that must be put in place by the decision-maker in order to implement a given pricing principle. It includes the *charging structure* (see section 3.6) and the *average levels* sought (see section 3.7). A principle may be implemented through a variety of structures and levels, which are normally defined through a selection process.
- A *charging practice* is defined as the result of the operationalization of charging schemes for their implementation in the real world. The application of a scheme to reality entails a wide number of technical, informational and managerial details that may lead to different practices. Contrarily to principles and schemes, which remain in a theoretical level, the practice can be observed in reality.

5.3.3.4 Sources of transfer

As in its general version, the particularization of the framework assesses the transferability of principles, schemes or practices that have been previously preselected (*sources of transfer*).

The sources of transfer are principles, schemes or practices that already exist, that have already been implemented in other jurisdictions and have proven feasible. As explained in section 5.2.6.4, they should have been implemented to solve a similar problem and should be considered *adequate* by the importer entity.

In the case of railway infrastructure pricing, this precondition may be very demanding, particularly as regards the preliminary selection of infrastructure pricing principles. As it was exposed in section 3.5, pricing principles are strongly related to the set of objectives sought for the pricing policy. These objectives may be varied, like "favor the best possible use of the rail network", "reach a level of cost coverage for operation and maintenance costs", "contribute to the enhancement and enlargement of the network", "reflect the quality of service provided to the operator", "increase competitiveness of rail against other transport modes", etc. and cannot be fulfilled simultaneously by the pricing policy.

Thus, the preselection of pricing principles should already take this point into account and limit the sources of transfer to those principles that are not in open contradiction with the proposed objectives.

5.3.3.5 External influences

In order to assess the transferability of a pricing principle, scheme or practice from one jurisdiction to another, it is necessary to identify those external influences that may condition its successful implementation in the importer jurisdiction. Such influences are external to the importer entity or jurisdiction, which has no power to change them, but can only adapt or resist to them.

In the field of railway infrastructure pricing, such external influences normally result from larger *structural processes* affecting the railway sector. In the case of the EU, they may result from the dynamics of *Europeanization*[56], which exert a relevant top-down coercion on transport domestic policy. Their action may be direct, for instance through the enactment and enforcement of directives and resolutions that drive the objectives and shape the provisions of the national railway reform, or indirect, through the delivery of

[56] Europeanisation may be defined as "*a process whereby domestic policies becomes increasingly subjected to European policy making*". This definition, as well as an in depth discussion of the concept may be found in Buller et al. (2002, pp.4-20).

recommendations, guidelines or best practices. They may also be accompanied by the mobilization of financial resources earmarked to specific objectives (e.g. through the awarding and allocation of EU funds).

The Member States that receive provisions and guidelines through the supranational coercion of the EU may adopt them or resist them. Knill and Lehmkuhl (2002, pp. 255-263) differentiated three types of Europeanization mechanisms and proposed an analytical framework to predict the possible success of European policies according to the institutional compatibility, the particular interest constellation and institutional opportunity structures at the domestic level and the fit between domestic reforms and European regulatory objectives.

Another type of external influence may result directly from the action of *external market forces*. This can be the case when a small country is obliged in the end to adopt regulations or provisions similar to those of a bigger neighbor.

5.3.3.6 Context conditions

To be able to assess the transferability of railway infrastructure pricing policies and /or practices, it is necessary to take into account the conditions and limitations to the transfer that may arise from the particular context existing in the importer jurisdiction.

Table 15: Potentially relevant contextual variables

Category	Variable
Geography	Climate, topography, demography, situation
Transport market	Market segmentation, transport volume, market trends, intermodal competition conditions, modal shares
Railway market	Type of separation, type of ownership, type of competition, degree of competition, market segmentation
Regulation	Type of regulation, type of regulator, service quality regulation, price regulation, access regulation
Railway network	Network length, network utilization, network complexity, technical characteristics, useful life, state of maintenance and renewal, enhancement / enlargement projects
Operation conditions	Type of services, type of rolling stock, average speeds, average delay, level of saturation
Financial conditions	Level of State funding, type of State funding, capital markets, other commercial revenues
Management	Information systems, accounting systems
Political / Societal	Acceptability, political environment, policy-making procedures, political commitment, institutional complexity

Source: own elaboration

In fact, the diversity observed among entities in the choices of pricing policies may be frequently explained by the differences existing between their original contexts. In the field of railway infrastructure, the relevant contextual differences may be relative to the geographical conditions, the whole transport market, the railway market, the regulatory framework, the railway network, the operational, financial and management conditions or large societal and political issues. Without the intention of being exhaustive, Table 15 presents some of the more relevant context variables that could interfere with the successful implementation of an external railway infrastructure pricing principle, charging scheme or charging practice.

This does not mean that all the listed variables may have a direct effect on the transferability of a pricing principle, scheme or practice from one jurisdiction to another, but that they can have an influence if they reflect a strong difference between the importer and exporter jurisdictions.

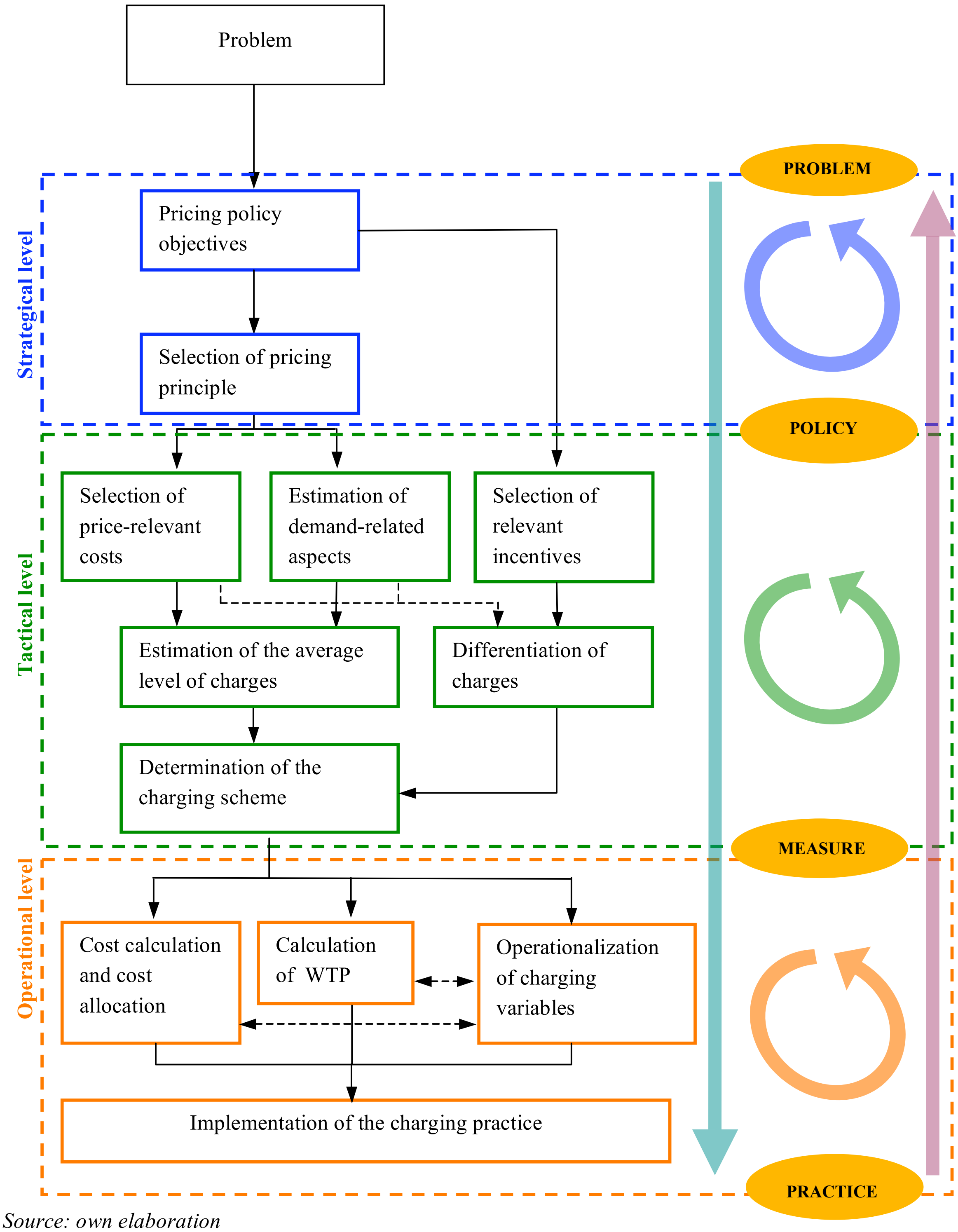
5.3.4 Levels of analysis

The levels of analysis proposed by the general framework are maintained in its particularization for the railway infrastructure pricing field. Accordingly, *schemes* and *practices* can be conceived as different levels of implementation of *principles*, involving their own decision-making procedure (see section 5.2.7).

Relating this decision-making model with the basic scheme proposed for pricing policies in section 3.8, it is possible to distinguish three levels of analysis (Fig. 60):

- A strategical level: it includes the assessment of transferability of pricing principles and the analysis of the decision-making process involved in their definition.
- A tactical level: it includes the assessment of transferability of charging schemes (levels and structures) and the analysis of the decision-making process involved in their definition.
- An operational level: it includes the assessment of transferability of charging practices and the analysis of the decision-making process involved in their implementation.

Fig. 60: Particularization of the multilevel structure proposed



Source: own elaboration

5.3.5 Transferability criteria

The general framework proposed four distincted criteria for the assessment of transferability (section 5.2.8), namely:

1) Indifference to context variation
2) Indifference to external influences
3) Horizontal compatibility
4) Multilevel compatibility

This section will detail each of them for the specific field of railway infrastructure pricing, suggesting some particular considerations as regards their relevance and appraisal.

5.3.5.1 Indifference to context variations

This criterion means that the potential outcomes of the object transferred should not be impeded by the differences existing between the original context in the exporter jurisdiction and the context in the importer jurisdiction. Once this criterion has been appraised, the object transferred will be considered *indifferent to context variations* (when there are not relevant context variations threatening its successful implementation or when they can be overcome through adaptations) or discarded as non-transferable.

In the case of railway infrastructure pricing, a number of context variables have been pointed out as potentially relevant for the assessment of transferability (Table 15), meaning that in those cases where they reflect strong differences between the importer and the exporter jurisdictions, there might arise a case of incompatibility.

Obviously, the relevance of each of the listed variables in order to assess transferability will not be the same depending on whether the level of transfer considered is strategical, tactical or operational. Some of them are predominantly related to one level, like the availability of State funding (*principles*), the type of rolling stock (*schemes*) or the average delay (*practices*). Others exert their effect across various levels, alone or in combination with other variables.

Some geography-dependent factors may be relevant to explain diversity in transport markets and railway infrastructure, shaping the characteristics of track access charges. An example of this relevance can be seen in the transport market of the Baltic Republics, located as a small link connecting the long distance railway traffic originated in Russia to the sea. Their strategical position and their relatively small size, allow the infrastructure managers of these countries to charge full costs to freight operators.

The overall size and possible evolution of the transport market will provide an upper bound to rail traffic, conditioning the degree of utilization of the network and thus the amount of variable costs. The characteristics of intermodal competition in the different market segments can provide a limitation of the infrastructure charging levels and may also condition the differentiation of charges across services and lines.

The structure of the railway infrastructure market will condition the pricing of railway infrastructure. Vertical separation is a precondition for the implementation of railway infrastructure charges. The type of competition introduced in every market segment or the number of operators effectively competing will have an influence on the demand for capacity and in the willingness to pay for it. The ownership of the infrastructure may have an influence on the access to financial resources (frequently cheaper in the capital markets when the infrastructure manager is publicly owned).

The regulatory framework will influence the effectiveness of the incentives on the infrastructure manager or the degree of competition on the network. It can also determine direct or indirect limitations on the price levels that can result incompatible with the transfer of a given charging scheme.

The physical condition of the network, as regards its length, equipment and complexity, may have a strong relevance for the operational conditions prevailing in the importer and exporter jurisdiction. In turn, this will condition the quality and cost of the service offered, which will influence the feasibility of a given charging scheme. Furthermore, the average age of the infrastructure, as well as its state of maintenance and renewal will be essential in the level of costs generated, influencing the adoption of a given pricing principle, scheme or practice.

The mix of traffic and services, as well as the type of rolling stock running on the network or the basic operational performance of the railway undertakings, may require a particular structure of charges in order to provide efficient incentives to the market. Inversely, it may make irrelevant or counterproductive the incentives embedded in a charging scheme designed for different operational conditions.

The availability of funds is another relevant context condition, as it may determine the minimum level of cost recovery that should be achieved by the infrastructure manager in order to meet the financial equilibrium. Strong deviations in the availability of State subsidies or in the access and costs of capital markets may condition the transfer of a railway infrastructure practice.

Management procedures and systems can exert influence on the feasibility of a given transfer, particularly as regards the implementation stage. Differences in the accounting systems with respect to the exporter jurisdiction may alter significantly the level of the costs included in a charging scheme (e.g. through the consideration of different useful lives and depreciation functions) or the definition of the cost categories (e.g. which costs are allocated to the relevant activities of the infrastructure manager).

Deviations in the political environment and commitment existing at the moment of implementing a railway infrastructure pricing practice may limit the success of the whole political process in which the transfer is involved, compromising the adoption of some practices. Acceptability of a policy is another important consideration, as it will influence people's views of the policy instrument and condition the effectiveness of the proposed principles and schemes.

5.3.5.2 Indifference to external influences

This criterion means that the potential outcomes of the object transferred should not be impeded by influences external to the control of the importer entity. Once this criterion has been appraised, the object transferred will be considered *indifferent to external influences* (when there are not relevant external influence threatening its successful implementation or when they can be overcomed through adaptations) or discarded as non-transferable.

Some pertinent external influences identified in section 5.3.3.5 as regards railway infrastructure pricing, were the direct coercion in the form of legal provisions, the indirect coercion in the form of best practices and recommendations, or the effect of external market forces. Their effect on the importer entity and its ability to adapt or resist to them, may influence the transferability of a given pricing principle or scheme.

In the European case, Member States are supposed to comply with the provisions included in Directive 2001/14/EC as regards the design and implementation of a railway infrastructure charging scheme. As it has been previously remarked, this norm provides a wide number of requirements on the principles (section 3.5.3) and structures (section 3.6.2) applied, which may conflict with the transfer of some objects.

For instance, an infrastructure manager trying to increase the cost coverage of its charging scheme can be interested in transferring a two-part tariff with a fixed access charge. The implementation of such a principle would probably increase its cost coverage, but it would certainly go against the provisions of Directive 2001/14/EC as regards the potential discrimination of new entrants in the market. This external influence can, in the end, make impossible the successful implementation of the two-part tariff.

A relevant consideration in the assessment of the effect of such influences comes from the effective degree of coercion achieved by the external influence in the importer and exporter jurisdiction. In fact, EU directives may be subject to scope in their interpretation, while the penalties for non-compliance (e.g. fines) may not be particularly serious. If this is the case, the importer jurisdiction may still have room for voluntary decision, though probably will go against increasing pressures in the long run.

A similar thought is valid for indirect coercions in the form of recommendations or best practices. Their influence on the importer and exporter jurisdiction may be different depending on their technical, political and managerial ability (that may make easier the adoption of recommendations and practices *already done and validated* by a supranational institution) and their alignment with domestic interests.

An indirect form of external influence may come through *supranational funding* linked to some decisions able to influence the transfer and implementation of pricing principles or schemes. The mobilization of financial resources at European level (e.g. for investments in the transeuropean network) may alter the financial equilibrium of the infrastructure and thus influence the viability of a given pricing principle or scheme.

5.3.5.3 Horizontal compatibility

This criterion means that the object transferred should not enter in open conflict with those objects already existing at their same level of definition (principles, schemes or practices). Once this criterion has been assessed, the object transferred will be considered *horizontally compatible* (when it does not conflict with other relevant objects operating in the importer jurisdiction at the same level) or discarded as non-transferable.

In the case of railway infrastructure pricing, horizontal compatibility may be a concern as regards other policies acting on the importer jurisdiction that are directly or indirectly connected to pricing. This may be the case for policies related to intermodal competition, regulation of transport operating companies, regulation of access to the infrastructure, infrastructure investment, etc.

Where such policies are already in place, it is necessary to check that their objectives will not conflict with the pricing policies likely to be transferred. This incompatibility may also arise as regards the financial resources available for the political action. Track access charges are a source of revenues that may be applied to fund the infrastructure manager or to fund other relevant policies and investments. At the time of transferring, it should be evaluated whether the transfer of given pricing principles may lead to a reduction of financial resources.

At the level of charging schemes, particular attention should be driven to the incentives embedded in the transferred objects, as they could be in contradiction with the signals embedded in previously existing incentivization mechanisms. For instance, the introduction of a strict performance regime successfully tested in the exporter jurisdiction may conflict with the incentives embedded in a time-dependent structure.

5.3.5.4 Multilevel compatibility

This criterion means that the object transferred should not enter in open conflict with objects already existing at superior levels. Hence, the schemes transferred should not be in open conflict with the principles already at work in the importer jurisdiction and the practices transferred should be in agreement with the schemes and principles already set.

Once this criterion has been assessed, the object transferred will be considered *vertically compatible* or discarded as non-transferable.

Accordingly, the introduction of charging schemes originated in other jurisdictions should not be incompatible with the pricing principles already adopted in the importer jurisdiction. The adoption of a specific practice should be aligned with the schemes already at work in the importer jurisdiction.

For example, the adoption of a very detailed differentiation related to elements other than cost causation, may conflict with the effective application of a marginal cost principle throughout the network. The implementation of delay measurement points at final stations may be in contradiction with a very detailed performance regime taking into account time deviations in every link.

5.3.5.5 Additional considerations

A particular attention should be deserved to the *comparability* of information used in the assessment of transferability in the field of railway infrastructure pricing. As it has been noted in section 4.4.3.5, low comparability is a frequent situation when treating about railway infrastructure companies. Moreover, it may also affect the information available on the context conditions or the external influences.

Comparability problems are likely to appear in relation to cost information or availability of public funding (differences in accounting norms), price levels (different purchase parity power), technical condition of the infrastructure and quality of service (differences in performance indicators), etc.

5.4 Synthesis

Building on the review of the transfer notion developed by the policy transfer and benchmarking literatures, the research proposes its operationalization through the concepts of *transfer problem* and *transferability*. The first is defined as the situation where an entity wants to transfer a policy or practice already successfully applied by another entity in another jurisdiction to its own jurisdiction. The second refers to the condition of being *transferable* from the exporter jurisdiction to the importer jurisdiction, meaning that the transferred policy or practice can be successfully implemented in the importer jurisdiction (i.e. it is able to achieve there the outcomes that it has already attained in the exporter jurisdiction). Accordingly, the assessment of transferability is conceived as a prospective exercise that tries to determine *a priori* how likely is a policy or practice of being *successfully* implemented in the importer jurisdiction by the importer entity.

A number of assumptions have been formulated as regards the position of the *transferability assessment* with respect to the literatures reviewed, the transfer process and the policy-making process. As regards its relation to the literature, a *high degree of complexity* is postulated for the transfer exercise on the consideration that it will be extremely non-standardized and context-dependent, closely interrelated with problems arising in other areas of policy-making, subject to conditions of great uncertainty and it will take place in an environment populated by multiple stakeholders with potentially incompatible interests. In these circumstances, the quantitative and defined approach of the benchmarking literature will be mainly limited to the "practice" level, while the qualitative an undefined approach of the policy transfer literature will prevail at the "policy" and "measure" levels. As regards its relation to the transfer procedure, the research proposes a five-step process (definition, selection, learning, adaptation and action) and assumes that the transferability assessment happens at the *selection phase*. Transferability is thus conceived as a *necessary condition* that must be fulfilled by the policies or practices studied in order to continue through the next stages of the transfer process. Finally, it is assumed that the relation between transferability assessment and the policy-making process takes place through the transfer process (i.e. at some step of the policy-making process, decision-makers resolve to engage in a policy transfer process, one of whose steps is the assessment of transferability). The connection between the transfer and the policy-making processes is supposed to happen in the first part of the policy-making cycle, from the formulation of a problem/idea to the implementation of policy, and particularly at the steps of *definition of options* and *implementation*.

On the basis of the mentioned assumptions, the research has defined a general framework for the assessment of the transferability of policies, measures and practices between different jurisdictions. The framework is conceived as a set of elements, levels and criteria. The *elements* are defined as the basic inputs that should be available in order to assess transferability. They are six: the jurisdictions and entities involved; the aim of the transfer process; the object being transferred; the sources of policy transfer; the external influences acting on the importer jurisdiction; and the context conditions prevailing in the importer jurisdiction. The *levels of analysis* are defined with the aim of particularizing the assessment of transferability for the different stages of the policy-making process. They are three: the strategical level (focused on the transferability assessment of policies and the decision-making process involved in their definition), the tactical level (focused on the transferability assessment of measures) and the operational level (focused on the transferability assessment of practices). Finally, the general framework states four *transferability criteria*, understood as necessary conditions to be fulfilled by the object being transferred (either policy, measure or practice) in order to be suitable for transfer to the importer jurisdiction. An object should be qualified as transferable to the importer jurisdiction if it is able to fulfill the criteria of *indifference to context variations* (i.e. the contextual differences between the importer and the exporter jurisdiction do not affect its outcomes), *indifference to external influences* (i.e. the external influences do not prevent its implementation), *horizontal compatibility* (i.e. it does not enter in conflict with other objects located at its same level in the policy-making process) and *multilevel compatibility* (i.e. it does not enter in conflict with other objects located in superior levels).

In a second step, the general framework has been particularized for the consideration of railway infrastructure charging policies and practices. The approach adopted has maintained the formal structure of the general framework and specified each of its elements, levels and criteria for the field of railway infrastructure charging. The application of the framework to railway infrastructure pricing, is driven by the existence of a *transfer problem* in that specific field: an entity with ability to take or directly influence decisions related to pricing policies on a given railway infrastructure, wants to transfer and implement a pricing policy, measure or practice that has already been successfully applied by another entity on another railway infrastructure. The type of objects likely to be transferred and the corresponding levels of analysis are identified with the *pricing principles* (strategical level), the *charging schemes* (tactical level) and the *charging practices* (operational level). The context conditions are established with respect to categories like geography, transport market, railway market, regulation, railway network, operation conditions, financial conditions, etc. The external influences are identified with larger *structural processes* affecting the railway sector (e.g. the Europeanization dynamics embedded in the EU railway reform). The transferability criteria have been adapted to the particularities of the context conditions and the external influences, as well as to other pricing principles, charging schemes or charging practices already acting on the importer jurisdiction.

Chapter 6

CHARACTERIZATION OF CASE STUDIES

6.1 Introduction

Within the design of this research, case studies are conceived both as a means to complete the characterization of the framework proposed to assess the transferability of railway infrastructure charges and as a method to test its validity. Three steps are central to ensure the achievement of these objectives: the selection of cases, that should be as much representative as possible; their documentation, that should be detailed enough as to correctly depict policies, practices and contexts; and their analysis, that should be able to illustrate and challenge or verify the assumptions made in the proposed framework.

The selection of case studies has been limited in scope to the EU-27, where the diversity of railway infrastructure charges applied by the Member States and the political influence of the EC towards greater harmonization, makes rather likely the development of transfers in the future. This choice has as well the advantage of a greater availability of information on the practices under study.

The documentation of the case studies has been envisaged as both descriptive and goal-oriented. It is descriptive because it gathers and presents detailed information on the railway infrastructure pricing principles, charging schemes and charging practices followed by several entities, according to a wide number of information sources available. It is goal-oriented because it already structures the collected information in view of the main concepts included in the transferability framework proposed.

The analysis of the case studies has been designed as a way to further explore the feasibility of the framework proposed when it is applied in the real world. Nevertheless, it should be noted that the literature does not provide any documented case of transfer of railway infrastructure charges between European countries. This circumstance shapes and limits the type of analysis performed, which is more oriented to prove the conceptual strength of the framework proposed to integrate different informations and formulate reasonable hypotheses for the assessment of transferability.

The scope of this chapter is to select and document a number of case studies that will be used in chapter 7 to provide further validation to the assumptions of the transferability assessment framework proposed in section 5.3.

Section 6.2 presents the selection criteria and the case studies chosen for the validation of the conceptual framework; Section 6.3 provides a detailed characterization of the context and conditions prevailing in the selected importer jurisdiction; Section 6.4 briefly characterizes the context and the railway infrastructure pricing practices observed in the exporter jurisdictions; Section 6.5 presents a brief synthesis of the information gathered and the case studies selected for their development.

6.2 Selection of case studies

The fragmentation of practices and circumstances observed in the EU provides a rich field for the identification of case studies able to illustrate and validate the conceptual framework proposed. Twenty-five national infrastructure managers are currently applying charging schemes in the networks under their management, with different principles, structures and levels. Their contexts are even more diverse with respect to market structure, regulation, operational conditions, financial resources, etc. The number of cases that could be developed goes already up to 576 only as a combination of the possible importer and exporter national jurisdictions, and to many more if the different possible objects of transfer are considered.

Hence, it seems necessary to formulate some criteria able to guide the selection of the importer and exporter jurisdictions and the objects of transfer.

According to the transfer process proposed (see section 5.2.4), the assessment of transferability is undertaken in a preliminary stage, what conditions the information available on the practices and the contexts of the external jurisdictions. Contrarily, the importer entity has a wide knowledge on the context and circumstances that are distinctive of its own jurisdiction. To simulate to a certain extent this particularity, it has been decided to select the same importer entity and jurisdiction for all the cases and to do it according to a *criterion of maximum information available*. As a result of these considerations, the national Spanish national rail network has been selected as the importer jurisdiction and the Spanish Public Works Ministry as the importer entity.

Though performed on practical criteria, this selection is not perceived as unrealistic, given the later start of the railway reform in effective terms in Spain and the increasing interest shown by the Spanish Public Works Ministry on the subject of rail infrastructure charges.

As to the selection of the exporter jurisdictions, three criteria have been formulated

- The *maturity* achieved in the practice of rail infrastructure pricing, which has been evaluated according to the year of introduction of infrastructure charging schemes (positive for the jurisdictions with at least 10 years of experience). This criterion assumes that the importer entity will be more interested in bringing in practices from the more experienced railway networks.
- The *size* of the railway infrastructure market in the exporter jurisdiction. It is presupposed that the importer jurisdiction will be more likely to introduce practices applied in the larger markets (more than 30 million transport units-km in year 2005). This assumption would also be reasonable if analyzed from a European scale, as it seems more probable a process where the practices spread from larger to smaller markets.
- The *geographical proximity* to the importer jurisdiction. It seems more likely that the importer entity will adopt policies or practices from the neighboring networks (one or two borders ahead of the importer jurisdiction). This condition is also aligned with the harmonization of railway infrastructure charges on international corridors including the importer jurisdiction.

It should be noticed that the selected criteria are in agreement with the factors affecting the likelihood of transfer and its success mentioned in section 4.3.3.5. In fact, the availability of information on the object being transferred or the degree of prediction of the outcomes are related to the geographical proximity and the maturity of the practice. The existence of interdependences is also related to the geographical proximity, in the form of international traffic and border agreements.

The application of the three mentioned criteria has led to the selection of the rail networks managed by RFF (France), DB Netz (Germany), RFI (Italy), Network Rail (UK), Banverket (Sweden) and REFER EP (Portugal), as they are the only exporter jurisdictions in the EU-27 fulfilling at least two of the three conditions. The results of the evaluation for the selected exporter jurisdiction are shown in Table 16.

Table 16: Evaluation of selected exporter jurisdictions

Exporter jurisdiction	Maturity of practice	Market extension	Geographical proximity
RFF (France)	Yes	Yes	Yes
DB Netz (Germany)	Yes	Yes	Yes
Network Rail (UK)	Yes	Yes	Yes
Banverket (Sweden)	Yes	Yes	No
REFER (Portugal)	Yes	No	Yes
RFI (Italy)	No	Yes	Yes

Note: Criteria - Maturity (Yes- prior to 1998; No- equal or later than 1998); Market size (Yes- traffic volume greater than 30 million transport units-km in year 2005; No- traffic volume inferior to 30 million transport units-km in year 2005); Geographical proximity (Yes- one or two borders ahead of the impoter jurisdiction; No- more than two borders ahead of the importer jurisdiction).

Source: own elaboration

Once the importer and exporter jurisdiction have been identified the construction of the case studies requires selecting the objects that will be transferred between them. The selection criteria applied to these objects have been their *distribution* across the levels defined in the conceptual framework (two objects for each level: strategical, tactical and operational) and the *representativeness* of the object transferred in the exporter jurisdiction (though it has been applied on a subjective basis, it seeks to reflect the idiosyncrasy of each railway administration). The selected objects are presented in Table 17.

Table 17: Selected objects and levels of analysis for the case studies

Exporter jurisdiction	Level	Object
RFF (France)	Tactical	Charging scheme for high speed services
DB Netz (Germany)	Tactical	Charging scheme for freight services
Network Rail (UK)	Operational	Congestion cost calculation and allocation procedure
Banverket (Sweden)	Strategical	Marginal social cost pricing principle
REFER (Portugal)	Operational	Infrastructure cost calculation and allocation procedure
RFI (Italy)	Strategical	Full cost minus subsidy pricing principle

Source: own elaboration

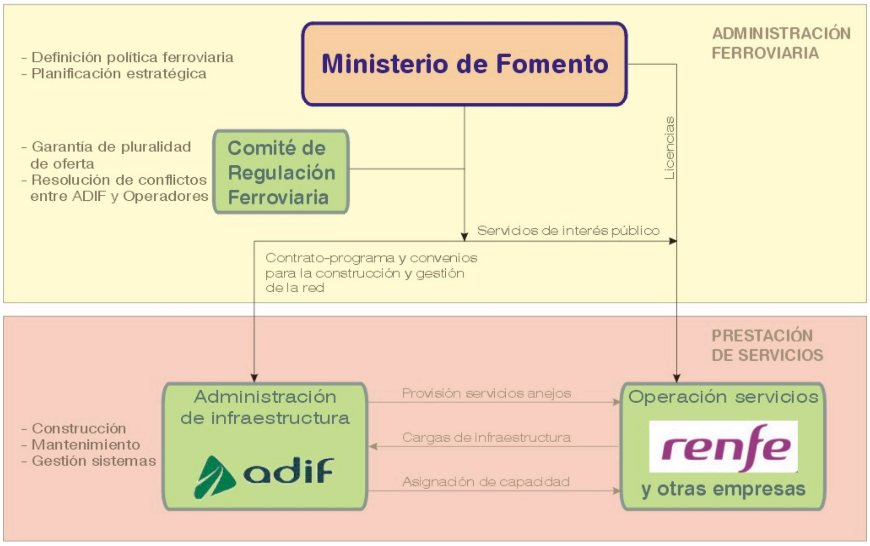
6.3 Characterization of the importer jurisdiction

6.3.1 The Spanish railway model

Spain addressed the reform of the railway sector with the 2003 Railway Law *(Ley 39/2003 del Sector Ferroviario*), which came into force on the 1st of January of 2005[57]. In line with the EU requirements, the new model implied separation between infrastructure management and railway services, creation of a license system for railway undertakings, opening of national and international transport to new railway operators, strengthening of railway administration and the creation of a regulatory body for the sector.

The Railway Law entrusted the management of the railway infrastructure to the public business entity *Red Nacional de los Ferrocarriles Españoles* (RENFE), that changed its name to *Administrador de Infraestructuras Ferroviarias* (ADIF) and integrated the former public business entity *Gestor de Infraestructuras Ferroviarias* (GIF), dedicated to the management of the high speed network. The Railway Law created as well a new public business entity, RENFE-Operadora, in charge of the rendering of railway transport services to the public. RENFE-Operadora assumed the assets dedicated to the transport activity that previously belonged to RENFE.

Fig. 61: Layout of the Spanish railway sector



Source: Public Works Ministry (www.fomento.es ; 2008-04-25)

Furthermore, the Railway Law introduced the figure of the *Comité de Regulación Ferroviaria* (CRF), with the duty to safeguard the plurality of railway services, to guarantee equal access conditions and to resolve conflicts in the market when new

[57] The enforcement of the Railway Law 39/2003, initially set for May 2004, was delayed until 2005 in order to allow the completion of the regulatory framework for the rail sector (*Real Decreto Ley 1/2004*)

operators other than RENFE-Operadora will start their operations. The layout resulting from the railway reform is depicted in Fig. 61.

Under the new model, the State is still the dominant actor in the railway sector, through the activity of the Public Works Ministry. This institution is responsible for: 1) the strategic planning of the railway sector and its development; 2) the general planning and regulation of the railway sector; 3) the definition of the national financial framework for railways, which includes the financing of the infrastructure manager and the financial compensations for public service obligations; 4) the definition and supervision of the track access charging regime; and 5) the awarding of licenses and security certificates to railway companies (Railway Law 39/2003, Art.81).

ADIF is a public business entity attached to the Public Works Ministry with own legal personality, full capacity to operate and own assets. It is in charge of the construction of the new railway infrastructure mandated by the Public Works Ministry (with recourse to own or external resources) and is also responsible for the management of the infrastructure to which is entitled or that is entrusted to it by the State through specific agreements. Additionally, ADIF prepares and publishes the Network Statement, allocates infrastructure capacity to railway undertaking requesting it, provides and set charges for additional, complementary and ancillary rail transport services and levies charges for the use of railway infrastructure (Railway Law 39/2003, Art.21).

RENFE-Operadora was created as well as a public business entity attached to the Public Works Ministry with own legal personality, full capacity to operate and own assets. Its main objective is the provision of railway transport services for both, passengers and freight, which also includes the maintenance of the rolling stock. RENFE-Operadora is allowed to undertake any other commercial action convenient or required for the correct accomplishment of its main objective. The Railway Law also defined the transitory steps to be followed by RENFE-Operadora in order to adapt to the entry into force of the planned liberalization provisions[58].

In order to be able to provide transport services, the new entity inherited the operation business units of the former RENFE: Suburban services, Regional services, High speed services, Long distance services, Freight services and Maintenance of rolling stock. In addition, RENFE-Operadora received those assets, liabilities and rights formerly belonging to RENFE but required for the provision of railway transport services. These assets were finally defined in year 2006 through the Ministerial Order 2909/2006, which

[58] In this sense, the Railway Law 39/2003 guarantees to RENFE-Operadora the allocation of capacity for the operation of freight services until the publication of the network statements and the exclusivity of the operation of passenger services until the entry into force of the European legislation opening this segment to competition.

assigned to RENFE-Operadora the equipments needed for the maintenance of rolling stock, the rolling stock itself and the buildings and equipments required for the administration and the central services of the entity. RENFE-Operadora received as well the shares and capital contributions that RENFE held in subsidiaries or other companies related with the provision of railway transport services.

The CRF is a collegiate body integrated within the Public Works Ministry. It is responsible for the supervision and control of the railway market in order to safeguard plurality in the provision of railway services on the network, guaranteeing no discrimination among public and private companies in their access to the mentioned services. It also ensures that track access charges are set according to the provisions stated in the Railway Law and are not discriminatory and solves conflicts that may arise between the infrastructure manager and the railway operators regarding the structure or application of charges related to additional, complementary and ancillary services (Railway Law 39/2003, Art.82).

The reform of the sector was preceded by an intensive debate concerning the allocation of the debt belonging to RENFE among the newly created stakeholders ADIF and RENFE-Operadora and the State. The financial and economic studies accompanying the draft of the Railway Law presented several options with different effects on the viability of the new entities and the deficit of the State[59] (Izquierdo et al. 2004, p.591).

Although at a given moment of the process the State supported the allocation of the debt mainly to the new public business entities[60], the final solution consisted on the assumption of 5.459 million € by the State, 1.379 million € by RENFE-Operadora and 1.087 million € by ADIF (RENFE, 2004a). With this arrangement RENFE assumed the debt derived from the acquisition of new high speed rolling stock, ADIF assumed the debt linked to the Madrid-Seville high speed line and the State assumed 3.659 million € due for the historical debt of the entity and 1.799 million € due for the financing of investments in infrastructure (Art. 5 of Decree 7/2004). These decisions granted a sound financial and economic basis to the new stakeholders at the beginning of their activity.

The picture of the Spanish railway sector is completed with the presence of *Ferrocarriles Españoles de Vía Estrecha* (FEVE), an integrated railway company depending from the Public Works Ministry managing the narrow-gauge network, and

[59] The mentioned financial and economic studies presented four different scenarios, here expressed in million €: 1) ADIF - 0, RENFE-Operadora - 1.357, State - 5.883; 2) ADIF - 5.883, RENFE-Operadora - 1.357, State - 0; 3) ADIF - 2.036, RENFE-Operadora - 1.357, State - 3.847; 4) ADIF - 4.345, RENFE-Operadora - 1.357, State - 1.538.

[60] The Public Works Minister announced before summer that ADIF should assume 4.344 million € of RENFE's debt, RENFE-Operadora 1.357 million € and the State 1.538 million € (Chamizo, 2003).

four regional integrated railway companies (*Ferrocarrils de la Generalitat de Catalunya, Ferrocarrils de la Generalitat Valenciana*, *Euskotren* and *Serveis Ferroviaris de Mallorca*). In year 2006 these five railway companies summed up nearly 9% of the total rail passenger-km produced in Spain, while RENFE-Operadora carried the remaining 91% (Ministerio de Fomento, 2007a, p.286).

6.3.2 Considerations on the Spanish railway reform

The layout of the railway sector previously described has been designed in order to minimize the burden of the railway system on the public accounts, according to the rules stated in the European System of National and Regional Accounts (ESA 95).

For the purposes of describing income, expenditure and financial flows, and balance sheets for every institutional sector, the ESA-95 has adopted as the basic statistical unit the *institutional unit*, which is defined as "*an elementary economic decision-making centre characterised by uniformity of behaviour and decision-making autonomy in the exercise of its principal function*" (European Council, 1996a, Annex A, § 2.12). As producers, the institutional units are classified into different types depending on their nature (public or private[61] / profit or non profit[62]) and their production, which can be for the market, for own final use or for other non market purposes.

Public producers can be classified as market producers or other non-market producers, depending on the so-called "50% criterion": they are market producers if more than 50% of the production costs are covered by sales and non-market producers otherwise. The implications of this criterion are rather relevant, as public institutional units regarded as market producers are classified outside of the general government sector[63] and, when they do not have an independent legal status, treated as quasi-corporations owned by the government. Public institutional units regarded as non-market producers are classified in the general government sector and consolidated within it.

Sales are accounted excluding taxes on products but including all payments made by the general government or the institutions of the European Union and granted to any kind of

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[61] A public producer is defined as "*a producer controlled by the general government or, in the case of non profit institutional unit, controlled and mainly financed by the general government*" (European Council, 1996a, Annex A, § 3.28).

[62] A non profit institutional unit is defined as "*a legal or social entity created for the purpose of producing goods and services whose status does not permit them to be a source of income, profit or other financial gains for the units that establish, control or finance them*" (European Council, 1996a, Annex A, § 3.31). This distinction is however unnecessary when treating with public producers.

[63] They are classified in the non-financial or financial corporations sectors

producer in relation to its activity, i.e. all payments linked to the volume or value of output are included, but payments to cover an overall deficit are excluded. Sales are only used in valuing market output, as other non-market output is valued at costs. Production costs are the sum of intermediate consumption, compensation of employees, consumption of fixed capital[64] and other taxes on production. For this criterion other subsidies on production are not deducted. To ensure consistency of the concepts sales and production costs when applying the "50% criterion", the production costs should exclude all costs made for own-account capital formation.

In addition to this definition of sales and production costs, the ESA-95 states that the "50% criterion" should be applied by looking over a range of years: only if the criterion holds for several years or holds for the present year and is expected to hold for the near future, it should be deemed fulfilled. Minor fluctuations in the size of sales from one year to another do not necessitate a reclassification of institutional units (European Council, 1996a, Annex A, § 3.33).

The "50% criterion" defines an indirect condition on the layout of the railway sector and its public agents, as depending on the nature of their products (market or non-market) they will consolidate or not as general government sector. If considered non-market producers, the public expenditure on them has to be accounted as non-financial expenditure; if classified as market entities, the public expenditure has to be treated as a financial investment without effects on public deficit.

Consequently with these norms, the focus of the Spanish railway reform has gone to ensure the classification of the newly created entities ADIF and RENFE-Operadora as public market producers. This classification entails the financial nature of the public capital contributions to the railway sector, avoiding them to be consolidated as debt.

In the case of ADIF, the first aim of the reform has been to define an entity capable to fulfill the "50% criterion" on the long term in spite of the strong investment already committed through the ongoing infrastructure plans. The relevant variables considered in order to attain this goal were the ownership of the infrastructure, the definition of a depreciation scheme for ADIF and the level of the railway infrastructure charges (the two first factors acting on the cost side of the problem and the latter one on the income side).

- *The ownership of the infrastructure*.

  The ownership of the infrastructure contributes to the production costs of the infrastructure manager through depreciation and to the sales through the charges

[64] The inclusion of capital consumption is particularly relevant from the perspective of the infrastructure management activity, as it includes depreciation of fixed assets.

for the use of infrastructure and the economic compensations for its management. Depending on the type of line, the net contribution to the fulfillment of the "50% criterion" may be positive or not.

When the infrastructure is owned by the State and entrusted to ADIF, depreciation is not accounted in the production costs, while track access charges and economic compensations for its management are summed up to sales. On the other side, the State has to pay for the depreciation, which contributes effectively to public deficit.

- *The depreciation scheme applied to fixed assets entitled to ADIF.*

  The choice of a given depreciation scheme for the fixed assets entitled to ADIF, defines the contribution of infrastructure to the production costs of a given year. If the selected scheme is linear over time, it will have a fixed contribution with no correlation to sales, therefore increasing the risk of no-compliance of the "50% criterion" in the first years of operation (when traffic is generally expected to be lower). If the selected scheme is somehow linked to the output produced (e.g. train-km), it will also correlate to the ability to generate sales, thus reducing the risk of non-compliance.

- *The definition of railway infrastructure charges.*

  As it will be explained later in this chapter (section 6.3.7), the definition of railway infrastructure charges in the Spanish railway model has been done according to financial considerations rooted on this rationale.

6.3.3 Policy objectives for the railway sector

The Public Works Ministry is in charge of the definition of the national transport and railway policy, and its implementation through the strategic planning activity.

In year 2005 the Public Works Ministry issued its Strategic Infrastructure and Transport Plan (PEIT), which defines the principles and objectives that will drive the Spanish transport policy in the period 2005-2020. Within the PEIT framework and with a particular focus on railway transport policies, the Railway General Directorate (DGF) has elaborated the Railway Transport Sector Plan in close collaboration with ADIF, RENFE-Operadora and FEVE. However, this plan has not been enacted yet, as it is still involved in the strategic environmental impact evaluation process (www.fomento.es; 2008-04-30).

Building on an extensive diagnostic of the Spanish transport system, the PEIT formulates the basic guidelines for the national railway transport policy until year 2020 (Ministerio de Fomento, 2005a, pp.66-69):

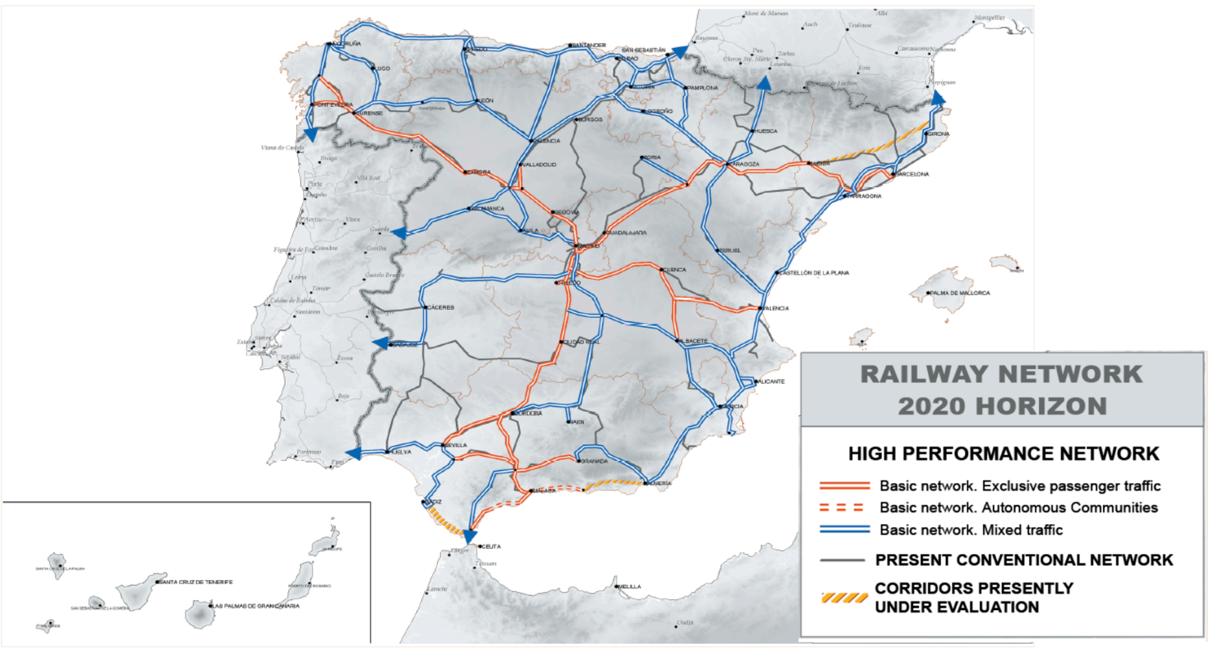
- Consolidation of the new railway model arising from the EU railway reform.
- Promotion of a central role for railways in the intermodal system for the transport of passengers and goods on trunks and high demand corridors.
- Setting a target for reduction in total travel times for all interurban links, to be reached in stages according to the planned development of the network. The resulting travel times must, within the Plan's horizon, place rail in a competitive position in relation to air transport in links using the high speed trunk routes for distances of less than 700 km. On other routes, the reference for improved travel times will be that for private vehicle transport over distances of more than 300 km.
- Construction of a high performance network in line with Directive 96/48/EC on the interoperability of European high speed rail. The network will be designed mainly for mixed traffic, including cross-border rail links, although on routes where demand volumes and characteristics require it, the new infrastructures will be exclusively for passenger traffic.
- A strategy to improve rail share in the movement of freight across medium and long distances, by improving the quality standards offered by rail, in line with freight market's demand.
- Definition of a freight transport network in line with Directive 2001/16/EC on the interoperability of the conventional rail system, including lineal infrastructure and equipments, which will provide sufficient capacity in the most important corridors.
- Contribution to the accessibility throughout the country with regional services adapted to local characteristics in accordance with priorities and resource allocation by the relevant territorial administrations.
- Definition of a new framework for the development of regional services, based on agreements between operators and regional administrations and the coordination between them and long distance services as regards timetables and charges.
- Priority attention to the maintenance of the network, with improvements in its management by the allocation of necessary resources, estimated in terms of safety and efficiency criteria, and implementation of an updated system for preventive and integrated maintenance.

- Maintenance of high safety standards in rail transport throughout the process of migration toward a European safety system, setting up a national authority in the field as part of the European safety agency.
- The suburban networks will be completed in the major metropolitan areas and major cities, and priority will be given to the modernization of rolling stock.
- Closed, unused lines will be analyzed with a view in placing a value on these public assets according to their potentialities.
- Establishment of intermediate temporal horizons for the development of the network and the patterns of services, drawing up rail transport sector plans every eight years.

In line with these guidelines and until the Railway Transport Sector Plan is finally approved, the Public Works Ministry has set the national priorities for the rail transport policy in 2005-2008 (Ministerio de Fomento, 2005a, pp.95-96). Within this period, the two main actions are the consolidation of the new institutional framework and the investment program in the network.

The consolidation of the institutional framework is focused on the definition of clear relationships between the infrastructure manager ADIF and operators (initially RENFE-Operadora). This consolidation will require the development and review of the current pricing system for the use of railway infrastructure and the gradual introduction of competition in the freight transport market.

Fig. 62: Spanish railway network planned for year 2020.



Source: Ministerio de Fomento (2005a)

The investment program is focused on the delivery of the high performance links currently under construction, as well as the interventions on the conventional network improving operation conditions for freight services, intermodality and interoperability.

From 2009 to 2020, action will be aimed at improving passenger and freight services, progressively enlarging the high performance network and interoperability with the French network (Ministerio de Fomento, 2005a, pp.96-97). Within this period, the possible introduction of competition in rail passenger transport is foreseen. According to these priorities, in year 2020 the railway reform will be probably completed, with freight and passenger rail services competing on an extended and specialized railway network including high performance links for exclusive passenger traffic, high performance links for mix traffic and conventional links (Fig. 62).

The PEIT states as well that the transport activity of RENFE-Operadora has to be understood as a central element of the intermodal chain of public transport services and that its railway services have to be defined in every case according to different but complementary goals. Building on this basis, the PEIT defines transport policy objectives for four different types of services (Ministerio de Fomento, 2005a, pp.103-104):

- *Long distance passenger services*: the priority must go for the creation of high frequency services in the high performance corridors, coordinating schedules and facilitating connections with other railway services and road transport.
- *Regional passenger services*: they should be coordinated with long distance services and seek complementarities with public road transport. They should be set accordingly to regional interests and defined within the framework of agreements between RENFE-Operadora and the regional administrations.
- *Suburban passenger services*: they should reach a progressive integration with metropolitan public transport services, and be focused on corridors with high demand and high frequency requirements. These services are to be analyzed within the specific framework of urban mobility.
- *Freight services*: they should be oriented to the provision of intermodal transport services in high demand corridors and promote the international activity with complementary strategic partners among operators from other countries.

6.3.4 Railway network

The scope of the railway reform is centred in the General Interest Rail Network (REFIG), which is defined in Art. 4 of the Railway Law 39/2003 as the rail infrastructure that is essential to ensure a common railway transport throughout the whole territory of the State or whose joint management is required for the correct operation of such common railway transport system. The inclusion or exclusion of rail links in the REFIG is the competence of the Public Works Ministry.

ADIF manages the larger part of the REFIG (the remaining part being managed by FEVE), which has increased steadily in the period 2005-2008 (Table 18) as a result of the enlargement of the high speed network, a trend that is expected to be continued in the next years.

Table 18: Evolution of the railway network managed by ADIF

Type of network	2005 (July)	2006 (May)	2006 (December)	2008 (April)
High speed network	1.010	1.056	1.237	1.563
Conventional network	11.759	11.714	11.715	11.736
Mixed network	21	21	21	21
Narrow gauge network	18	18	18	18
TOTAL	12.808	12.809	12.991	13.338

Note: Km of railway line. Classification of the network according to the track gauge: High speed network (international gauge – 1.668 mm); Conventional network (Iberian – 1.435 mm); Mixed network (both international and Iberian); Narrow gauge (1.000 mm).
Source: own elaboration with data from ADIF (2005), ADIF (2006a), ADIF (2007b) and ADIF (2008)

The part of the REFIG managed by ADIF includes infrastructure within a wide range of technical characteristics as regards gauge, electrification (Table 19), maximum speeds (Table 20) or signaling systems.

Table 19: Electrification in the railway network managed by ADIF

Type of network	Single track	Double track	TOTAL
Electrified	3.601	4.450	8.051
Non electrified	5.210	56	5.266
TOTAL	8.811	4.506	13.317

Note: Km of railway line.
Source: ADIF 2008, p.25

Broadly speaking it is possible to distinguish three types of infrastructure: the new high speed infrastructure (UIC gauge, speeds greater than 250 km/h, double track, electrified), the Mediterranean corridor (Iberian gauge, maximum speed of 220 km/h, double track, electrified) and the conventional network (Iberian gauge, speeds below 160 km/h). This distinction, which reflects as well the different quality of the infrastructure services rendered to the operators, has been incorporated to the current infrastructure pricing system through the variable type of line (see section 6.3.9).

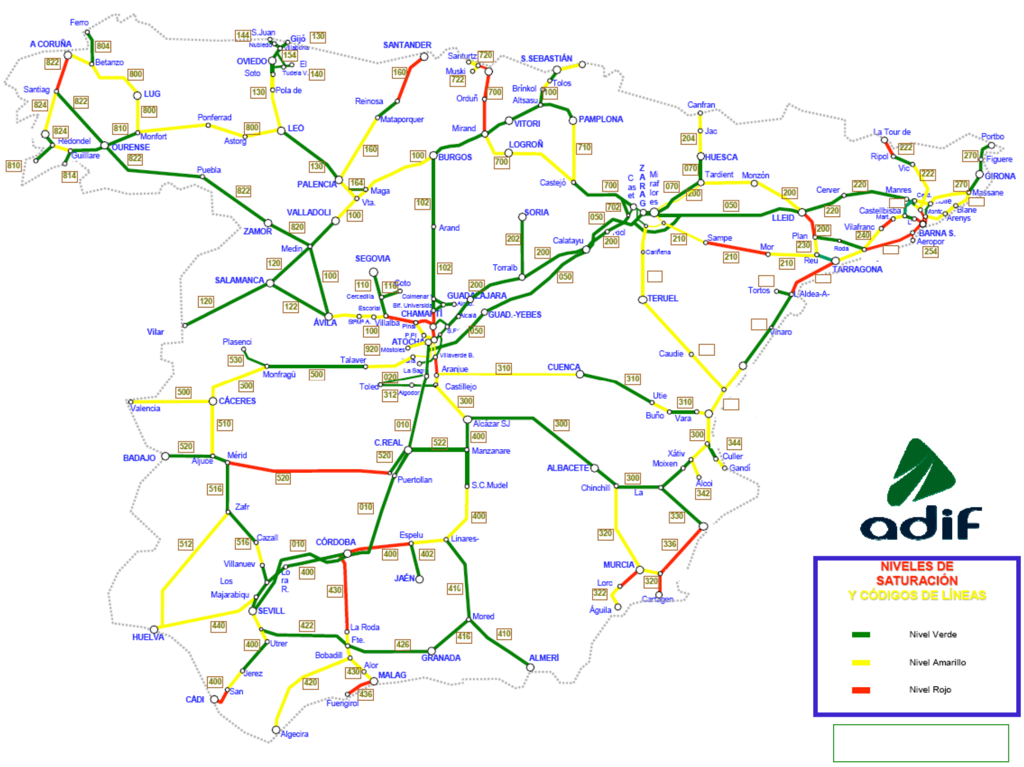
Table 20: Maximum speeds in the railway network managed by ADIF

Maximum speed	Length
> 250 km/h	1.247
200-250 km/h	487
160-200 km/h	215
140-160 km/h	4.725
100-140 km/h	3.601
< 100 km/h	3.063
TOTAL	13.338

Note: Km of railway line.
Source: ADIF 2008, p.25

As regards the level of congestion present in the network, it is generally low (occupancy below 80% of the predefined train slots) with the exception of some single track links and some links closed to the main urban areas (Fig. 63).

Fig. 63: Saturation levels in the Spanish railway network. 2006



Note: Green – occupancy below 50% of the predefined train slots; Yellow – occupancy between 50% and 80% of the predefined train slots; Red – occupancy above 80% of the predefined train slots.
Source: ADIF, 2006c, p.16

6.3.5 Railway infrastructure market

The Spanish transport market is dominated by road in both passenger and freight markets. According to the EC (2006a, pp.19-32), in year 2005 the railway mode carried 4,6% of the total ton-km transported by land in Spain, while road reached the 92%. In year 2004, rail carried as well the 4,7% of the total pax-km transported by land, with road transporting the 94%. This weak share of rail is expected to increase as the new high speed network enters into service and the operation segment is opened to competition.

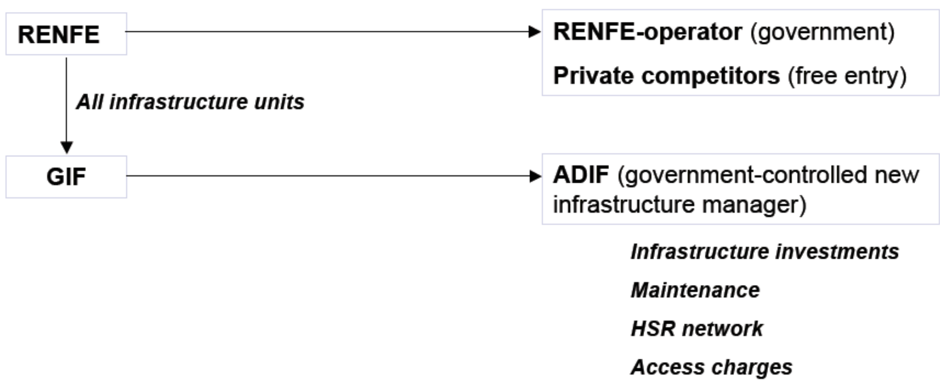
The railway market is still in a transition phase towards the new model and, though in evolution towards greater competition in the operation market, the great majority of the transport activity is still performed by the public operator RENFE-Operadora. A consequence of this situation is that today, the railway infrastructure market may be described as a combination of a monopoly (with a single provider of infrastructure services – ADIF) and a monopsony (with a single consumer of infrastructure services – RENFE-Operadora).

The next sections provide further insight on the structure of the Spanish railway infrastructure market as regards the type of separation, the type of ownership and the type and degree of competition.

6.3.5.1 Type of separation

Since the first of January 2005, Spain has enforced separation between infrastructure management and transport operation activities. The model adopted has been the one of institutional separation, through the creation of two independent companies: ADIF and RENFE-Operadora (Fig. 64).

Fig. 64: Vertical separation in the Spanish railway sector



Source: Campos, 2005, p.16

6.3.5.2 *Type of ownership*

Prior to the restructuring of the sector, the REFIG was entitled to the integrated railway companies RENFE and FEVE and to the high speed infrastructure manager GIF. When the reform entered into force, the railway lines managed at that moment by RENFE ceased to come under its jurisdiction and reverted to the State, except for the high speed railway line Madrid-Seville, which became property of ADIF. Additionally, ADIF received all the assets belonging to GIF, the patrimonial property[65] belonging to RENFE (except the assets required for the railway transport operation business) and all the stations, terminals and other fixed assets permanently required for the rendering of infrastructure services. With independence of its ownership, the entire rail network entitled to the State and being managed by RENFE at the enforcement of the Railway Law 39/2003 was entrusted to ADIF on December 31st 2004, with the only exemption of the rail links Lleida-La Pobla de Segur and Quart de Poblet-Ribarroja[66].

Table 21: Ownership structure of the General Interest Railway Network

	State			ADIF	TOTAL		
	Single track	**Double track**	**Total**	**Double track**	**Single track**	**Double track**	**Total**
Electrified	3.611	2.903	6.514	1.010	3.611	3.913	7.524
Non electrified	5.236	30	5.266	--	5.236	30	5.266
TOTAL	8.847	2.933	11.780	1.010	8.847	3.943	12.790

Note: Km of railway line, year 2005, excluding narrow gauge lines entitled to FEVE
Source: Public Works Ministry (www.fomento.es; 2008-04-30)

The ownership of the railway infrastructure constructed after the enforcement of the railway reform is allocated to the State or to ADIF on a case-by-case basis depending on financial criteria (see 6.3.2). Until now, all the new links constructed or under construction have been entitled to ADIF and only the high performance link Ourense-

[65] The Law on Public Administration Property (*Ley 33/2003*) makes a clear distinction between patrimonial property and public domain property, the latter being those assets devoted to the public use or recognized as such by law. The Regulation of the Railway Sector (*Real Decreto 2387/2004*) defines as public domain railway property those assets within the public domain zone established in art. 13 of the Railway Law 39/2003 and defines as patrimonial assets of the infrastructure manager the stations, terminals and other fixed assets excluded from the concept of "line" with the exception of those entirely built within the public domain zone or those built in the future with State or third parties resources. The concept of line is defined in the Annex of the Railway Law 39/2003 as the railway infrastructure connecting two points integrated by platform, superstructure, civil engineering works (as bridges, tunnels and overpasses) and signalling, safety, lightening and track telecommunication equipments.

[66] Both lines were excluded from the General Interest Rail Network and transferred to regional administrations (Ministerio de Fomento, 2004 and Ministerio de Fomento, 2005c).

Santiago has been entitled to the State. The ownership structure of the General Interest Railway Network resulting from the reform is indicated in Table 21.

6.3.5.3 *Type and degree of competition*

The railway model adopted in Spain foresees on track competition for rail freight services. New operators have been entering slowly in the Spanish market and, as of May 2008, ten railway undertaking licenses have been delivered for the production of railway freight services in Spain (Table 22). One more operator, Euro Cargo Rail, belonging to the EWS Group and previously licensed in France, has been included in the Special Railway Registry (Vía Libre, 2008-01-24). In addition to these companies, four more entities are in possession of certificates for the request of capacity (Transfesa, Logística y Transporte Ferroviario, Container Train and Conterail).

Table 22: Railway undertakings licensed in Spain

Company	Date of awarding
RENFE-Operadora	27/09/2005
COMSA Rail Transport SA	27/09/2005
Continental Rail S.A.	21/10/2005
Press Cargo Tren S.A.	16/03/2006
Acciona Rail Services SA	13/06/2006
Activa Rail SA	04/07/2006
Traccion Rail SA	24/07/2006
Eusko Trenbideak - Ferrocarriles Vascos SA	24/08/2006
Arcelor Mittal Siderail	21/12/2007
Logitren Ferroviaria SA	30/04/2008

Source: own elaboration with data from (ADIF, 2007c), (Vía Libre, 2008-05-28) and DGTREN (http://ec.europa.eu/transport/rail/market/licence_en.htm;2008-05-06)

Most of the new entrants are subsidiaries of the main Spanish construction groups. This is the case of Acciona, COMSA, ACS, Azvi and Torrescamara.

- Acciona Rail Services started the operation of rail freight transport at the beginning of year 2007, with a regular service transporting coal from the port of Gijón to the power station of Unión Fenosa at la Robla (León). Since December 2007 the company also operates a daily service between the Port of Algeciras and Barcelona in collaboration with RENFE-Operadora (www.acciona-railservices.com; 2008-05-06).
- COMSA Rail Transport provides handling services in railway terminals and transport of construction materials for railway works. In January 2008 it has

started the operation of rail services from the automobile factory of SEAT in Martorell to the port of Barcelona (COMSA, 2008).

- Continental Rail (property of ACS) started its activity transporting construction materials to the building sites of the new high speed lines. RENFE-Operadora and Continental founded a joint venture named Construrail[67], which in February 2007 started regular services connecting Madrid and the Port of Valencia (http://www.continentalrail.es; 2008-05-06; http://www.constru-rail.es; 2008-05-06).
- Traction Rail (owned by Azvi) is currently testing a rail service between the rail freight terminal of Huelva and the biodiesel production plant located in Valdetorres (Vía Libre, 2008-06-08).
- Logitren Ferroviaria (Torrescamara group) has been recently licensed and expects to start operation by the end of 2008 (Vía Libre, 2008-05-28).

Other two licenses have been awarded to entities already present in the railway market. This has been the case for EUSKOTREN, the public regional railway operator of the Basque Country or Activa Rail, owned by the logistic operator Transfesa, in turn owned by Deutsche Bahn, RENFE-Operadora and SNCF[68].

Finally, a license has been awarded to Arcelor Mittal Siderail. The iron and steel company will operate trains between its factories in Gijón and Avilés and the port of Gijón (Fernández et al. 2006). It is the only new entrant which has declared a "level 2"[69] traffic activity (Líneas, December 2007). Two more companies have already requested the operating license: Corporación General de Transportes and Ferrocarriles del Suroeste (En Punto, February 2008).

The declared objectives of the new entrants are, in words of their association AEFP, the cooperation with the current agents of the sector, the increase of the market share of railways and the diversion of traffics from other transport modes (http://www.aefp.es 2008-06-10). It strikes to the eye the soft position with respect to the incumbent, as none of these objectives suggests an active competition for the market of RENFE-

[67] Participated by Continental Rail (51%) and RENFE-Operadora (49%).

[68] DB acquired the 60% of Transfesa in year 2007 with the approval of the EU competition authorities. RENFE-Operadora has entered into negotiations with DB in order to increase its share in Transfesa (now 20%) and define collaboration strategies (Ruiz del Árbol, 2007; Deutsche Bahn AG, 2008d).

[69] Art. 61 of the Regulation of the Railway Sector defines three types of services (hauling, passenger transport and freight transport) and three traffic levels: level 1 (less than 1 million transport units – km), level 2 (between 1 and 10 million transport units – km) and level 3 (more than 10 million transport units – km).

Operadora. This first impression is apparently confirmed by the large number of agreements between the incumbent and the new entrants. RENFE-Operadora holds shares in Transfesa (also owner of Activa Rail) and Construrail and has reached agreements with Acciona Rail and with COMSA Rail[70]. It is still to be seen whether the activity of Deutsche Bahn, through its new subsidiaries Transfesa, Activa Rail and EWS, will follow this trend or will bring direct competition to the freight unit of RENFE-Operadora.

It is still too early to evaluate the economic relevance of the new entrants in the market, both in terms of share and growth, but apparently it is progressing slowly and receiving critizisms with respect to the barriers still present in the access to the market. The new entrants complain about the requirements from RENFE-Operadora to hire some of its former employees under the same working conditions they had, the sale of rolling stock to foreign companies in order to avoid their availability for them or the reduced learning facilities for train drivers (El Confidencial Digital, 2008-06-03).

6.3.6 Railway infrastructure market regulation

The Public Works Ministry is in charge of the overall organization and regulation of the Spanish railway sector. This activity has been performed through the definition of the legal basis of the sector, the signature of framework agreements with the public business entities ADIF and RENFE-Operadora, the setting of a specific regulatory body for railways and the control of access to the operation market. ADIF is involved as well in the regulation of access to the network, through the delivery of safety certificates to the operators and the allocation of capacity to them.

6.3.6.1 Legal basis and framework contracts

The Public Works Ministry is responsible for the development of the railway's sector legal framework, which has been done through the Railway Sector Regulation (Real Decreto 2387/2004), the Statutes of ADIF and RENFE-Operadora (Real Decreto 2395/2004 and Real Decreto 2396/2004) and other relevant norms concerning the separation and coordination of railway activities (Orden FOM/2909/2006 and Orden FOM/32/2005), the safety certification (Real Decreto 810/2007), the capacity allocation process (Orden FOM/879/2005) and the setting of track access charges (Orden FOM/898/2005 and Orden FOM/3852/2007).

[70] RENFE-Operadora signed an agreement with FGC and COMSA Rail for the future operation of services between the factories of SEAT in Martorell and Zona Franca (Europa Press, 2008-06-05).

The Railway Sector Regulation defines the railway infrastructure, the additional, complementary and ancillary infrastructure services, the railway transport services, the inspection services, the Special Railway Registry (*Registro Especial Ferroviario*) and the Railway Regulation Committee (*Comité de Regulación Ferroviaria*). The Statutes of ADIF and RENFE-Operadora define the juridical form, the functions and the general organization of each entity, as well as a framework for their staff, property and financial resources.

Additionally, the Public Works Ministry and the Ministry of Economy and Finance are jointly responsible for the definition of the Program-Contracts driving the relationship between the public business entities ADIF and RENFE-Operadora and the State (*Contrato-Programa Administración General del Estado – ADIF 2007-2010* and *Contrato-Programa entre la Administración General del Estado y la entidad pública empresarial RENFE–Operadora 2006–2010*). These contracts define the objectives, quality of service and financial targets to be achieved by the public business entities in exchange of a financial contribution from the State. They both have duration of 4-5 years and include provisions for the follow-up and renovation.

From the perspective of the State, the Program-Contracts are key elements for the successful implementation of the new model and the promotion of rail transport, as they are seen as a very efficient way to drive the policies of public railway entities. In line with this concept, the Public Works Ministry points out that it is of great importance to define a stable framework for the relation between the administration and the railway public operator leading to the adaptation of RENFE-Operadora to the new context and to a dynamic change in railway services. This framework is to be established within a Program-Contract including aspects such as significant improvements to service quality, linked to the multiple actions proposed in rail infrastructure or the definition of service standards and services of general interest (Ministerio de Fomento, 2005a, p.103).

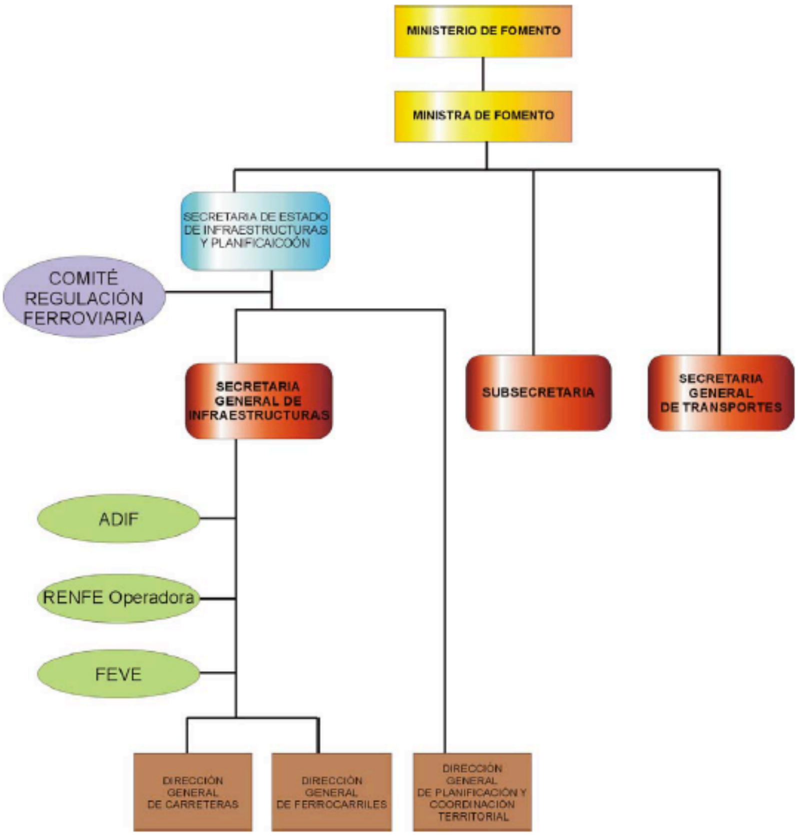
6.3.6.2 Railway regulatory body

The Spanish Government has created a regulatory body within the Public Works Ministry, the Railway Regulation Committee (CRF).

The Committee is composed of a chairman, a secretary and four members, appointed from the civil servants of the Public Works Ministry. Their activity is regulated through the provisions of Decree 2387/2004. The members of the Committee were appointed in March 2005 and the constitution meeting was held on June 9, 2005 (www.fomento.es; 2008-05-26). The initial set-up of the Railway Regulation Committee foresaw the total integration of this body within the Public Works Ministry and its dependency from the State Secretariat for Infrastructures and Planning (Fig. 65).

This layout already received the criticism from the Advisory Bodies in the occasion of the discussion and approval of the Railway Law. The Social and Economic Council pointed out the inconsistency of this regulatory framework with respect to the regulatory schemes applied in other economic sectors and the biased composition of the Committee, with all its members belonging to the Public Works Ministry (CES, 2003, pp.15-16). On the other side, the Council of State highlighted that the Railway Committee was conceived as an administrative body with no independence, which could lead to malfunctions in its regulatory activity (Consejo de Estado, 2003).

Fig. 65: Position of the Railway Regulation Committee with respect to the Spanish Administration



Source: Ministerio de Fomento, 2005b

These advices were not taken into account in the text of the Railway Law, but they were considered two years later, when the Government mandated the Public Works Ministry to draft a law modifying the Railway Law in order to set up an independent Railway Regulation Committee (Resolución de 1 de abril de 2005). As a response to this mandate, the Public Works Ministry argued that the Railway Regulation Committee had been already created and that the limited dimensions of the railway market in Spain made advisable to place the Committee within the structure of the Public Works Ministry[71]. In accordance to this rationale, the Ministry drafted a decree instead of a law, which also received a negative advice from the Council of State[72] (Consejo de Estado, 2006). Up to now (May 2008), the Government has not enacted any decree or law with effects on the situation of the Railway Regulation Committee. There is no evidence either of any resolution or decision published from the Committee.

6.3.6.3 Access regulation

In order to operate in the rail transport market, the new entrants have to be in possession of a railway undertaking license awarded by the Public Works Ministry and a security certificate awarded by ADIF (Railway Law, art.44).

The railway undertaking license is unique for the whole REFIG, and certifies that the applicant has the legal form, professional capacity and financial capacity required for the operation of transport services, as well as an appropriate insurance coverage. The consecution of the railway undertaking license implies a declaration of activity in terms of type of railway service and traffic volumes. Once awarded with a railway undertaking license, the transport operating companies are registered in the Special Railway Registry. The inscription in the Special Railway Registry is also granted to operators licensed in any other EU Member State.

The safety certificate is awarded to railway undertakings on the bundle of services and railway routes on which they intend to perform their activity, and it is a precondition for the request of capacity to the infrastructure manager.

Additionally, Art. 31 of the Railway Law 39/2003 foresees the possibility of giving access to the network to entities other than railway undertakings. This is the case for transport agents, shippers and operators of combined transport that, although do not have the consideration of railway undertakings, are interested in the production of railway services. These applicants are however requested to provide a certificate in order to ask for the allocation of capacity.

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[71] The Ministry supported this statement on the three following points: 1) that the railway market has only been opened to freight operators, 2) that there is only a reduced number of railway undertakings and 3) that railway only holds a market share lower than 4% (*Informe de la Secretaría General Técnica del Ministerio de Fomento, de 29 de junio de 2006*).

[72] The Decree would allow the modification of the Railway Regulation (*Real Decreto 2387/2004*), but it would keep untouched the contents of Art. 82 of the Railway Law 39/2003, which states the dependency of the Railway Regulation Committee from the Public Works Ministry. On this basis, the Council of State retained that the proposed draft did not comply the specifications of the mandate from the Government (Consejo de Estado, 2006).

6.3.6.4 Capacity allocation

ADIF is responsible for the allocation of railway infrastructure capacity in the terms set in the Railway Law 39/2003 and the Ministerial Order 897/2005. This activity is performed within the Traffic area of the infrastructure manager.

The allocation of capacity to a railway operator grants the use of a specific time band so that it can run a train between two points during a specified time period. The allocation of capacity implies the access to all the infrastructure required, including junctions and crossovers, as well as receiving the train operating control service, including signaling (Art.6, Ministerial Order 897/2005). This definition already states the double nature of the capacity allocation process, which includes both a regulatory perspective (i.e. the access to the network/market of the different operators) and a technical perspective (i.e. the definition of the railway schedule).

In order to better reflect the capacity needs of different railway operators, ADIF has established four types of train-path requests: regular train paths (SERVITREN), occasional train-paths (TRENDÍA), special train-paths with application (Immediate train-paths) and special train-paths without application[73] (ADIF, 2007b, pp.63-64).

In order to facilitate the whole capacity allocation process, ADIF provides to the railway operators the Capacity Manual containing a general estimation of the train paths available in every link. First the network is segmented according to homogeneous traffic characteristic and the timetable is divided in eight periods of three hours from 0h to 24h. Second, three types of service are defined: passenger - long distance services, passenger - short and medium distance services and freight services. Lastly, the Capacity Manual provides a number of train paths for every type of service in each link and in every period[74] (ADIF, 2006c, pp.3-9).

ADIF manages the capacity requests with the aid of several technical models that integrate the technical capacity of the line and its level of saturation, the possibility of defining an operating plan according to traffic and the frequency of existing or potential traffic. The capacity allocation process, leading to the working timetable, has four main steps (Fig. 66):

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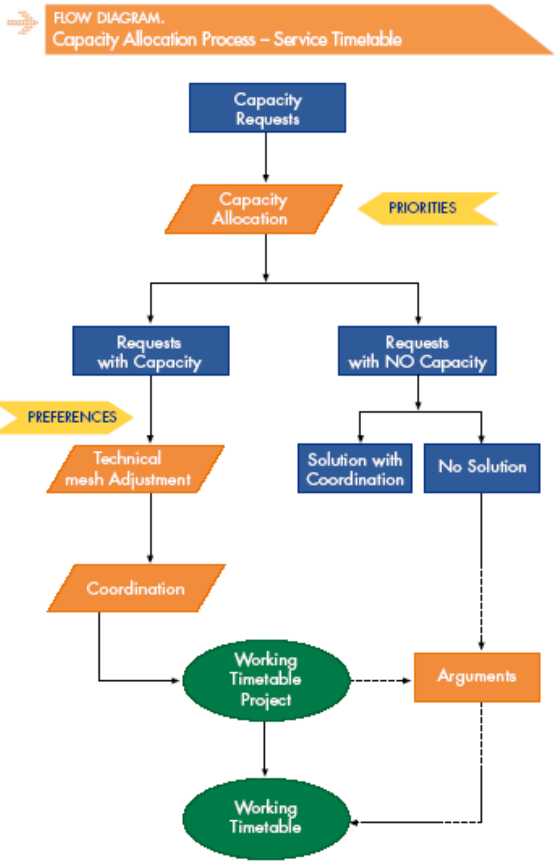
[73] Regular train-paths refer to those requests with a relevant operating frequency (40 days in the Timetable period), while the occasional train-paths refer to requests with low frequency and that are usually communicated with a short notice (up to 24 hours before the requested departure). Special train-paths refer to requests resulting from exceptional and justified circumstances (ADIF, 2007b, pp.63-64).

[74] Additionally, the Capacity Manual provides the distribution of real circulations in the link according to time (on an hourly basis) and type of service on a representative day. The estimated number of train paths and the number of real circulations on the representative day are then used to calculate an overall saturation level for every time period (ADIF, 2006c, pp.3-9).

Fig. 66: Capacity allocation process. ADIF



Source: (ADIF, 2007b, p.74)

- Capacity allocation: capacity is first allocated according to the capacity available on each line and depending on the traffic types defined in the Capacity Manual. If some requests for a specific traffic type cannot be satisfied within the pre-allocated capacity, then they will be allocated within the residual capacity of other traffic types (if it is technically feasible). If several requests are still competing for the same slot, then ADIF will apply priority rules[75] or/and propose a rerouting of the train in those cases were feasible alternatives exist.
- Technical adjustment on mesh: once the requests have obtained capacity, the infrastructure manager coordinates the requests at network level relying on technical criteria. This process may alter the schedules proposed by applicants due to technical or network compatibility reasons. Some services on specialized lines, regular services and long distance services may receive preference in this

[75] Priority rules are defined in the Art. 11 of Ministerial Order 897/2005. The priority order is there established as follows: 1) Priorities established by the Public Works Ministry for every type of service and line; 2) Service types that take priority on specialised lines; 3) Services declared as public interest; 4) Train paths allocated and actually used during the period of the previous Working Timetable; 4) International services; 5) Those requests subject to an existing agreement; 6) The greatest frequency for which a train path is requested in a Working Timetable; 7) System efficiency.

adjustment. At the end of this phase, a preliminary allocation of capacity is issued.

- Coordination phase: the infrastructure manager communicates the preliminary allocation to the applicants, who may accept or reject it, provide suitable comments and enter into negotiations with the infrastructure manager. At the end of this process a working timetable project is issued.
- Argument phase: the applicants have a 15 day period to present their arguments.

6.3.7 Price regulation

The Spanish Government has adopted an approach to pricing of railway infrastructure based on direct regulation. According to the Railway Law, the definition of rail infrastructure charges is the responsibility of the Public Works Ministry, as they are public prices that can only be modified through a legislative procedure[76]. However, it is the responsibility of the infrastructure manager to levy them on the railway infrastructure under its administration (Railway Law 39/2003, Art. 73).

Article 76 of the Railway Law mandates that incomes from track access charges are to be allocated to the railway infrastructure manager, and that they will have to be taken into account when defining additional contributions from the State to the infrastructure manager within the framework of yearly agreements or Program-Contracts. The incomes arising from these charges belong to the infrastructure manager, and they will be deducted when calculating the financial support from the State in any agreement or Program-Contract (Art. 74).

Finally, article 77 states that the levels of track access charges and charges for the use of stations and other railway facilities will be set by the State through a Ministerial Order, that will have to be backed by a financial report justifying the proposed amount.

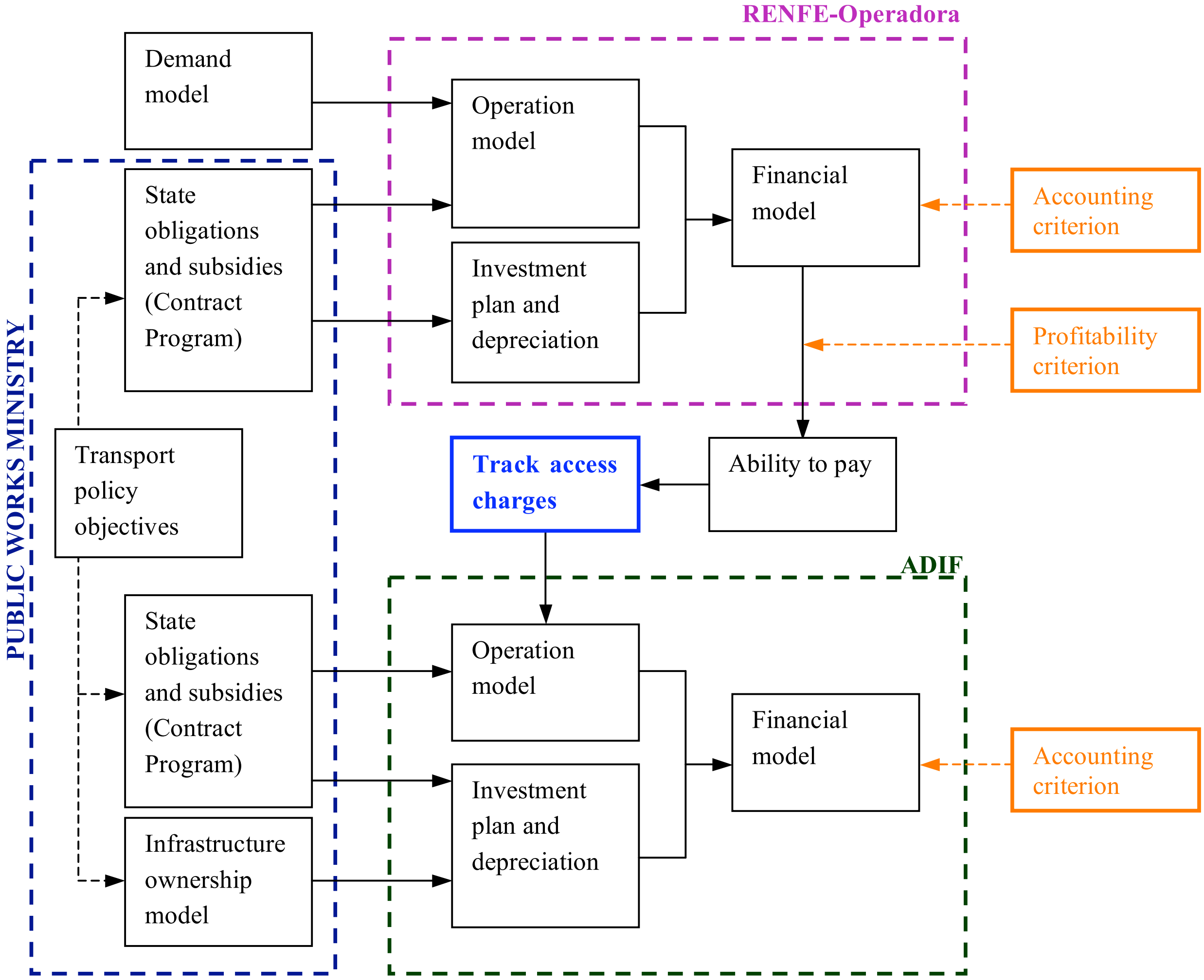
As specified in the Economic Report joined to the draft of the Railway Law 39/2003 (Ministerio de Fomento, 2002), the setting of track access charges must be performed in such a way as to ensure the accomplishment of the accounting criteria set by the ESA-95 by both public entities ADIF and RENFE-Operadora (see section 6.3.2). Additionally, charges should be set at a level able to ensure the profitability of the

[76] Public prices refer to the charges for the minimum access package and the access to stations and other installations. Charges for additional, complementary and ancillary services are private prices defined by ADIF. In Spanish legislation, charges within the first category are referred to as “*cánones*”, while the charges belonging to the second group are referred to as “*tarifas*”.

operation business. The first condition will be referred to as *accounting criterion* and the second one as *profitability criterion*.

The overall system that has been adopted for the definition of railway infrastructure charges in Spain can be synthesized as in Fig. 67. First, the process takes into account the expected demand as well as the future operation and investment activity of RENFE-Operadora to define the evolution of the financial conditions of the entity and its ability to pay. Track access charges are then defined in relation to the ability to pay of the operator.

Fig. 67: Conceptual scheme of track access charges definition in the Spanish railway network.



Source: own elaboration, based on Ministerio de Fomento (2002) and INECO et al (1998)

The level of track access charges defined in such a way is then analyzed from the perspective of the infrastructure manager ADIF, which must comply the 50% accounting criterion. The Public Works Ministry disposes of several leverages to equilibrate the whole system, particularly through the infrastructure ownership model (allocating the capital costs to the State or to ADIF) adopted and the financial support to the operation and infrastructure management activities through the signature of contract programs.

Within this adjustment, the accounting and profitability criteria act in opposite directions. In fact, the profitability criterion provides a superior limit to the level of charges (as profitability depends on the financial resources left after the payment of track access charges), while the accounting criterion represents an inferior limit to the level of charges (as charges contribute to the commercial incomes of the infrastructure manager that have to be maintained above the 50% limit).

6.3.8 Pricing principles

Although the payment of compensations for the use of the railway infrastructure had been previously treated in Spanish legislation[77], the definition of a charging regime applicable in the whole railway network was first included in the Railway Law 39/2003, which specifies the principles and the structure of the charges, as well as the criteria to be adopted in their quantification.

In its article 73, the Railway Law states the principles driving the setting of track access charges in the following terms: "*Track access charges will be defined according to general principles of economic feasibility and efficient operation of infrastructure, market conditions and financial equilibrium in the rendering of services, as well as according to equal treatment, transparency and no discrimination*". Compensations for the unpaid environmental, accident or infrastructure costs incurred by the competing transport modes and considerations reflecting congestion, introduction of new railway services or incentives for under-utilized lines are also admitted.

In its article 74, the Law defines the cost relatedness of the different components included in the charge (see section 6.3.9). Apparently, the operation charge should reflect variable infrastructure management costs, the reservation charge fixed infrastructure management costs and the traffic charge would be a mark-up oriented to recover part of capital costs.

Somehow, the proposed system would be able to charge a proxy to short run marginal costs (through the operation charge) and increase the recovery rate through a reservation

[77] The economic compensation for the use of railway infrastructure first appeared in the State General Budget Accompaniment Law 53/2002 (*Ley 53/2002 de Medidas Fiscales, Administrativas y del Orden Social*), defining the charges to be paid to the former high speed infrastructure manager GIF. The levels of the charges were defined in the Ministerial Order 1587/2003 (*Orden FOM/1587/2003,por la que se fijan las cuantías para la aplicación de los cánones ferroviarios establecidos en los artículos 23 y 24 de la Ley 53/2002*).

charge applied to all services and a traffic charge only applied to high speed services according to their potential ability to generate incomes (measured in seat-km, which suggests a kind of Ramsey pricing).

However, no references other than the present writing of the Railway Law are available to support the application of a marginal cost approach to charging. Moreover, the influence of the price regulation mechanism presented in the previous section (based on the demand side) could even be contradictory with a pricing principle based on the cost side of the price setting problem.

6.3.9 Charging structure

Article 74 of the Railway Law defines the structure and quantification criteria for the track access charges in the REFIG. The compensation due to the infrastructure manager for accessing the network comprises four different types of charges:

- *Access charge* (α) for the general use of the network. It is levied once in every timetable period and it should be differentiated according to the activity declaration of the railway operators and the links of the network in which they develop their activity[78]. It should recover costs related to administrative management procedures associated to the infrastructure manager's relation with the railway operators (e.g. staff and equipment for general administration, publication of the network statement, elaboration of operation plans, capacity allocation and supervision of running trains).
- *Reservation charge* (β) for the availability of the requested train path. It is levied proportionally to the length of the reserved train path and it should be differentiated according to the type of infrastructure, the type of service, the type of train and the time period. It should reflect fixed maintenance, operation and rail infrastructure management costs.
- *Operation charge* (γ). It is levied on the basis of the network length effectively used by the railway undertaking and it should be differentiated according to the type of infrastructure and the type of service. It should recover the variable maintenance, operation and management costs of rail infrastructure.

[78] Both informations have to be provided in the licensing process of railway undertakings, which differentiates activity according to the type of service (freight/passenger). Additionally, the homologation procedure for the request of capacity takes into account the volume of traffic (Art.81, *Real Decreto 2387/2004, por el que se aprueba el Reglamento del Sector Ferroviario*).

- *Traffic Charge* (δ). It is levied taking into account the economic value of the railway service, measured in terms of capacity offered (e.g. seats-km, ton-km, TEU-km). It should be differentiated according to the type of infrastructure and the time period. It should reflect the financial costs related to depreciation of fixed assets and, when appropriate, the costs required for a reasonable development of railway infrastructure.

The charging scheme levied by ADIF, has been synthesised through expression [1]:

$$C = \frac{\alpha(T)}{T} + \beta(P,L,S) + \gamma(L,S) + \delta(P,L,S) \cdot \frac{seats}{train} \qquad [1]$$

Where:

C *track access charge (per train-km)*

T *traffic volume (train-km in one year)*

P *time period*

L *type of line*

S *type of service*

The values of the main variables intervening in the Spanish charging scheme are defined according to bands:

- *Traffic volume* (T): *N1* if it is less than 1 million train-km/year; *N2* if it is between 1 and 5 million train-km/year; *N3* if it is between 5 and 10 million train-km/year; *N4* when it is between 10 and 15 million train-km/year; and *N5* if it is greater than 15 million train-km/year.
- *Time period* (P): *Peak* from 7:00 to 9:29 and from 18:00 to 20:29; *Normal* from 9:30 to 17:59 and from 20:30 to 23:59; and *Valley* from 00:00 to 06:59.
- *Type of line* (L): *A1* for the high speed lines Madrid-Barcelona, Córdoba-Málaga and Madrid-Valladolid; *A2* for the high speed lines Madrid-Sevilla, La Sagra-Toledo and Zaragoza-Huesca; *B* for the Mediterranean Corridor; and *C* for the rest of lines.
- *Type of service* (S): *V1* for passenger services traveling at a maximum speed greater than 260 km/h; *V2* for passenger services traveling at a maximum speed lower than 260 km/h; *M* for freight services; *P* for test services.

6.3.10 Charging levels

Since the enforcement of the Railway Law in year 2005, the Public Works Ministry has defined twice the level of track access charges and charges for the use of station and other railway facilities, through Ministerial Order 898/2005 and Ministerial Order 3852/2007. The latter established the values indicated in Table 23 for the coefficients appearing in expression [1].

Table 23: Coefficients and charges set by the Public Works Ministry in 2007.

α (Access charge)	62.424-1.466.964	€ / year
β (Reservation charge)	0,05-3,54	€ / train path-km
γ (Operation charge)	0,06-2,08	€ / train path-km
δ (Traffic charge)	0-0,0131	€ / seat-km

Source: own elaboration from Ministerio de Fomento (2007h)

To assess the relative relevance of the charging components included in the Spanish charging scheme, an estimation has been performed for the reservation, operation and traffic charges (Table 24). These figures should be completed with the access charge associated to the overall traffic volume carried by the operator. In the case of RENFE-Operadora, the value of the access charge has been estimated at around 0,01 €/train-km.

Table 24: Unitary track access charges under the current Spanish charging scheme.

		Type of service			
Time band	**Type of line**	**V1**	**V2**	**M**	**P**
Peak	**A1**	10,21	7,56		0,88
	A2	9,76	7,14		0,79
	B1	3,54	0,58	0,38	0,06
	C1		0,26	0,38	
Normal	**A1**	6,88	4,40		0,88
	A2	6,51	4,11		0,79
	B1	0,82	0,26	0,11	0,06
	C1		0,26	0,11	
Valley	**A1**	2,87	1,51		0,88
	A2	2,70	1,39		0,79
	B1	0,62	0,16	0,11	0,06
	C1		0,16	0,11	

Note: Figures in €/train-km, includes reservation, operation and traffic charges. Traffic charge calculated on the hypothesis of 350 seats/train. Time period, type of line and type of service as specified in section 6.3.9.

Source: own calculations from ADIF 2008, pp.104-114.

It is also possible to analyze the results of these estimations on the basis of the services provided by the operator, which are necessarily a combination of the infrastructure-related variable and the service-related variable. It is possible to classify them as high speed services (service *V1* running on infrastructure *A1* or *A2*), Euromed services (service *V1* running on infrastructure *B*), high speed regional services (service *V2* running on infrastructure *A1* or *A2*), conventional passenger services (service *V2* running on infrastructure *C* or *B*) and freight services (service *M* running on infrastructure *C* or *B*).

According to this segmentation, the relative levels of the railway infrastructure charge can be presented as in Table 25.

Table 25: Relative level of charges for different services under the current Spanish charging scheme.

	Time period		
Service	**Peak**	**Normal**	**Valley**
AVE	38,4	26,0	11,0
Euromed	13,6	3,2	2,4
HS regional	28,2	16,4	5,8
Conventional passenger	1,0	1,0	0,6
Conventional passenger (Mediterranean corridor)	2,2	1,0	0,6
Freight	1,5	0,4	0,4

Note: Figures expressed as a relative index with respect to the conventional passenger service running on the time band Normal. Includes reservation, operation and traffic charges. Traffic charge calculated on the hypothesis of 350 seats/train. Time band as specified in section 6.3.9.
Source: own calculations from ADIF 2008, pp.104-114

It is interesting to notice that the time-band related incentives embedded in the Spanish charging scheme vary with the service provided by the operator. Particularly, they provide stronger signals for those services running on the Mediterranean corridor, either Euromed or conventional services, and for freight trains running on the conventional network. In this cases, the price of the train-km in the peak hour goes up respectively to 4,25 times, 2,2 times and 3,75 times its price of the normal hour.

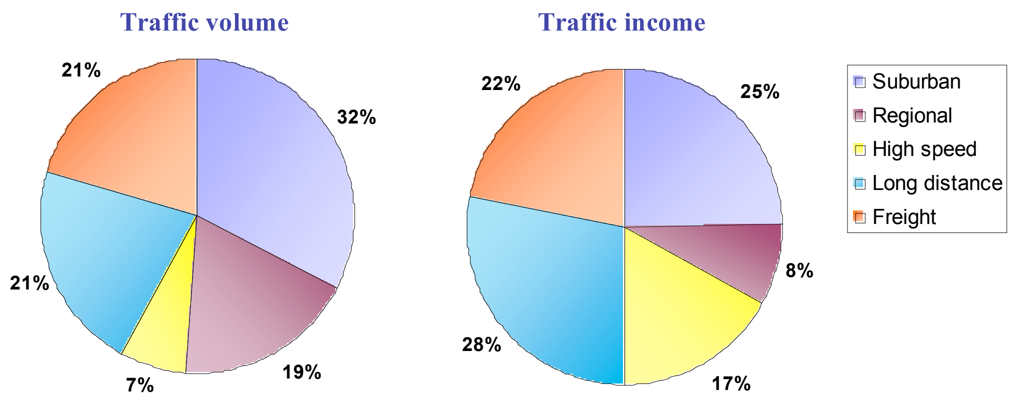
6.3.11 Transport operation conditions

RENFE-Operadora performs its activity in two markets clearly differentiated in terms of technical, operational and economic characteristics: passenger and freight rail transport. The first can be considered the core activity of the entity, as in year 2005 accounted for 79% of the traffic volume and 78% of the traffic incomes. The freight market had a secondary relevance, contributing with the complementary part of volume and income (i.e. 21% and 22% respectively). This situation is depicted in Fig. 68, which additionally details the contribution of the basic segments of the passenger transport market.

In year 2005, RENFE-Operadora transported a total traffic volume of 19.809 million passenger-km. The main contribution to this figure came from the segment of suburban services (42,5%), followed by the long distance services (31,9%), the regional services

(13,9%) and, lastly, the segment of high speed services, which represented the 11,7% of the activity in the passenger transport market.

Fig. 68: Transport activity performed per type of service. RENFE-Operadora. 2005



Note: Traffic volume shares have been established on the basis of train-km.
Source: own elaboration with data from (RENFE-Operadora, 2006, pp.36-71)

The suburban segment is characterized by the high number of passengers transported over short distances (around 20 km on average) in urban and metropolitan areas. The demand in this segment presents strong peaks associated to commuting, which has resulted in a generally oversized provision of seats-km leading to low occupancies. In 2005 the suburban services unit of RENFE-Operadora carried more than 90% of the total volume of passengers, running an average of 3.692 daily circulations over a network length lower than 2.000 km (RENFE-Cercanías, 2006, p.9).

The regional segment transports passengers over medium distances (around 100 km on average), generally in larger metropolitan areas or polycentric urban systems. As in the previous case, variations in demand produce low occupancy ratios. The activity of this segment is strongly dependent on the geographical specificities of each region. In year 2005, the 65% of the traffic incomes generated by the regional services unit of RENFE-Operadora was generated in only three regions: Catalonia, Andalucía and Castilla y León (RENFE-Operadora, 2006, p.47).

The long distance segment is characterized by a relatively low number of passengers being transported over long distances (around 500 km on average) on the conventional network. Its origins and destinations are located along main national corridors and some international relations[79]. The demand here is less fluctuating than in previous segments, allowing for greater occupancies. Part of the services being performed in this segment will be progressively substituted by their high speed counterparts.

[79] RENFE-Operadora provides international services in cooperation with CP and SNCF.

Table 26: Main operational parameters per type of passenger service. RENFE-Operadora. 2005

OPERATIONAL INDICATORS (YEAR 2005)	Suburban	Regional	High speed	Long distance	TOTAL
Passengers (million)	458	28	7	13	**505**
Passenger-km (million)	8.417	2.745	2.325	6.322	**19.809**
Train-km (million)	57	33	12	37	**139**
Seats-km (million)	21.770	7.824	3.869	9.810	**43.273**
Occupancy (%)	38,7%	35,1%	60,1%	64,4%	**45,8%**
Average seats per train	382	239	319	262	**310**
Average trip length (km)	18,4	99,5	324,0	502,1	**39,2**
Perceived quality index (i)	7,45	6,62	7,70-8,10 (a)	7,20	**n/a**
Punctuality index (ii)	98,9	96,6	97,4-99,6 (b)	95,8	**n/a**

Note: (i): Defined through surveys to the costumers on a scale 0 (worst) – 10 (best); (ii): Defined as the percentage of trains arrived punctual (i.e. with a deviation to schedule below a threshold differently defined for every type of service); (a): Range of values including different services: long distance, medium distance and Talgo 2000; (b): Range of values including different corridors/services: Madrid-Seville line; Madrid-Lleida line and Talgo 2000 services; n/a: Not applicable.
Source: own elaboration with data from RENFE-Operadora, 2006, pp.36-67

The high speed segment is rapidly progressing in Spain, as the new links of the high performance network are being opened to traffic. They include both long distance and medium distance services, with an overall average distance near to 325 km. As in the case of the long distance segment, demand is rather stable. In year 2005, the long distance high speed services represented the 78,8% of the total incomes generated by the high speed services unit of RENFE-Operadora.

The main operational parameters of the services provided in 2005 by RENFE-Operadora in each segment are detailed in Table 26.

Year 2006 saw an increase in the passenger transport activity performed by RENFE-Operadora, which rose up by 2,28% with respect to the previous year and reached a total volume of 20.260 million passenger-km. The volume of activity corresponded in a 58,2% to the suburban and medium distance services and in a 41,8% to the high speed and long distance services.

The evolution of the operational parameters (Table 27) was positive as well with respect to the previous year. The increase in the number of passengers (2,2%) and passenger-km (2,28%) was absorbed by a slightly lower increase in the trains-km (0,9%) and the number of seat-km offered (2,1%), which lead to a greater number of seats per train (1,1%) and to an improvement in the occupancy by 0,19%. The overall evolution of the perceived quality and the punctuality index cannot be exactly defined, but apparently the lower bounds of both indicators remained stable.

Table 27: Main operational parameters per type of passenger service. RENFE-Operadora. 2006

OPERATIONAL INDICATORS (YEAR 2006)	Suburban / Medium distance services	High speed /Long distance services	TOTAL
Passengers (million)	498	18	**516**
Passenger-km (million)	11.792	8.468	**20.260**
Train-km (million)	94,3	46,4	**140,7**
Seats-km (million)	31.175	12.999	**44.174**
Occupancy (%)	37,83%	65,1%	**45,9%**
Average seats per train	331	280	**314**
Average trip length (km)	23,7	465,3	**39,2**
Perceived quality index [(i)]	6,61 - 7,72 [(a)]	7,25	**n/a**
Punctuality index [(ii)]	96,3 - 99,7 [(a)]	95,7 - 99,7 [(b)]	**n/a**

Note: [(i)]: Defined through surveys to the costumers on a scale 0 (worst) – 10 (best); [(ii)]: Defined as the percentage of trains arrived punctual (i.e. with a deviation to schedule below a threshold differently defined for every type of service); [(a)]: Range of values including different services: suburban, high speed medium distance and conventional medium distance; [(b)]: Range of values including different corridors/services: Long distance services, Madrid-Seville line; Madrid-Lleida line and Talgo 2000 services; n/a: Not applicable.
Source: own elaboration with data from (RENFE-Operadora, 2007a, pp.34-51)

The rail freight market segment faces a completely different situation, with a steady decline of its market share with respect to other modes and a reduction in most of its operational parameters over time. On the top of it, the liberalization provisions have entered into force with the allocation of the services rendered in the terminals to the infrastructure manager, which increases the planning and operational complexity of the services.

The position of RENFE-Operadora in the freight transport market has reflected the declining situation with a reduction of its activity between in years 2005 and 2006. In this period the total volume transported evolved from 11.071 million ton-km to 11.012 million ton-km and the containerized traffic from 340 to 335 million TEU-km. All the main operational indicators related to the freight transport activity reflected this tendency (Table 28), with reductions in the number of tonnes transported (-2,4%), in the ton-km and TEU-km carried (-0,5% and -1,5% respectively) and in the train-km and ton-km offered (-1,7% each).

Table 28: Operational activity in the freight transport market. RENFE-Operadora. 2005 - 2006

OPERATIONAL INDICATORS	2005	2006
Tons (million)	25,5	24,9
TEU (million)	0,7	0,7
Ton-km (million)	11.071	11.012
TEU-km (million)	340	335
Train-km (million)	36,1	35,5
Ton-km offered (million)	28.313	27.825
Ton km offered / train	785	784
Average trip length – ton (km)	434	442
Average trip length – TEU (km)	503	479
Perceived quality index		5,14

Source: own elaboration with data from (RENFE-Operadora, 2006, pp.68-71), (RENFE-Operadora, 2007a, pp.52-55) and (RENFE-Operadora,2007b, p.61)

Part of this decline can be certainly explained by the low value of the perceived quality index, which only reached a score of 5,14 over 10 in year 2006. The more critical aspects pointed out by the shippers as regards the perceived quality were the delivery time, the absence of usual interlocutors and the quality of the general information provided[80].

6.3.12 Economic results from transport operation

The activity of RENFE-Operadora in the passenger transport market summed up traffic incomes of 1.145 million € in year 2005, while the activity in the freight transport market reported 323 million €. The maintenance of rolling stock unit mainly produced services for the transport operation units and additionally gained 8 million € from external clients. The operational incomes of the entity also included subsidies to suburban and regional transport segments (277 million €), incomes from other activities (93 million €) and transfers (248 million €). On the operational expenditures side, the main items were staff (635 million €) and external services (977 million €). In relative terms, staff expenditures were particularly relevant in the maintenance unit, where accounted for 52% of its total expenditures. The external services were predominant in the high speed unit, representing 83% of its total expenditures.

[80] The surveys were conducted on 76 shippers and provided the following scores for the mentioned critical aspects: delivery time (4,72); absence of usual interlocutors (5,51) and the quality of the general information provided (5,85) (RENFE-Operadora, 2007b, pp. 60-61).

Putting aside the subsidies to operation and including depreciation and variations in provisions, none of the units of RENFE-Operadora achieved profits in 2005, and it is only thanks to the subsidies that suburban and regional trains attained positive figures. In relative terms, the more negative result among the units was reached by the freight unit, whose loss equalled 18% of its total incomes. The maintenance unit was second, with a loss equal to 16% of its incomes and the long distance unit third with a ratio of 13%.

Table 29: Unitary incomes, expenditures and profits per market segment. RENFE-Operadora. 2005

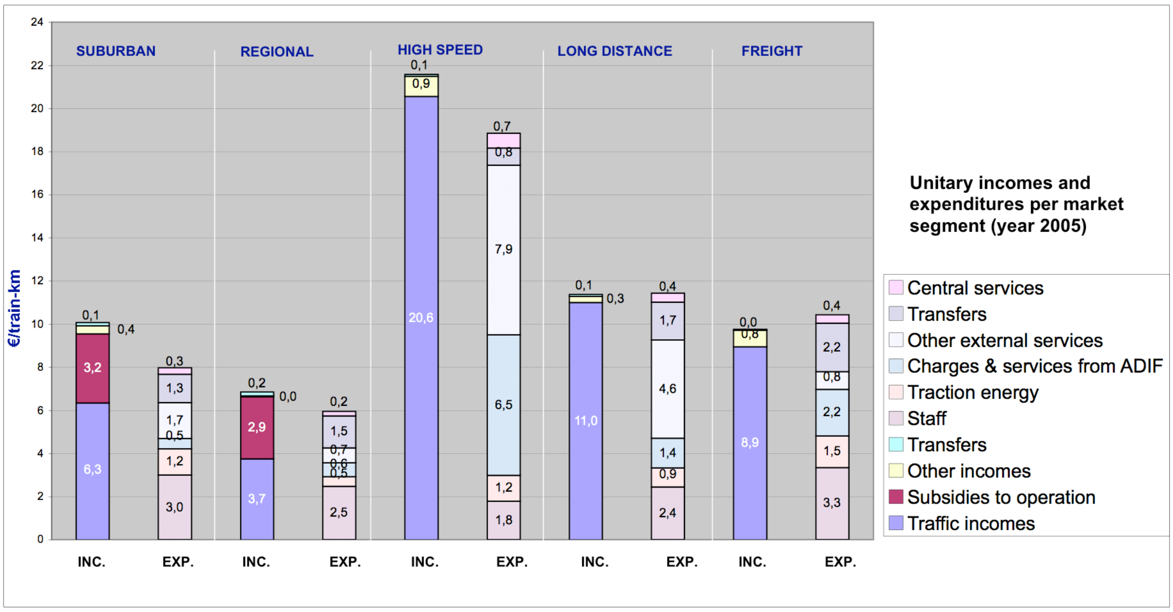
	Operational incomes (€/train-km)	Operational expenditures (€/train-km)	Operational profit / loss (€/train-km)
Suburban	10,1 (6,9*)	8,0	2,1 (-1,1*)
Regional	6,8 (4,0*)	6,0	0,9 (-2,0*)
High speed	21,6	18,9	2,7
Long distance	11,4	11,4	-0,1
Freight	9,7	10,4	-0,7

Note: (*) Excluding subsidies to operation.
Source: own elaboration with data from (RENFE-Operadora, 2006, pp.36-71)

The analysis of incomes and expenditures on a product unit basis provides further insight on the economic performance attained in each market segment (Table 29). The high speed services emerged as the ones with greater ability to generate incomes (21,6 €/train-km) and cover their operational expenditures with traffic incomes. Long distance services were rather close to operational equilibrium at 11,5 €/train-km but still presented a small operational loss. Freight services produced less than half of the unitary incomes of the high speed services (9,7 €/train-km), generating a significant loss of 0,7 €/train-km. The unitary loss produced by suburban and regional services was even greater, but thanks to subsidization they contributed positively to the operational result. Their ability to generate incomes, subsidies excluded, was equal to 6,9 €/train-km and 4,0 €/train-km.

Though the structure of operational incomes remained rather similar for all the services, relevant differences could be observed as regards the structure of their operational expenditures on a unitary basis (Fig. 69).

Fig. 69: Detail of unitary incomes and expenditures per market segment. RENFE-Operadora. 2005



Note: Figures in €/train-km; INC.: Operational Incomes ; EXP. : Operational Expenditures.
Source: own elaboration with data from (RENFE-Operadora, 2006, pp.36-71).

- Unitary staff expenditures varied between 1,8 €/train-km for high speed services and 3,3 €/train-km for freight services.
- Unitary expenditures in traction energy were significantly lower for regional services (0,5 €/train-km) and higher for freight services (1,5 €/train-km). Suburban and high speed services expended the same amount in traction energy in unitary terms (1,2 €/train-km).
- Unitary expenditures in charges and services provided by ADIF were predominant in high speed services, were accounted for 6,2 €/train-km. In freight services they reached 2,2 €/train-km, in long distance services 1,4 €/train-km and in suburban and regional services remained around 0,5 €/train-km.
- Unitary expenditures for other external services were maximum again for high speed services (7,9 €/train-km), followed by long distance services (4,6 €/train-km), suburban services (1,7 €/train-km), freight services (0,8 €/train-km) and regional services (0,7 €/train-km).
- Transfers from the transport service units had as main destination the maintenance of rolling stock unit. They accounted for 2,2 €/train-km in freight services, 1,7 €/train-km in long distance, 1,5 €/train-km in regional services, 1,3 €/train-km in suburban services and 0,8 €/train-km in high speed services.

The unbalance between incomes and expenditures here depicted for most of the services is further increased when taking into account depreciation, a particularly relevant item for the high speed (3,0 €/train-km) and suburban transport units (1,6 €/train-km). Long distance services faced a depreciation equal to 1,1 €/train-km, freight services bore 0,9 €/train-km and regional services 0,5 €/train-km.

The evolution of the economic performance of the service units of RENFE-Operadora since year 2005 shows a different behavior. Year 2006 saw an increase in the unitary profit of suburban and medium distance services as a result of a greater increase in unitary operational incomes and subsidies than in unitary operational expenditures. On the other side, the high speed and long distance services reduced their unitary profit by 10% and the freight services incremented their unitary loss by more than 22%. A summary of these trends is offered in Table 30.

Table 30: Unitary incomes, expenditures and profits per market segment. RENFE-Operadora. 2006

		Operational incomes (€/train-km)	Operational expenditures (€/train-km)	Operational profit / loss (€/train-km)
Suburban and medium distance	**2005**	8,9 (5,9*)	7,4	1,5 (-1,1*)
	2006	9,7 (6,2*)	8,2	1,6 (-2,0*)
	Var. 05/06	+9,0% (5,1%*)	+10,7%	+1,0% (-81,8%*)
High speed and long distance	**2005**	14,2	13,4	0,7
	2006	15,3	14,6	0,8
	Var. 05/06	+8,0%	+9,1%	-10,2%
Freight	**2005**	9,9	10,6	-0,7
	2006	9,7	10,6	-0,8
	Var. 05/06	-1,6%	-0,1%	-22,3%

Note: (*) Excluding subsidies to operation
Source: own elaboration with data from (RENFE-Operadora, 2007a, pp.36-59)

From year 2006 to now (June 2008), the progressive implementation of the provisions defined in the strategic plan of RENFE-Operadora for the period 2005-2009 has attempted to invert the negative tendency observed in the profitability of the different market segments. However, the results obtained in 2007 apparently did not represent a major change with respect to the 2006 situation, with a 5% increase in operational incomes and 4,5% in operational expenditures (RENFE-Operadora, 2008).

Nevertheless, there is the generalized opinion that the entrance into operation of new high speed relations and the restructuring of the commercial offer in other segments will certainly contribute to invert the currently observed trend. Some recent facts already support this view. In October 2007, José Salgueiro, CEO of RENFE Operadora declared an expected increase in incomes of 25% in year 2008 thanks to the operation of the new high speed services to Barcelona, Málaga and Valladolid (EFE, 2007-10-09). Moreover, at the end of the first quarter of 2008 RENFE-Operadora announced that the freight services unit had reached for the first time a positive operational result (Vía Libre, 2008-06-05).

The economic forecasts of the Program-Contract between RENFE-Operadora and the State also support this view. More precisely, they foresee a 50% increase in the operational incomes between 2006 and 2009. Operational expenditures will present a lower growth in the period, with a significant moderation after 2008. The combination of both trends is expected to result in increasing operational profits over the period.

The growth in total incomes will be supported by greater unitary incomes per passenger (a yearly growth in the range 4,5%-7% depending on the type of passenger service, 2,1% for freight) and a strong increase in demand (8,2% in passenger services and 4,1% on freight services)[81].

6.3.13 Economic and financial relations in the Spanish railway sector

The predominance of financial considerations among the criteria intervening in the definition of railway infrastructure charges in the Spanish railway network, makes necessary the characterization of the financial relations among the key actors of the sector.

6.3.13.1 Public contributions to the railway sector

The Public Works Ministry, together with the Ministry of Economy and Finance is in charge of the definition of the General State Administration's financial framework for railways, which includes the financing of the central railway administration, the infrastructure manager and the financial compensations for public service obligations.

As regards the principles driving the financial framework, the PEIT underscores the need of maintaining an appropriate level of investment in the infrastructure network together with an adequate regulation of transport services, including their financial needs. In this sense, the Public Works Ministry supports the "*user pays*" view of the European Union as the main economic tool for regulating transport demand and ensuring that financial resources required do not become an unaffordable burden for the public budget. However the Ministry recognizes that the possible path leading from the current *"tax*

[81] Own calculations on the basis of Annex 1 of the Program-Contract between RENFE-Operadora and the State.

payer pays" to a system in which the user bears all the costs related to transport activity will need a long transition time. In fact, the financial framework for rail is still mainly based on State budget resources, which are assigned according to the principle of the single fund, avoiding any earmarking of taxes (Ministerio de Fomento, 2005a, pp.169-170).

From a practical point of view, the definition of the financial framework for railways faces the constraints set on the public budget by the budgetary discipline of the Stability and Growth Pact[82] and the extensive investment program in the railway network planned for the next years.

On the one side, the Stability and Growth Pact limits the public deficit to less than 3% of GDP in the short term and in the medium and long-term seeks the balance or surplus of national accounts (European Council, 1997a). This commitment, combined with high investment levels, has fostered the adoption of deferred and indirect financial schemes for part of the State contribution to the rail sector and the increasing involvement of private capital.

Table 31: Investment programs in rail transport defined in the PEIT 2005-2020

Program	**Estimated investment 2005-2020 (million €)**	**% on total PEIT investment**
Railway transport (excluding urban interventions)	**108.760**	**43,7**
High performance	83.450	33,53
Maintenance and improvement of conventional network	18.000	7,23
Level-crossings suppression	3.560	1,43
Rolling stock	3.750	1,51

Source: Ministerio de Fomento (2005a)

On the other side, the development of the investment programs established in the strategic plan, and particularly the construction of the high speed rail network, requires the intensive allocation of financial resources. A total amount of € 108.760 million will be spent in railway transport over the period 2005-2020 (Table 31). The PEIT foresees that the public budget will supply 81,4% of the funds needed, while the remaining 18,6% will be obtained through off-budget financing (Ministerio de Fomento, 2005a, p. 184).

Building on these premises, the Spanish Government has defined a financial framework which is largely based on the contribution of the State to the execution of the PEIT's investment plan through the funding of various investment agents. The key stakeholders

[82] The Stability and Growth Pact, adopted by the European Council in 1997, aims to ensure more rigorous budgetary discipline through surveillance and coordination of budgetary policies within the euro zone.

in this scheme are the General Directorate of Railways (within the Public Works Ministry), the infrastructure manager ADIF, the public railway operators FEVE and RENFE-Operadora and the State Agency for Land Transport Infrastructure (SEITT).

In quantitative terms, in year 2007 the financial framework for the rail sector accounted for 4.895[83] million €, equivalent to 2,60% of the total National Budget and 0,47% of the 2007 GDP[84]. The allocation of these financial resources to the key stakeholders is depicted in Fig. 70.

The financial contribution from the 2007 National Budget was delivered through three different programs:

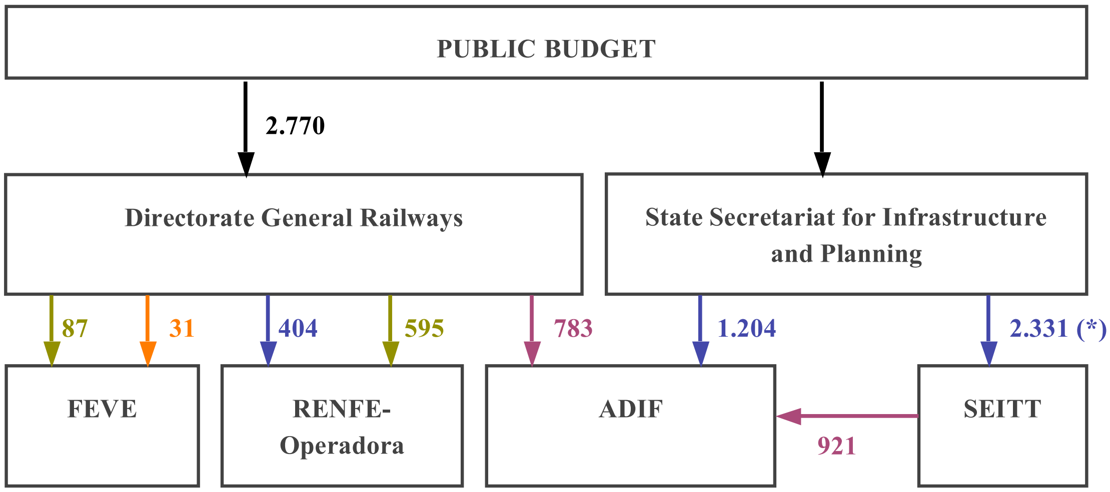
- Program 441M - Subsidies to Land Transport, which included the transfer of funds from the Directorate General of Railways to the public entities RENFE-Operadora (595 million €) and FEVE (87 million €).
- Program 451N - Management and General Services of the Public Works Ministry, which included capital contributions from the State Secretariat for Infrastructure and Planning to ADIF (1.204 million €) and SEITT (2.331 million €). The SEITT is responsible for investments in roads and railways entitled to the State. Regarding railways, part of the investment was performed through ADIF within the framework of two agreements between the State Secretariat for Infrastructure and Planning, ADIF and SEITT (921 million €).
- Program 453A - Railway Transport Infrastructure, which included a capital contribution from the Directorate General Railways (DGF) to RENFE-Operadora (404 million €), a capital transfer from DGF to FEVE (31 million €) and direct investment in the network from DGF (1.574 million€), part of which done through ADIF (783 million €). Other relevant concepts within this program were a capital transfer to the Figueras-Perpignan concession[85] (67 million €), a capital contribution to railway infrastructure developers (1 million €) and current expenditures of DGF (11 million €).

[83] Own figure, calculated as the addition of different concepts detailed in the National Budget Law for the year 2007 and the Program-Contract between the State and ADIF. It does not include the direct investments in railway infrastructure managed by the SEITT in year 2007.

[84] In year 2007 the National Budget amounted 188.417 million € (http://www.minhac.es; 2008-05-07). According to the Spanish National Statistics Institute, the 2007 GDP represented 1.049.848 million € (http://www.ine.es; 2008-05-07).

[85] 50 year concession on the high speed rail link Figueras-Perpignan awarded to the consortium TP Ferro (ACS, Dragados and Eiffage). The concession contract included construction costs estimated in 952 million € and public subsidies for 540 million € to be paid by the European Commission, the Spanish Government and the French Government (Ministerio de Fomento, 2005d).

Fig. 70: National budget allocation to main public stakeholders in the Spanish railway sector. 2007



Note: Figures in € million; Colour code: Blue – Capital contribution; Green – Transfer; Orange – Capital transfer; Purple – Payment for services rendered; (*) Only part of the capital transfer to the SEITT will effectively revert in the railway sector.
Source: own elaboration based on data from the National Budget Law for the year 2007 (Ley42/2006 de Presupuestos Generales del Estado), the Program-Contract between the State and ADIF and the Program Contract between the State and RENFE-Operadora.

A cornerstone of this scheme is represented by the agreements signed between the State Secretariat for Infrastructure and Planning, ADIF and SEITT within the framework of the Program-Contract between the State and ADIF for the period 2007-2010. The first agreement is devoted to the promotion of investments in the railway network entitled to the State and foresees a total investment of 2.127 million € (Ministerio de Fomento, 2007e). The second agreement is dedicated to the construction of the high speed link Ourense-Santiago and amounts to 1.715 million € (Ministerio de Fomento, 2007d).

In addition to the investments done through ADIF, the SEITT performs other investments in the railway network through specific agreements with the Public Works Ministry. In year 2006 the SEITT awarded railway construction contracts for 182,4 million €[86], while in year 2007 the amount rose to 263,8 million €[87].

The basic structure of the financial framework is expected to be maintained in the following years, as it is suggested by the Program-Contracts signed by the State with

[86] Amounts awarded for the links “Variante ferroviaria de Camarillas” (Ministerio de Fomento, 2006a), and Lebrija-El Cuervo and Utrera-Las Cabezas de San Juan in the high speed line Sevilla-Cádiz (Ministerio de Fomento, 2006b).

[87] Amounts awarded for the links Villaverde de Medina-Villafranca de Duero, Villafranca de Duero-Coreses and “Acceso a Zamora” in the high speed line Madrid-Galicia (Ministerio de Fomento, 2007f) and the link Las Cabezas de San Juan-Lebrija in the high speed line Sevilla-Cádiz (Ministerio de Fomento, 2007g).

ADIF and RENFE-Operadora, the agreements signed between the State Secretariat for Infrastructure and Planning, ADIF and SEITT, and the agreements signed between the Public Works Ministry and the SEITT[88]. The stability of this scheme has been confirmed as well by the amounts allocated to the different investment agents in the 2008 National Budget (Ley 51/2007 de Presupuestos Generales del Estado).

Within this scenario, the financial contributions from the State to the infrastructure manager ADIF and the public operator RENFE-Operadora are expected to reach 10.556 million € in the period 2008-2010.

6.3.13.2 Economic relations between RENFE-Operadora and the State

The increased opening of the railway markets to competition, with year 2010 as the most likely date for the liberalization of passenger services, will be a milestone for the relations between the State and the public railway operator RENFE-Operadora. In fact, according to the Railway Law 39/2003 and the Decree 2396/2004, the current contractual relation between both stakeholders will necessarily change once the market opening is enacted. Until then, the relations between the State and the operator are regulated through the Program-Contract 2006-2010, conceived as a transitional framework towards the open competition scenario[89].

The nature of the Program-Contract is defined in the fourth transitory provision of the Railway Law 39/2003 that states that it should define the basic action guidelines, the investment levels and the commitments required by RENFE-Operadora to fulfill its objectives. In accordance to this provision and in line with the framework stated for the national transport policy in the Strategic Infrastructure and Transport Plan (PEIT), in January 2007 the State and RENFE-Operadora signed the Program-Contract defining their mutual objectives, commitments and obligations for the period 2006-2010.

The main common objective stated by the signatories for the period is the definition of an explicit economic and financial framework for RENFE-Operadora oriented to strengthen its competitiveness in view of the liberalization. This objective is specified in the fifth clause of the contract, which details the following aims:

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[88] Agreement for the improvement of the suburban rail network in Catalonia (Ministerio de Fomento, 2007b) and agreement for the construction of a high speed link between Olmedo and Zamora (Ministerio de Fomento, 2007c).

[89] According to the fourth transitory provision of Railway Law 39/2003, the Program-Contracts should be extinguished once the passenger rail transport market will be opened to competition.

- To foster the development of railways through the provision of high quality railway services integrated in the national transport policy.
- To increase the rail market share through the acquisition of new clients, the development of new products and the search of new business areas.
- To develop an integrated management system and to optimize the current organizational model with respect to the objectives stated in the PEIT for the regeneration of railway transport.

At the tactical and operational levels the Program-Contract advocates for a more business-oriented structure focused on its main markets, the development of specialized management and control tools within each area of activity[90], the promotion of a greater involvement of private initiative in the business and the definition of a strong technological focus.

In line with the abovementioned aims, the Program-Contract establishes the mutual commitments between the State and RENFE-Operadora at the economic and financial levels. In this regard, the Program-Contract defines the contributions that will be paid to RENFE-Operadora by the State, the level of investments, the maximum indebtedness allowed to the operator, the adjustment of its human resources and the financial results to be obtained in the period.

The contributions from the State to the operator are mainly provided in the form of subsidies for the rendering of unprofitable suburban and medium-range services and contributions for the stabilization of its final results and in the form of capital contributions (see Table 32).

The evolution of the amounts suggests a progressive phasing out of the contributions for stabilization, which is in line with the competition scenario. As far as the subsidies for suburban and medium-range services are concerned, provision nº 2 of decree 2396/2004, states that until the opening of the passenger rail transport market arrives, RENFE-Operadora will be able to perceive subsidies and compensations from the State for the rendering of unprofitable passenger railway services. Once the passenger transport market will be opened, PSO commitments will be awarded under a competitive regime by the Public Works Ministry (Art. 53 of the Railway Law 39/2003).

[90] The redefinition of the areas of activity within RENFE-Operadora is oriented as well to clarify and improve the control of the payments in exchange of public service obligations.

Table 32: Expected economic contributions from the State to RENFE-Operadora. 2006-2010

Item	2006 (M€)	2007 (M€)	2008 (M€)	2009 (M€)	2010 (M€)	TOTAL (M€)
TRANSFERS	558,1	595,0	584,7	490,9	395,8	2.624,5
Subsidies for suburban and medium range services	300,5	316,5	343,4	347,5	349,9	1.657,8
Contributions for stabilization	257,6	278,5	227,0	143,4	45,9	952,4
Compensations for suburban and medium range services in 2007	0,0	0,0	9,7	0,0	0,0	9,7
Compensations for the Human Resources Plan	0,0	0,0	4,6	0,0	0,0	4,6
CAPITAL CONTRIBUTIONS	404	404	449	479	404	2.140
TOTAL	962,1	999,0	1.033,7	969,9	799,8	4.764,5

Note: Figures in million €
Source: 11th clause of the Program-Contract 2006-2010 between the State and RENFE-Operadora.

Although it is not possible to know the allocation of the contributions from the State between suburban and regional services in the period 2006-2010, the 2005 annual report of RENFE-Operadora states that the contributions from the State in that year allocated 181 million € to suburban services and 68 million € to regional services (RENFE-Operadora, 2006, p.130).

RENFE-Operadora has kept as well the agreements for the rendering of transport services signed between the former RENFE and the *regional administrations*. In the financial year 2004, RENFE renewed the agreements signed with eight regional governments (Extremadura, Catalunya, Galicia, Murcia, País Vasco, La Rioja, Cantabria and Navarra) (RENFE, 2005, p.26). In the financial year 2005, RENFE-Operadora reported the renewal of agreements for the rendering of transport services in low traffic lines in nine different regions (Navarra, Extremadura, La Rioja, País Vasco, Cantabria, Galicia, Castilla y León and Aragón) and the modification of the agreement with the Catalan Government (RENFE-Operadora, 2006, p.44). Lastly, in the financial year 2006, RENFE-Operadora renewed the agreements with five regional administrations (Navarra, La Rioja, Galicia, Castilla y León, Aragón and Madrid) (RENFE-Operadora, 2007a, p.37).

The overall economic relevance of the agreements between RENFE-Operadora and the regional administrations is however limited. In year 2005 RENFE-Operadora accounted incomes from agreements with regional administrations for 28,3 million € (RENFE-Operadora, 2006, p.143). One year later, this figure rose up to 32,5 million € (RENFE-Operadora, 2007a, p. 19).

6.3.13.3 Economic relations between ADIF and the State

The economic and financial relations between ADIF and the State may be differentiated according to the main activities of the infrastructure manager: the construction of the new high speed links and the management of the network.

The *construction activity* is driven by the State, who entrusts the construction of new rail links to ADIF through specific administrative resolutions. In turn, ADIF has the legal ability to perform the construction activity internally, to contract it out under the Law on Public Administration Contracts (Decree 2/2000) or to award it under a concession contract (Art. 22, Railway Law 39/2003). When ADIF was created in 2005, it inherited the construction commitments belonging to the former high speed infrastructure manager GIF[91]. Later on, these commitments were partially modified and enlarged at the beginning of year 2007 by a resolution from the State Secretariat for Infrastructure and Planning[92].

The political will to construct a high performance rail network throughout the whole country has been internalized by ADIF through its strategic plan for 2006-2010, which includes investments in the network summing up more than 20.000 million €. Approximately 90% of this amount will be dedicated to the high performance rail network. (ADIF, 2007a, p.11).

In 2005 ADIF invested 2.842,5 million € in the construction of the high speed network, attaining a cumulated investment of 13.215 million €[93]. At the end of the year 1.053 km of the high speed network were already in operation, while 1.185 km more remained under construction (ADIF, 2006b, p.17). In 2006 ADIF invested 3.273 million € in the construction of the high speed network, pushing the cumulated investment up to 16.309 million € (ADIF, 2007a, p.35). During the year, the high speed rail network in operation

[91] The transfer is stated in the third additional provision of Decree 2395/2004 (*Real Decreto 2395/2004*). These commitments already included the following high speed links: Madrid-Barcelona-Zaragoza-French Border; Madrid-Segovia-Valladolid-Medina del Campo; Córdoba-Málaga; Madrid-Comunidad Valenciana-Región de Murcia; Variante de Pajares; HSL of the Basque Country; Ourense-Santiago; Navalmoral de la Mata-Cáceres; Soria-Calatayud; Segovia - HSL Madrid-Valladolid and Bobadilla-Granada (ADIF, 2007a, p.17).

[92] This resolution entrusted to ADIF the links Venta de Baños-León-Asturias, Valladolid-Burgos-Vitoria, Límite de la Región de Murcia - Murcia and Cáceres-Mérida-Badajoz. The resolution also removed previous commitments for the construction of the links Soria-Calatayud and Segovia - HSL Madrid-Valladolid (*Resolución de diciembre de 2006, de la Secretaría de Estado de Infraestructuras y Planificación*).

[93] Cumulated investment on the high speed network at 31st December 2005, excluding the lines already in full operation when ADIF started its activity (i.e. the Madrid-Seville line).

grew up to 1.247 km and the network under construction descended to 1.081 km (ADIF, 2007a, p. 23).

These strong investments in the high performance network are mainly supported by the public budget through capital contributions and payments for the construction activities performed in high performance network entitled to the State, European funds and loans.

ADIF is currently receiving economic compensations from the State for the construction activities performed in the link Ourense – Santiago on behalf of the State. The Program-Contract signed between the State and ADIF defines the payment of 1.715 million € in the period 2007-2010 and regularizes previous financial agreements for investments in this link. Additionally, ADIF receives EU funds devoted to the co-financing of studies, projects and construction works on the high performance network. Specifically, ADIF benefits from Cohesion Funds, ERDF Funds and TEN Funds. At the end of year 2006, the cumulated amount of the EU funds awarded to ADIF for the high performance network amounted to 10.253 million €[94], of which 7.254 million € had already been recovered (ADIF, 2007a, pp.37-38).

ADIF has also taken advantage from capital markets to finance its constructing activity, within the limits set by the State for its indebtedness. In year 2005 the infrastructure manager reported a debt of 2.201 million € with the European Investment Bank (EIB) for investments in tangible fixed assets (ADIF, 2006b, p.43). In year 2006, the Public Works Ministry agreed a credit line of 10.000 million € with the EIB to finance the infrastructures defined in the PEIT. From the total amount, the Ministry expected to allocate 2.000 million € to ADIF (Ministerio de Fomento, 2006c). At the end of year 2006 the debt contracted with the EIB reached 3.109 million € (ADIF, 2007a, p.40).

Debt will also be a relevant financial source in the period 2007-2010. In fact, the National Budget Law (Ley 42/2006, de Presupuestos Generales del Estado) has authorized ADIF to increase its debt by a maximum of 705 million € during year 2007[95]. For the period 2008-2010 the Program-Contract between the State and ADIF foresees a maximum increase in the debt with financial entities equal to 1.800 million €.

In addition to the investments in the high performance network, ADIF performs investments in the conventional network in exchange of payments from the State. These

[94] 7.308 million € from Cohesion funds awarded to the Madrid-French Border line, Madrid-Valladolid line and Madrid-Levante line; 2.785 million € from ERDF funds awarded to high speed links in Andalucía, Asturias, Castilla y León, Castilla la Mancha, Murcia and Valencia regions; 161 million € from RTE funds directly awarded to ADIF.

[95] The presented amount represents the net increase in debt allowed in year 2007, including short and long term debt.

investments include renewals and the replacement and modernization of assets, as well as other activities In year 2005 ADIF invested 545 million € in the conventional network (ADIF, 2006b, p.32), amount which decreased to 386 million € in year 2006 (ADIF, 2007a, p.35). The Program-Contract signed between the State and ADIF defines the payment of 2.127 million € in the period 2007-2010 for this activity.

The *management of the railway infrastructure* includes its maintenance and operation, as well as the management of its control, traffic and safety systems. The maintenance activity is defined as the bundle of conservation, repair, technological update and replacement operations requested to preserve the railway infrastructure in adequate operation and safety conditions. The operation activity includes the preparation and publication of the network statement, the allocation of infrastructure capacity, the rendering of additional and ancillary services and the control and inspection of railway infrastructure. The management of control, traffic and safety systems regards the management, verification, inspection and supervision activities of the equipments ensuring the operation of control, traffic and safety systems (Real Decreto 2387/2004, Art.41). The latter activity, i.e. the management of control, traffic and safety systems, has to be performed within ADIF and cannot be entrusted to third parties (Real Decreto 2395/2004, Art.11).

The internal organization of ADIF does only reflect partially these main areas of activity, as only the maintenance activity is clearly allocated within the Directorate General for Infrastructure Development. In year 2006, the expenditures related to maintenance amounted to 732 million €.

The maintenance activity areas perform preventive and corrective maintenance, but also improvements in the rail network (in the form of renewals and replacements). A relevant part of these activities is externalized: in year 2006 ADIF contracted out 238 million € in relation to the infrastructure maintenance in the conventional network and 132 million € in relation to the maintenance of the high speed network[96] (ADIF, 2007a, p.39). ADIF performs the supervision and control of the maintenance tasks in the whole network,

[96] ADIF contracts out the maintenance of the relevant technical systems of the high performance lines (e.g. infrastructure and track, catenary, switches, etc.). Generally the contracts are referred to specific sections and have a multi annual duration. For instance, the maintenance of the infrastructure and track of the Madrid-Seville line was divided into three contracts (section I – Mora, Section II – Calatrava and Section III – Hornachuelos) and awarded to three different contractors for the period 2006-2009 for 25 million €. The maintenance of all the switches in the line during the same period made part of a single contract for 24,8 million €. The maintenance of the catenary was awarded through a single contract for 9,9 million € (Europa Press, 30 de septiembre de 2005).

with the help of the geographic information system GEOMIF and the operation management system SFINGE[97].

The operation and the management activities are mainly performed inhouse, with the exception of external contracts for the provision of some additional and ancillary services. Particularly relevant was the signature of a contract for the energy provision to the network in year 2007, which amounted 234,4 million € for the supply of electricity and 52,2 million € for the supply of oil (ADIF, 2007a, p.31).

ADIF receives compensations for the management of the rail network entitled to the State. In year 2006 they reached 635 million € (ADIF, 2007a, p.4), and according to the Contract-Program with the State they will sum up 3.438 million € in the period 2007-2010. These amounts do not include the improvements in the conventional rail network, which are financed as investments.

6.3.13.4 Economic relations between ADIF and RENFE-Operadora

Since January 1st 2005, RENFE-Operadora performs the operation of railway services on the railway network administered by the infrastructure manager ADIF. The State has defined the legal framework ruling the relations between ADIF and RENFE-Operadora and, particularly, the allocation of capacity (Ministerial Order 897/2005) and the charges for the use of railway infrastructure (Ministerial Order 898/2005). In addition, the State has set up the Commission for the Coordination of Railway Activities[98], which may intervene in the resolution of conflicts between ADIF and RENFE-Operadora and provide guidance in the different interpretations of the legal framework. From an economic point of view, the State fixes the charges for the use of railway infrastructure, the charges for the use of stations and other installations and the security tax, all of them to be paid by RENFE-Operadora to ADIF.

In years 2005 and 2006, RENFE-Operadora paid 122 million € (RENFE-Operadora, 2006, pp. 16) and 162 million € (RENFE-Operadora, 2007a, p.18) respectively in charges for the use of railway infrastructure and charges for the use of stations and other installations (Table 33). The difference between both amounts is partially explained by the fact that in year 2005 the passenger services running on the conventional network only had to pay the access charge and the trains running on the high speed network were

[97] SFINGE is only implemented for the management of the high speed network (http://www.adif.es, 2008-05-16).

[98] The Commission for the Coordination of Railway Activities (*Comisión de coordinación de las actividades ferroviarias)* is dependent from the State Secretariat for Infrastructure and Planning. Its functions are defined in art. 4 of Ministerial Order 32/2005.

granted a discount of 10% in the capacity reservation, running and traffic charge (transitory provisions 1 and 2 of Ministerial Order 898/2005).

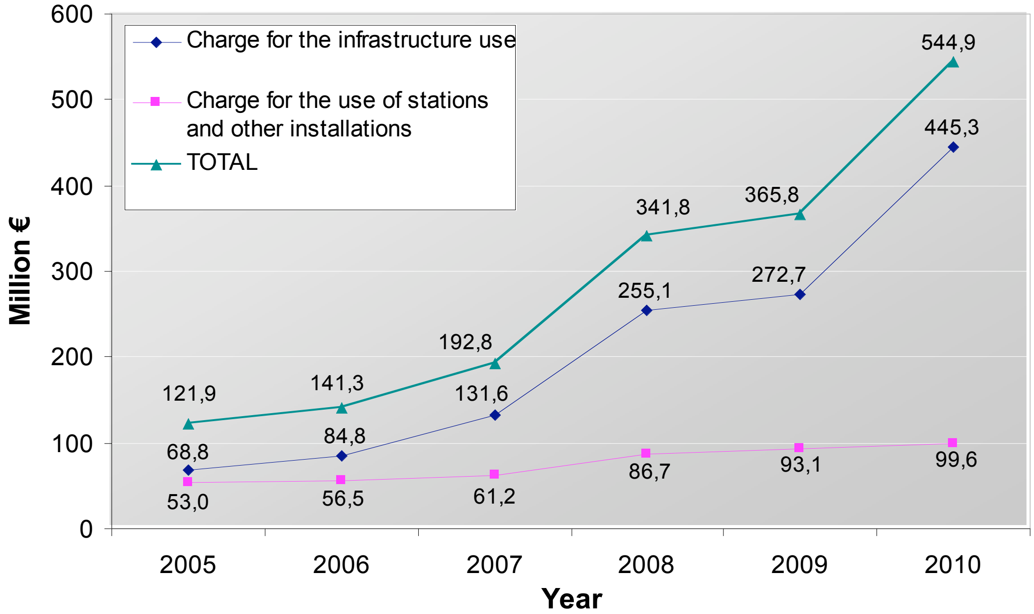
Table 33: ADIF incomes from track access charges. 2005-2006

	2006 (M€)	2005 (M€)	Variation 05/06
Charge for the use of rail infrastructure	**105,3**	**68,8**	**53%**
Access charge	1,4	1,4	0%
Capacity reservation charge	56,1	28,4	97%
Operation charge	29,8	20,6	45%
Traffic charge	18,0	18,4	-2%
Charge for the use of stations and other installations	**55,9**	**53,0**	**5%**
Charge for the use of stations	49,4	47,5	4%
Charge for stabling and use of the platforms	4,4	3,6	21%
Charge for the use of siding tracks	0,1	0,2	-49%
Charge for the use of gauge changing installations	1,9	1,7	16%
TOTAL	**161,2**	**121,8**	**32%**

Note: Figures in million €.
Source: own elaboration with data from (ADIF, 2006b, p.52) and (ADIF, 2007a, p.47)

This figure is expected to grow steadily in the next years, as it has been stated in the Program-Contract 2007-2010 between the State and ADIF. The clause nº 6 and the annex nº 4 of this contract foresee the evolution of incomes due to track access charges depicted in Fig. 71.

Fig. 71: Expected evolution of incomes from track access charges. ADIF. 2007-2010



Note: Figures in million €.
Source: own elaboration with data from the Contract-Program between the State and ADIF, pp. 82-83

Table 34: Agreements in force between ADIF and RENFE-Operadora

Agreement	**ADIF**	**RENFE-Operadora**	**Scope**	**Payments (2005)**
Service level agreement (2005-06-07)	ADIF	RENFE-Operadora	Framework agreement for the monitoring of quality in the provision of services	---
Multi-operator stations (2005-06-07)	Passenger stations	All passenger services	Provision of services	??
Regional services stations (2005-06-07)	Passenger stations	Regional services	Provision of services	??
Suburban stations (2005-06-07)	Passenger stations	Suburban services	Entrustment of suburban stations to RENFE-Operadora	ADIF (12,7 M€)
Energy supply (2005-06-07)	Telecommunications and energy	RENFE-Operadora	Provision of fuel and electric energy to traction units	RENFE-O (185 M€)
Telecom services (2005-06-07)	Telecommunications and energy	RENFE-Operadora	Provision of telecommunication services	??
Provision of aid (2005-06-07)	Traffic	Rolling stock maintenance ; Freight services	Provision of aid in case of accident	ADIF (2,8 M€)
Hauling services (2005-06-07)	Traffic	Freight services	Hauling of special machinery to its working place	ADIF (0,5 M€)
Transport services (2005-06-07)	Maintenance in conventional network	Freight services	Transport of materials required for maintenance activities	ADIF (9,7 M€)
Maintenance of rolling stock (2005-06-07)	Maintenance in conventional network	Rolling stock maintenance	Maintenance of ADIF rolling stock in freight terminal	ADIF (1,9 M€)
Maintenance of rolling stock (2005-06-07)	Freight terminals	Rolling stock maintenance	Maintenance of ADIF rolling stock in freight terminal	ADIF (5,3 M€)
Provision of services in freight terminals (2005-10-28)	Freight terminals	Freight services	Framework agreement for the provision of services in the freight terminals	??

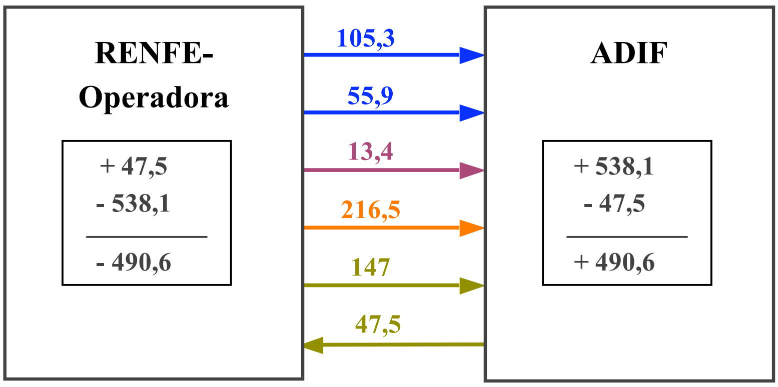
Note: The fields ADIF and RENFE-Operadora refer to the business units of each entity involved in the agreement; --- : No payments involved; ??: Disaggregated information not found.
Source: own elaboration with data from (RENFE-Operadora, 2006, p.29), (González, 2005a), (González, 2005b) and (ADIF, 2006b, p.50)

In addition to track access charges, ADIF is also responsible for the levying of a security tax on passengers through the railway operation companies. The incomes generated by this tax are also incorporated to the patrimony of ADIF. In year 2005 the incomes generated by the security tax amounted to 12,8 million € (ADIF, 2006b, p.51) and in 2006 they reached 13,4 million € (ADIF, 2007a, p.47). For the period 2007-2010 the

Program-Contract with the State foresees that security taxes will reach a total amount of 57,2 million €.

On their side, RENFE-Operadora and ADIF have formalized their relations with respect to the mutual rendering of services in the interface through the signature of 12 specific agreements (Table 34). The most relevant among them is the Service Level Agreement, which defines the overall framework for the relation between both entities and creates two follow-up committees at strategic and operational levels. The agreement sets up indicators related to the planning of activities and the quality of the services offered to the final user (punctuality, regularity, accident risk, track quality, etc.)[99]. The agreement foresees the definition of reference values for the indicators, and the possible implementation of an economic bonus/malus system linked to the performance of each entity. Up to know (May, 2008) the service level agreement has not involved any transfer of money between ADIF and RENFE-Operadora.

Fig. 72: Economic relations between ADIF and RENFE-Operadora. 2006



Note: Figures in € million; Colour code: Blue – Track access charges and charges for use of stations and other installations; Purple – Security tax; Orange – Energy; Green – Other agreements.
Source: own elaboration based on data from (ADIF, 2007a) and (RENFE-Operadora, 2007a)

The economic relevance of all the agreements attained more than 380 million € in year 2005[100] and more than 410 million € in year 2006[101]. The economic relations between both stakeholders in the year 2006 are synthesized in Fig. 72.

[99] The agreement integrates the previous monitoring system of the Traffic business unit (now under ADIF) and incorporates new indicators related to the planning and scheduling of railway services, management and feedbacks (González, 2005a).

[100] In its 2005 Annual Report, ADIF refers incomes from the railway operators equal to 335 million € and payments for agreements with railway operators up to 49,6 million € (ADIF, 2006b, pp.53-54). In the same year, RENFE-Operadora refers payments to ADIF of 147,5 million € (services without including energy) and 198 million € for the provision of energy. RENFE-Operadora refers incomes from ADIF equal to 35,8 million € (RENFE-Operadora, 2006, p. 116).

[101] In its 2006 Annual Report, ADIF refers incomes from the railway operators equal to 373 million € and payments for agreements with railway operators up to 44,9 million € (ADIF, 2007a, pp.48-49). In the

6.4 Characterization of the exporter jurisdictions

6.4.1 Réseau Ferré de France (France)

In France the reform of the railway sector started with the enactment of the Law 97-135 of 13 February 1997, which split the integrated company SNCF in a new State owned infrastructure manager, Réseau Ferré de France (RFF), and a "new" SNCF, focused on the transport operation business. This separation of RFF and SNCF introduced formal independence between operation and the essential functions of the infrastructure manager. However, there still exists a close relationship between both entities, as the management of traffic, as well as the operation and maintenance of the network are carried out by SNCF on behalf of RFF. SNCF is remunerated by RFF, which sets the objectives and the principles for each function[102]. Although since April 1st 2006 the railway freight transport market is opened to competition in France, the entrance of new operators is being quite slow (with 8 licensed railway undertakings in March 2007, according to http://ec.europa.eu/transport/rail, 2008-07-23).

RFF is a public business entity[103] under the French Ministry of Infrastructure, Transport and Tourism, whose main objective is "*to manage the railway infrastructure and to contribute to the revitalization of the railway mode within the perspective of sustainable development*" (RFF, 2007a, p.1). The infrastructure manager is responsible for the allocation of capacity, the maintenance and operation of the network, the development of the rail network and the levying of track access charges.

The principles driving the definition of railway infrastructure charges were initially set in Decree 97-446, which in its Art. 2 dictates that "*track access charges take into consideration the infrastructure costs, the transport market situation, the conditions of supply and demand, the needs for optimal use of the network and the harmonization of the conditions of intermodal competition*". This expression was partially changed by the amendments of Decree 2003-194 (Art. 30), which added a reference to the "*cost of the*

same year, RENFE-Operadora refers payments to ADIF of 147 million € (services without including energy) and 216,5 million € for the provision of energy. RENFE-Operadora refers incomes from ADIF equal to 47,5 million € (RENFE-Operadora, 2007, pp.18-19).

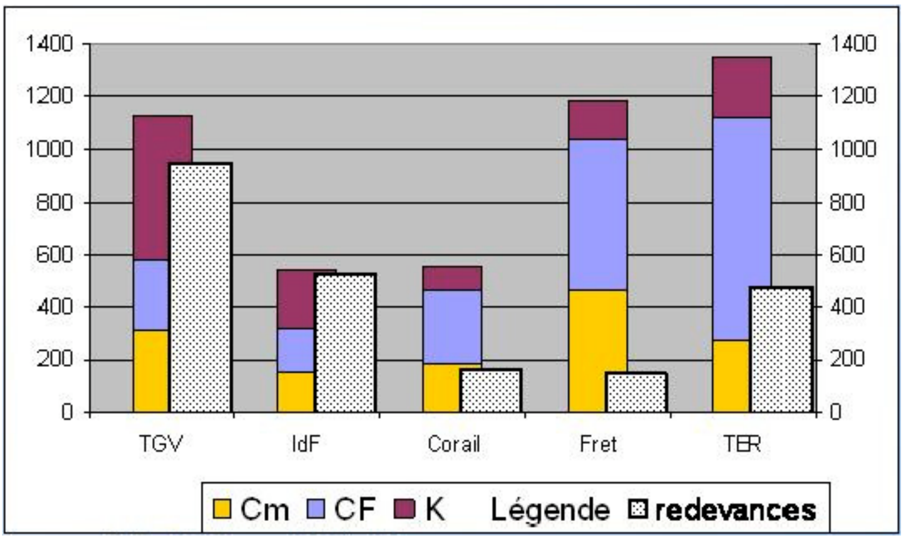
[102] According to RFF's annual report for the year 2005, SNCF received from the infrastructure manager a basic annual fee equal to 2.597 million €, which represented 59,7% of the total RFF's operating expenses in that year. This figure is to be augmented by various other types of remuneration totalling €79 million (summing up bonuses, research agreements, reimbursement of expenses related to malicious damage and sales of rail supplies) (RFF 2007b, p. 22).

[103] RFF has the legal form of an *Établissement Public de l'État à caractère Industriel et Commercial* (EPIC), a State organization whose accounting rules and management methods are similar to industrial and commercial enterprises.

environmental effects generated by the operation of trains". It is remarkable how these principles do not make any explicit mention to the marginal costs of the infrastructure, opening the way to a flexible approach to pricing on the cost side.

The structure and the amount of the charging elements and components are yearly fixed by the Ministry of Transport on proposal of RFF. The tariffs are mainly determined on the basis of financial considerations and are not based on a detailed methodology to calculate the marginal cost of the infrastructure. The incomes obtained by RFF from the pricing of railway infrastructure are rather relevant, and in year 2006 the track access charges represented a 52,96% of its operational expenditures in the period (RFF, 2007b, p.22).

Fig. 73: Cost coverage in the French rail network in year 2005



Note: Figures in M€; TGV – High speed trains; IdF – Île de France; Corail – Intercities; Fret – Freight; TER – Regional trains; Cm – Variable costs; CF – Fixed costs; K – Capital costs; Redevances – track access charges.
Source: RFF – COPIL interministériel, in French Parliament, 2008, p.13

At present, charges partly cover the costs associated to traffic management, maintenance, renewals and investments. However their weight is allocated unevenly across the different railway services, with a very relevant contribution from the high speed services to the cost coverage (Fig. 73). The economic relevance of the track access charges in the French railway system is expected to grow in the next years, mainly due to the investments programmed for the network, the decreasing contribution from the State due to the constraints on public deficit and debt, and the strong financial position of the national operator SNCF (French Parliament, 2008, p.15). RFF justifies the raise in the level of charges for the high speed services in the need of renewal in many parts of the network, but it proposes to combine this measure with a mix of policies leading to minimize their effect on final users (Sauvant, 2008, p.7). The forecasted increases in the level of track access charges have found the opposition from the incumbent operator

SNCF, who argues that they already account for more than 30% of its total expenditures (Leboeuf, 2008, p.8).

The French pricing system (minimum access package) is defined to cover the marginal costs of infrastructure as well as to contribute to the development costs of the network through a two-part tariff scheme. The fixed part of the charge adopts the form of a "soft" *access charge* (α) while the variable part includes a *running charge* (δ) and *a train path reservation charge* (β). The structure of this scheme has remained substantially unchanged for the last three editions of the network statement (with some minor changes in the classification of lines and the modulation coefficient (γ) modifying the train path reservation charge), though the values have been steadily increasing (see RFF 2005 and RFF 2006).

Although in 2004 Remond indicated a correspondence between costs and charges in this scheme (with the access charge recovering timetable establishment costs and the running charge approximating marginal operation and maintenance costs) (Remond, 2004), the network statement suggests that tariffs are mainly determined on the basis of financial considerations and are not based on a detailed cost-related methodology (RFF, 2007c, p.38). According to this source, charges are calculated using data from the information systems of RFF for a grouping of the network into categories and sub-categories of elementary sections reflecting infrastructure and traffic characteristics. Nevertheless, it seems out of discussion the allocation of mark-ups and maybe scarcity costs through the network groupings, since the sub-categories of a category have the same infrastructure characteristics but imply different prices. This effect can be observed for the high speed lines, where their geographical situation, associated to different subcategories, produces higher prices when approaching main cities (e.g. Paris).

The charging scheme applied by RFF can be synthesized in expression [2]:

$$C = \alpha(L) + \beta(L,P) \cdot \gamma(S,s,l) + \delta(S) \qquad [2]$$

Where:

C	*track access charge (per train-km)*
L	*line or section*
P	*time period*
S	*type of service*
s	*speed*
l	*length of the route*

The values applied by RFF in its 2009 network statement for the coefficients appearing in expression [2] are indicated in Table 35.

Table 35: Coefficients and charges adopted by RFF in its 2009 network statement

α (Access charge)	0-1,051	€ / train path-km
β (Train path reservation charge)	0-15,137	€ / train path-km
γ (Modulation coefficient)	0,6-1,3	---
δ (Running charge)	0,459-1,428	€ / train-km

Source: own elaboration from RFF 2007d

The RFF's charging scheme includes a very strong differentiation of charges depending on the combination of line type and time period in which the train runs. The charging scheme classifies the sections of the network into nine different types of line (Table 36) and defines three different time periods common to the entire network (peak-normal-valley).

Table 36: Types of line considered in the RFF's charging scheme for the timetable 2009

	Categories	Designation	Total length (km)	Network part
Suburban	High-traffic	A	289	1,0%
	Medium-traffic	B	1.022	3,5%
Main interurban	High-traffic	C	7.210	24,8%
	Medium-traffic	D	5.897	20,3%
Other lines	All	E	12.888	44,3%
High speed	High-traffic	N1	718	2,5%
	Medium-traffic	N2	456	1,6%
	Low-traffic	N3	322	1,1%
	LGV Est	N4	317	1,1%

Note: Total length of the network as of June 2007; Categories C and D* included within categories C and D.*
Source: EIM and CER, 2008, p.19

For high speed trains the classification of line sections is related to the volume of traffic supported by them[104], while the classification in time periods is, as said, the same as for the rest of the network. The amount of the unitary track access charges is almost equally dependent on both variables. The unitary track access charges levied on the high speed links are detailed in Table 37.

In the case of conventional passenger services, the unitary track access charges remain significantly lower than those for high speed services (e.g. the unitary charge for a conventional passenger train running on a medium traffic main interurban line in a "normal" time period is about 20% of the unitary charge of a high speed service running

[104] A new category has been set for the recently opened LGV Est (N4) This category, cheaper than the rest, has been probably defined in order to incentivize the utilisation of the new link during the ramp-up phase.

on a medium traffic high speed line in the same period). However there is a strong penalty for the services running on suburban lines, particularly in peak hours, which may make the level of both charges comparable.

Table 37: Unitary track access charges for high speed passenger services under RFF charging scheme for the timetable 2009

	Line N1 (high traffic)	**Line N2** (medium traffic)	**Line N3** (low traffic)
Valley	8,58 (+7%)	3,91 (-51%)	3,50 (-56%)
Normal	14,89 (+85%)	8,03 (-)	5,32 (-44%)
Peak	17,62 (+119%)	10,43 (+30%)	7,27 (-9%)

Note: Figures in €/train-km, includes access, running and train path reservation charges. Values in brackets reflect the variation with respect to the unitary charge for a train running on a medium traffic line on a normal time period.
Source: own calculations from RFF 2007d

Differentiation according to the time period is also relevant in high traffic main interurban lines, but results negligible in the case of medium traffic interurban lines and other lines (Table 38). This behavior (greater differentiation and levels in suburban lines) is also found in the case of passenger regional services, though with different reference values. In the case of regional services, the charge for a train-km run on a medium traffic main interurban line in a "normal" time period goes down to 0,89 €/train-km, instead of the 1,48 €/train-km of conventional passenger services.

Table 38: Unitary track access charges for conventional passenger services (except regional services) under RFF charging scheme for the timetable 2009

	Suburban lines		**Main interurban lines**		**Other lines**
	Line A (high traffic)	Line B (medium traffic)	Line C/C* (high traffic)	Line D/D* (medium traffic)	Line E
Valley	3,33 (+14%)	2,21 (-24%)	2,21 (+49%)	1,44 (-3%)	1,43 (+0%)
Normal	6,58 (+125%)	2,92 (-)	2,21 (+49%)	1,48 (-)	1,43 (-)
Peak	16,29 (+458%)	4,79 (+64%)	3,02 (+104%)	1,48 (+0%)	1,43 (+0%)

Note: Figures in €/train-km, includes access, running and train path reservation charges. Values in brackets reflect the variation with respect to the unitary charge for a train running on a medium traffic line on a normal time period.
Source: own calculations from RFF 2007d

The charges applied to freight services follow a pattern similar to the ones applied to conventional passenger services, though their level is lower (for freight traffic running on a medium traffic main interurban line in a "normal" time period the unitary charge stays between 0,49 and 0,53 €/train-km) and they include the effect of the modulation coefficient γ. This coefficient is designed so that it provides strong incentives for lower priority train paths in suburban and high traffic main interurban lines at the same time that it has no relevant effect on the charge on medium traffic main interurban lines and other lines (see Table 39).

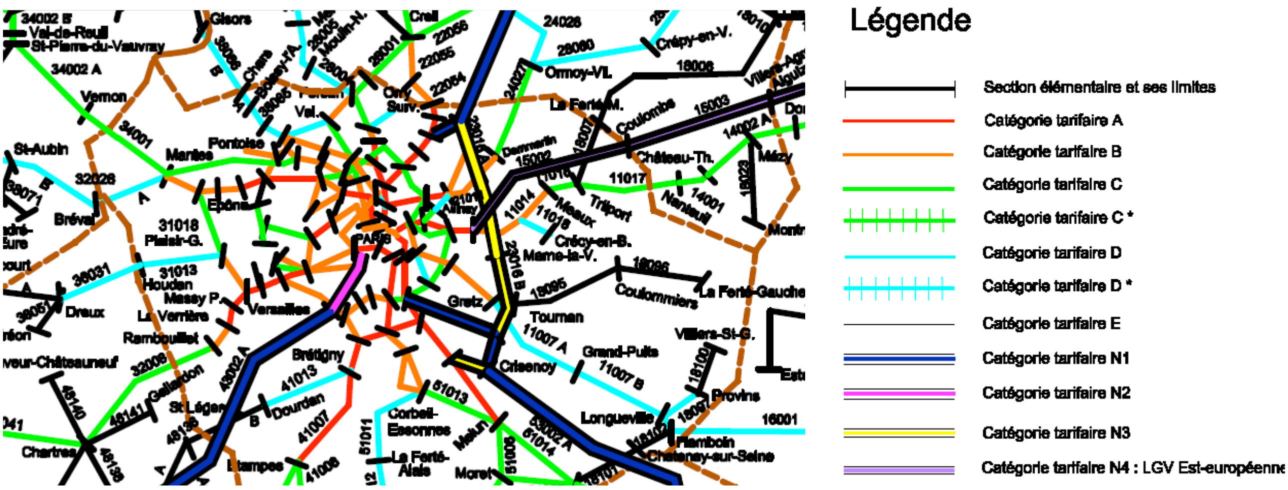
Table 39: Unitary track access charges for conventional passenger services under RFF charging scheme for the timetable 2009

	Suburban lines		Main interurban lines		Other lines
	Line A (high traffic)	Line B (medium traffic)	Line C/C* (high traffic)	Line D/D* (medium traffic)	Line E
Valley	1,61-2,93 (+ 18-22%)	0,93-1,47 (- 31-39%)	0,93-1,47 (+ 90-179%)	0,47 (- 5-11%)	0,46 (+0%)
Normal	3,56-7,15 (+ 161-198%)	1,36-2,40 (-)	0,93-1,47 (+ 90-179%)	0,49-0,53 (-)	0,46-0,47 (-)
Peak	9,38-19,78 (+ 589-725%)	2,48-4,82 (+ 82-101%)	1,42-2,53 (+190-380%)	0,49-0,53 (+0%)	0,46-0,47 (+0%)

Note: Figures in €/train-km, includes access, running and train path reservation charges. Ranges have been defined according to the modulation coefficient γ. Values in brackets reflect the variation with respect to the unitary charge for a train running on a medium traffic line on a normal time period.
Source: own calculations from RFF 2007d

The values applied by RFF to the different services in the 2009 network statement, together with the cost recovery ratios provided in Fig. 73, confirm the existence of mark-ups for high speed services and suburban services (particularly in the region Île de France), while the conventional and freight services are charged at lower rates. The charging scheme provides strong incentives for the rerouting or rescheduling of these services when approaching the main cities. This fact can be appreciated in Fig. 74, which illustrates the classification of the network sections in the vicinity of Paris.

Fig. 74: Classification of railway sections in region Île-de-France. Timetable 2009

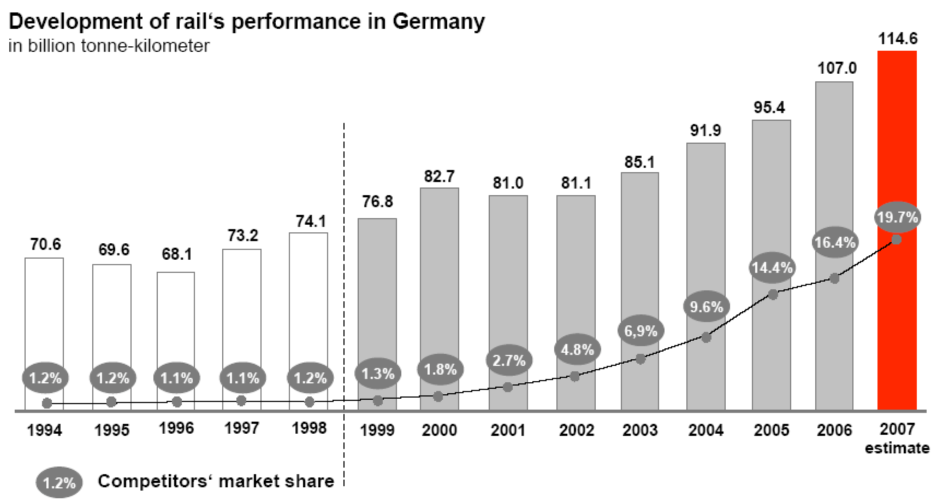


Source: RFF 2007e

6.4.2 DB Netz (Germany)

The railway reform in Germany started in 1993, with the merging of the railway companies from the Federal Republic and the former Democratic Republic in a single entity owned by the State, Deutsche Bahn AG. In year 1999, Deutsche Bahn was transformed in a holding integrating different subsidiary companies, each focusing on one different part of the railway business. At this stage, the railway infrastructure was allocated to the company DB Netz AG, which is currently responsible for its management. The third step of the reform foresees the privatization of the different subsidiary companies, granting their independence (Goujon, 2004a, p.2). After some years of discussion the privatization stage seems to have taken off. According to the Federal Government, there will be two companies: the infrastructure that will continue to be fully owned by the Federal Government and one stock corporation combining passenger transport, freight transport and logistics. Up to 24,9% of this corporation will be privatized (German Federal Ministry of Transport, 2008).

Fig. 75: Evolution of the German rail freight market – Market share of new entrants 1994-2007



Source: Fried, 2008, p.3

The early reform accomplished in Germany has found its reflection in the high number of new operators entering the market. At the end of year 2006, 347 railway undertakings were licensed in Germany (http://ec.europa.eu/transport/rail, 2008-07-23). However the market share of the new entrants in the operation business is still reduced. In the same year 2006, they run the 13% of the total train path-km operated in the DB Netz network (Deutsche Bahn, 2007, p.24). Still, the trend is increasing very fast, as it is reflected by the evolution of the German rail market freight (Fig. 75). The main transport policy objectives behind this reform have been expressed through the two statements "*More traffic onto rail*" and "*Tax payer relief*" (Deutsche Bahn, 2008a). These objectives have been internalized by the infrastructure branch DB Netz, through the strong business orientation of its activity (through the marketing of customer oriented track usage offers) and the further development of the rail network (Deutsche Bahn, 2007, p.25).

DB Netz AG is responsible for the setting of track access charges, which are verified by the Federal Network Agency, the Regulatory Body in charge of the supervision of the main network economies in Germany (Electricity, Gas, Telecommunications, Post and Railway).The principles driving the setting of track access charges are in line with Directive 2001/14/EC, transposed to the German legal framework in June 2005 through modifications in the 1993 General Railway Law (*Allgemeines Eisenbahngesetz*, AEG) and the regulation on railway infrastructure use *(Eisenbahninfrastruktur-Benutzungsverordnung*, EIBV) that came into force in August 2005. Article 14.4 of the AEG sets the general principle for the charging framework, stating that "*Infrastructure managers have to calculate their infrastructure charges [...] in such a way that their costs (plus a return on investment which can be borne by the market) can be covered*", which is developed in detail in articles 21-23 of the EIBV.

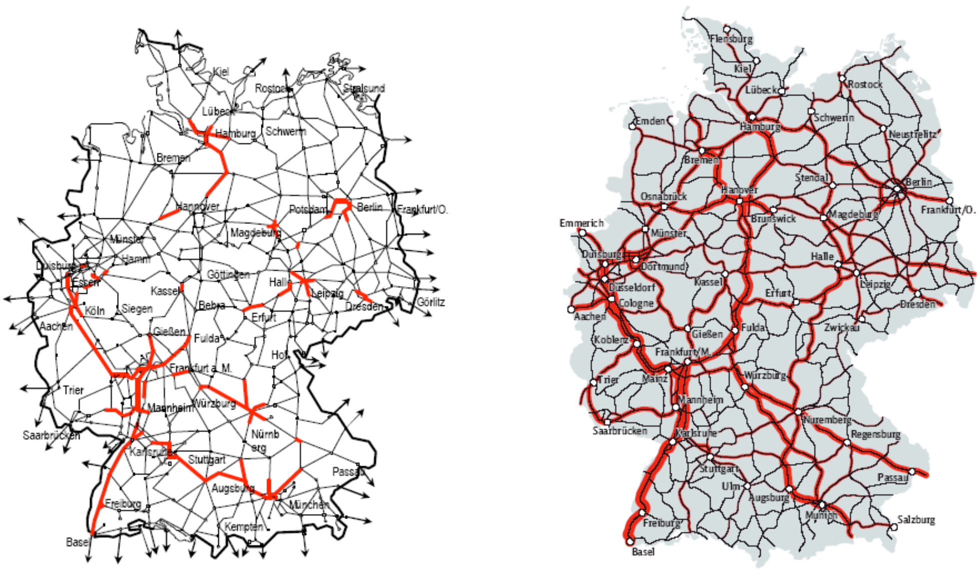
The German charging scheme is aimed at full cost recovery for the minimum access package (the maintenance and management have to be fully covered by track charges), taking into account governmental grants and interest-free loans. The RAILIMPLEMENT study estimated that 45-50% of total costs are covered by public investment funds. Since 64% of DB Netz's total track revenues is paid by regional transport (where 2/3 is subsidized by the state), the total public share of infrastructure cost coverage is approximately 65 to 70% (Steer Davies Gleave, 2005b, p.12).

The German pricing system for the services of the minimum access package is aimed at full cost recovery (minus State subsidies) and consists of a train path charge levied per train-km. The train path charge is a linear charge designed as the product of *a basic category price* (α) related to the line, a *product multiplier* (β) related to the train path quality, an *utilization factor* (γ), a *minimum speed factor* (δ) and a *regional factor* (ε) only applied to regional traffic. This expression is complemented by *a payload component* (φ) and a performance regime based on delay minutes accountancy (DB Netz, 2007b, pp.3-15). The structure of this charging scheme has been evolving during the last years, with the elimination of some special factors (tilting trains, steam locomotives, out-of-gauge trains), the simplification of other factors (e.g. the reduction of different weight classes to a single threshold) or the inclusion of the minimum speed factor and the performance regime (see for instance DB Netz, 2005, pp.2-11).

The procedure followed to define the train path charge is based on the allocation of costs derived from network operation, maintenance, administration and investment after State contributions (Ludwig, 2006, p.3). However, it also takes into account the viability of the market in terms of competitiveness and expected growth of the different demand segments (EIM and CER, 2008, p.30). With independence of the global optimization process, leading to the conciliation between cost recovery and demand for infrastructure services, it is possible to link some of the components of the train path charge to specific purposes:

- The utilization factor (γ) is related to the intensity of use of the different links of the network, increasing the amount of the overall charge for the most used links. According to Kandels, the purpose of this factor is to enable better capacity management and redirect traffic flows to routes with low traffic volumes (Kandels 2005, p.11), which suggests its correlation with demand and not with costs (Fig. 76).

Fig. 76: Sections of the German network affected by the utilization factor compared to the infrastructure utilization

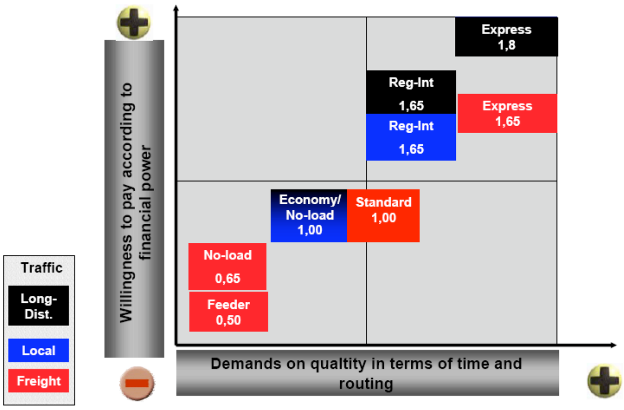


Note: Red links on the left graph represent sections where an utilization factor of 1,2 was applied in year 2005. Red bands on the right graph represent infrastructure utilization in year 2004 (proportional to the wide of the band).
Source: Kandels, 2005, p.11 (left) and Deutsche Bahn, 2008b, p.13 (right)

- The regional factor (ε) is related to the financial viability of the regional services operated in each of the States. The factor is set in order to improve the cost coverage ratio for these services and can be reviewed in the case of increases in regional subsidies or relevant increases in the number of train path orders (DB Netz 2007b, p.11).

- The product multiplier (β) seems to be related to the willingness to pay of the different railway services through the consideration of the priority allocated to different train path products (Fig. 77).

Fig. 77: Product multipliers adopted in the DB Netz charging scheme



Source: Bohrer, 2004, p.18

The charging scheme applied by DB Netz on a link of the network has been synthesized through expression [3]:

$$C = \alpha(L) \cdot \beta(S,H) \cdot \gamma(L) \cdot \delta(s) \cdot \varepsilon(S,L) + \varphi(W) \qquad [3]$$

Where:

C *track access charge (per train-km)*
L *line or section*
S *type of service*
H *type of train path – priority*
s *speed*
W *train weight*

The values adopted by DB Netz in its price list for year 2008 for the coefficients appearing in expression [3] are indicated in Table 40.

Table 40: Coefficients and charges adopted by DB Netz in its 2008 price list

α (Basic category price)	1,59-8,09	€ / train path-km
β (Product multiplier)	0,5-1,8	---
γ (Utilization factor)	1-1,2	---
δ (Minimum speed factor)	1-1,5	---
ε (Regional factor)	1,05-1,91	---
φ (Payload component)	0-0,92	€ / train path-km

Source: own elaboration from DB Netz 2007b, pp.3-15.

The multiplicative specification of the charging scheme is designed to provide strong incentives to the market. The scheme contains two components (δ and Φ) that become relevant only when the operator exceeds some limiting operational thresholds: a speed lower than 50 km/h and a gross weight greater than 3.000 tonnes. Made exception of them, the charging scheme of DB Netz for a given service is mainly dependent on the line or section (*L*) selected by the operator and the train path priority (*H*).

In order to estimate the relevance of each of these variables in the formation of the final unitary price a simple sensitivity analysis has been carried out for four different types of service, namely high speed services, conventional passenger services, regional passenger services and freight services. The calculation hypotheses assumed for each type of service are:

- High speed services: they run on sections F Plus (maximum speed above 280 km/h) or F1 (maximal speed above 200 km/h); they reserve an express train path or a long distance regular interval train path.
- Conventional passenger services: they run on sections ranging from F1 to F5 (maximum speeds above 100 km/h); they reserve an economy train path, a long distance regular interval train path or an express train path.
- Regional passenger services: they run on lines F6, Z1 or Z2; they reserve an economy train path, a long distance regular interval train path or an express train path. They can be affected by any of the regional coefficients defined in the DB Netz 2008 price list.
- Freight services: they run on lines ranging from F1 to F5 (maximum speeds above 100 km/h); they reserve a standard or an express freight train path.

For each of the types of service described, the proposed sensitivity analysis defines the values of the variables *L* and *H* that maximize or minimize their contribution to the unitary track access charge. Then, it calculates the unitary track access charge and evaluates the variation in this charge due to changes in each of the two variables (from the minimizing to the maximizing value). The results are presented in Table 41.

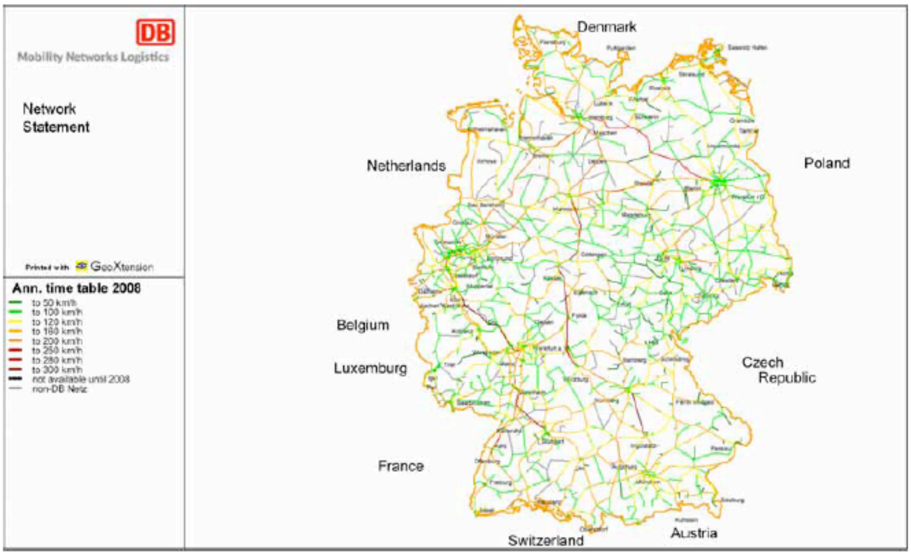
The value of the unitary charge levied within every type of service can be substantially different depending on the combination of *L* and *H* chosen. The relative range of variation for the unitary charge is different for every type of service, as well as the weight of each of the variables *L* and *H* in this variation. The relative range of variation (ratio between the maximum and the minimum values of the unitary charge) goes from 2,57 for high speed services to 4,78 for conventional passenger services, with intermediate values of 4,07 for regional services and 4,39 for freight services. In all the cases the relevance of the variable *L* is greater than the relevance of variable *H*. The relative weight of *H* with respect to *L* is respectively equal to 6,7% (high speed), 48,2% (conventional passenger), 63,3% (regional passenger) and 39,2% (freight services).

Table 41: Unitary track access charges for different type of services depending on priority and section variables under the German charging scheme

		Priority (*H*)		
Type of service	**Section (*L*)**	*Min*	*Max*	*Variation*
High speed	*Min*	6,80	7,42	*9%*
	Max	16,02	17,47	*9%*
	Variation	*136%*	*136%*	
Conventional passenger	*Min*	1,86	3,35	*80%*
	Max	4,94	8,90	*80%*
	Variation	*166%*	*166%*	
Regional passenger	*Min*	2,29	4,12	*80%*
	Max	5,18	9,32	*80%*
	Variation	*126%*	*126%*	
Freight	*Min*	1,86	3,07	*65%*
	Max	4,94	8,16	*65%*
	Variation	*166%*	*166%*	

Note: Figures expressed in €/train-km; Calculation hypotheses: High speed – Lmax (FP, γ=1,2), Lmin (F1, γ=1,0), Hmax (express train path), Hmin (long distance regular interval train path); Conventional passenger– Lmax (F1, γ=1,2), Lmin (F5, γ=1,0), Hmax (express train path), Hmin (economy train path); Regional passenger– Lmax (Z1, γ=1,2, ε=1,91), Lmin (F6, γ=1,0, ε=1,05), Hmax (express train path), Hmin (economy train path); Freight – Lmax (F1, γ=1,2), Lmin (F5, γ=1,0), Hmax (express freight train path), Hmin (standard train path).
Source: own calculation based on DB Netz 2007b, pp.3-15

Fig. 78: Maximum speeds in the German rail network. 2008



Source: Deutsche Bahn AG, 2008c

From this analysis, it arises that in spite of the apparently complex multiplicative specification ruling the calculation of track access charges on the DB Netz network, the more relevant factor for a train operator is still the type of section used, and in a secondary place the requested priority for its service. The classification of the links of the network within different section types is done according to the maximum speed and the type of traffic running on them (Fig. 78). Therefore, it is only partially based on technical data, allowing further considerations in the classification of those links with maximum speed below 200 km/h.

6.4.3 Network Rail (United Kingdom)

The reform of the British railway system started in 1994 with the enactment of the 1993 Railways Act, which restructured the sector into one infrastructure manager (Railtrack), 25 passenger train operating companies (TOCs), seven freight train operating units, three rolling stock leasing companies (ROSCOs) and several ancillary businesses, and enabled the Secretary of State for Transport to transfer them to the private sector. The passenger rail services were franchised to various private companies and the infrastructure manager was floated on the London stock exchange in 1996.

This model, the only in Europe combining full separation and full privatization of the railway business, led to substantial off-track competition, to the removal of potential barriers for accessing the market and to relevant incomes for the Exchequer (Preston, 1999, pp. 1-7).

However, there also existed some concerns about the investment policy followed by Railtrack. These concerns became a tragic reality in year 2000, when the investigations following the Hatfield accident pointed out rail fatigue cracking as its main cause and revealed a widespread incidence of this phenomenon all over the network. They also identified a number of significant failings in Railtrack's performance that had contributed to the failure to maintain the line in a safe condition and concluded that *"At the time of the derailment and over the previous two years, the culture within Railtrack which conditioned decision making on safety and performance issues, was biased towards performance-driven decisions. In particular, there was a bias towards minimizing train delays and quantifying rail failures in terms of broken rails but failing to focus on the poor quality of maintenance that was the root cause of the rail breakage."* (ORR, 2006, p.123).

The financial burden of the major repairs required in the network deteriorated the results of the company, which following an application to the High Court from the British Government, was placed into administration on October 7th 2001. After a year in administration, Railtrack was sold by its parent company Railtrack Group PLC to a newly created company, Network Rail, which took over responsibility for Britain's rail network.

Network Rail is a “not for dividend” private company limited by guarantee that owns the national rail network infrastructure and manages it under a network license granted by the Department for Transport (DfT)[105]. According to its legal form Network Rail operates in the private sector and belongs to its members[106], among which there is the Department for Transport. This layout keeps and intentional ambiguity as regards the public control of the infrastructure manager, which has been described by the economic’s editor Larry Elliott in the following terms: “*Network Rail may technically be a not-for-dividend private company with its debts underpinned by the government, but it is nationalised in all but name*” (Elliott, 2006).

The activity of Network Rail is mainly regulated by the Office of Rail Regulation (ORR) [107], which is the combined economic and safety regulator[108]. ORR is responsible for setting Network Rail’s access charges, establishing the baseline outputs that the company should provide to ensure that it is an efficient steward of the national railway network and enforcing the conditions set out in its network license. ORR also licenses operators of railway assets, approves agreements for access by operators to railway facilities and enforces domestic competition law.

The operation of passenger services is mainly performed by the 25 TOCs in possession of the rail franchises for running passenger services in England and inter-city services to and from Scotland and Wales[109] (Fig. 79). These franchises are awarded by the DfT, who since 2006 is responsible for specifying, awarding, and monitoring the contracts to the train operating companies[110]. The operation of freight services is basically performed by four main freight operating companies: English, Welsh and Scottish Railway (EWS),

[105] The network license was first issued by the Secretary of State on March 1994 to govern Railtrack’s activities, but enforced and amended by the Rail Regulator, which strengthened the company’s network license on 27 June 2002.

[106] According to Network Rail’s Webpage, the members of the company are drown among the rail industry and the general public (http://www.networkrail.co.uk, 2008-07-30)

[107] The Office of Rail Regulation (ORR) was established on 5 July 2004 by the Railways and Transport Safety Act 2003 (Art. 15-17). It replaces the Office of the Rail Regulator.

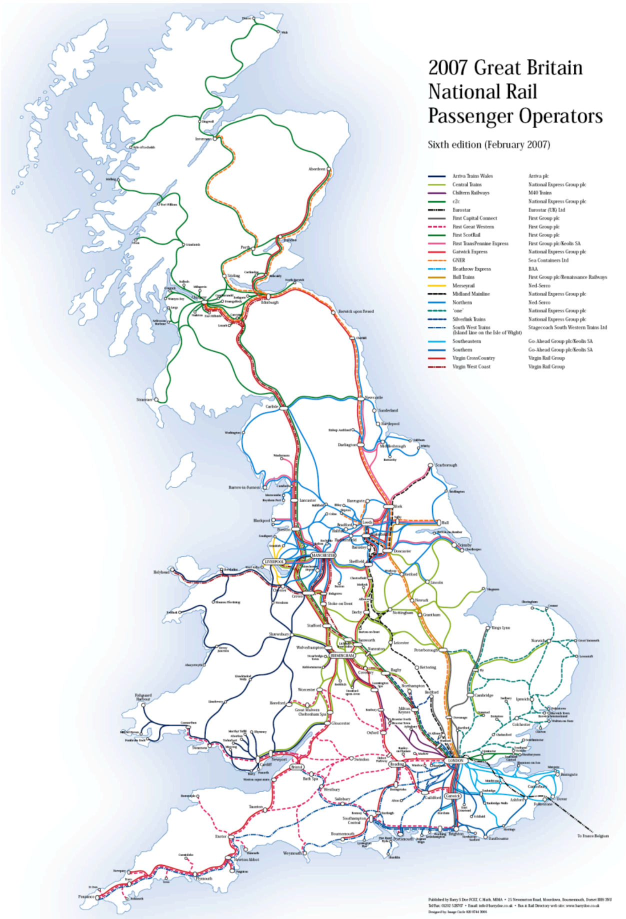
[108] Condition 6 of the Network License specifies that Network Rail shall be a member of the Rail Safety and Standards Board (RSSB), beeing subjected to the compliance of the obligations and agreements reached within this institution still exists, however; established in 2003 on the recommendations of a public inquiry, it leads the industry's progress in health and safety matters. The Rail Safety and Standards Board is responsible for imposing monetary penalties to Network Rail if it fails to fulfil its obligations.

[109] There are also some rail services operated on an open access basis (i.e. outside the franchise arrangements). Examples include the Heathrow Express or Hull Trains.

[110] In 2006, using powers in the Railways Act 2005, the Department for Transport took over most of the functions previously held by the now disappeared Strategic Rail Authority (SRA).

Direct Rail Services Limited, Freightliner Ltd and GB Railfreight Ltd. In spite of the complexity existing in the provision of rail transport services, the operation companies have attained steady increases in traffic and performance for both passenger and rail services, supporting the effectiveness of the British railway reform (Goujon, 2004b, p.4).

Fig. 79: National rail passenger operators in Great Britain. 2007



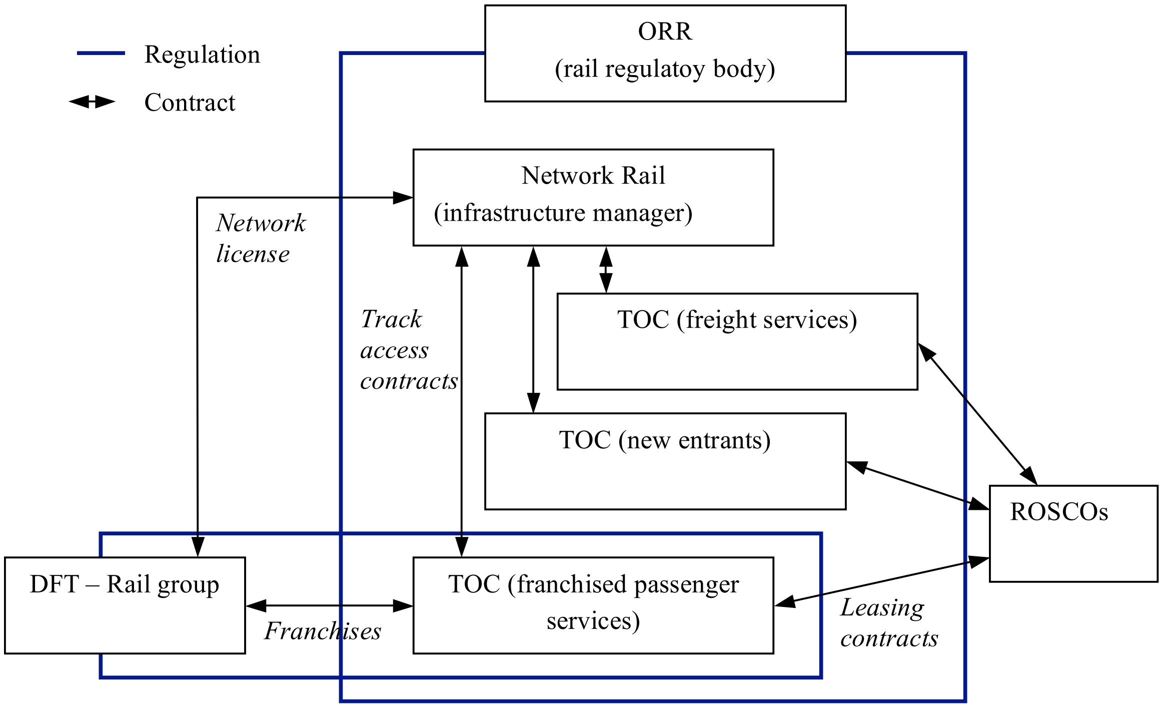
Source: Doe, 2007

The current structure of the British rail sector has been simplified and synthesized in the scheme of Fig. 80.

The clear relations among the different stakeholders and the existence of a strong regulatory body, helps to define objectives and risks in a more effective way. In this context, Network Rail’s task is to provide an optimal suite of rail infrastructure services in the short and long-term.

The charge setting procedure in Britain is part of a broader regulatory process in which the revenues and the financial framework for the infrastructure manager are defined for the next five-year period.

Fig. 80: Structure of the British rail sector. 2007



Source: own elaboration, adapted and updated from Kamleh 2006, p.4

The procedure foreseen for the period 2009-2014 starts with the definition by the UK Government[111] of the outputs expected from the rail sector (in terms of safety, performance and capacity) and the availability of public funding for their achievement. Then the ORR, as independent economic regulator, determines whether the outputs sought by the Government are affordable and deliverable within the funding that the Government is providing. Second, Network Rail proposes its approach and financial needs for meeting these output specifications, detailing investments, expenditures, track access charges and other incomes for the period[112]. Third, the ORR makes a final decision on the efficient level of expenditures for Network Rail and the track access charges, both in level and structure, to be applied by the infrastructure manager. The

[111] The participation of the Government at this stage of the process has occurred for the first time in the track access charges review for the period 2009-2014, after the strong criticisms made by the Transport Committee of the House of Commons in 2004. At that time the Committee concluded that *"A model of railway governance is required which restores to the Government control over the public interest, public expenditure, rail policy, and objective setting; while allowing the railway industry full operational responsibility for the delivery of improved infrastructure, train service outputs and strategy objectives."* (House of Commons, 2004, p.66). The definition of the output is performed through the High Level Output Specifications (HLOS).

[112] Network Rail has coordinated the scheduling of the regulatory reviews with its own planning activity, therefore it will deliver its Strategic Business Plan for the same period, 2009-2014, after several consultations to other industry stakeholders (including ORR) (http://www.networkrail.co.uk 2008-08-01).

whole procedure builds on detailed consultancy studies and a strong participation of all the relevant stakeholders.

The Government objectives for railways were stated in the 2007 White Paper, which declared the ambition for a railway "*able to handle double today's level of freight and passenger traffic*"; "*even safer, more reliable and more efficient than now*"; "*able to cater for a more diverse, affluent and demanding population*"; and "*able to reduce its own carbon footprint and improve its broader environmental performance*" (DfT, 2007b, p.7). These objectives mainly cover England and Wales, as since 2006 rail policy has been devolved to the Scottish Ministers, who now have the responsibility for specifying and funding the network infrastructure in Scotland.

In setting track access charges, the Office of Rail Regulation considers that the charging regime should promote the objectives of its funders and broad economic development, incentivise efficient utilization and development of the network, optimize the whole of industry costs, avoid discrimination between network users, provide practical, cost-effective and objective operation and comply with relevant legislation, including EU Directive 2001/14/EC (Jones, 2005, p.4).

The charging scheme proposed for year 2008 in the United Kingdom is based on marginal cost estimations and includes a specific mark-up levied on franchised train operators intended to ensure the full recovery of Network Rail's efficient costs. According to this scheme charges are classified in variables and fixed. Variable charges related to the minimum access package are the variable *usage charge* (α) (levied per train-mile and depending on the vehicle class) and the *capacity charge* (β) (levied per train-mile according to the service group). The *fixed charge* (γ) is unique and it is levied on an annual basis to the franchised operators. The *electrification asset usage charge* (δ) is levied as a mark-up on the electricity charge, levied per kWh. The scheme is completed with a performance regime and a possession regime (Network Rail, 2006, pp.37-38). Though not yet approved, the track access scheme for the period 2009-2014 will probably define a mark-up on freight-only lines and possibly introduce some route-based factors in the variable charge (Network Rail, 2007, pp.5-6).

The calculation procedures applied are specific for every charging component:

- The variable usage charge (α) allocates usage-related costs to individual vehicles in proportion to their relative propensity to cause damage to the network. Usage-related costs are based on a top-down analysis of Network Rail's short run incremental costs, while the allocation to different types of vehicles relies on a bottom-up engineering model. This approach was proposed to ORR by the consultant Booz Allen Hamilton in 1999 (BAH, 1999) and then first applied for the control period 2000-2004 (ORR, 2000a). A revision of the methodology was conducted within the 2005 structure of costs and charges review (BAH and TTCI, 2005) and is being conducted again for the definition of charges for the control period 2009-2014 (TTCI, 2008 and Halcrow Group, 2008).

Fig. 81: Part of variable charges in the UK charging system. 2001-2009

	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007	2007/ 2008	2008/ 2009
Revenue requirement* (£million)								
CP2	2,633	2,778	2,903	3,035	3,175			
CP3				4,443	4,411	4,242	4,199	4,137
Variable charges (£million)								
CP2	323	352	357	361	366			
CP3				367	374	381	382	387
Fixed charges (£million)								
CP2	1,415	1,486	1,560	1,638	1,720			
CP3				2,797	3,385	3,309	3,817	3,750
Variable charges as share of total revenue requirement								
CP2	12%	13%	12%	12%	12%			
CP3				8%	8%	9%	9%	9%

Note: *This is made up of freight and passenger charges, government grants, stations and other revenue.
Source: Office of the Rail Regulator.[9]

Notes: CP2 – Control Period 2; CP3- Control period 3.
Source: Thomas, 2004

The top-down model used for setting the charges applied in 2008 is still the one introduced in year 2000. This model assesses the total costs to the infrastructure manager of operating, maintaining and renewing the network and estimates the variability of these costs by asset category. The variable elements of costs are identified on the basis of a national "network average" estimate, for each asset type, of the variability of damage and cost with usage at the prevailing network average traffic density (Fig. 82).

The bottom-up model distributes the total usage-related costs to individual vehicle types according to the equivalent gross tonne miles (EGTMs) operated by each type of vehicle. The calculation of EGTMs is made separately for track and structures. In the first case it includes the type of train (loco-hauled or distributed traction), the operating speed, the axle load and the unsprung mass. In the second case, the calculation takes into account the type of vehicle (single axles or boogies), the axle load and the operating speed (BAH, 1999, p.34).

Further improvements foreseen for the definition of the variable usage charge include a more detailed break down of activities and asset types in the top-down model and the refinement of the engineering models through the inclusion of tangencial forces and rolling contact fatigue.

Fig. 82: Estimation of cost variability per asset type in the British rail network

	% variable	% by asset category
Track		38
Maintenance	30	
Renewals		
Rail	95	
Sleepers	25	
Ballast	30	
S&C	80	
Structures	10	10
Signals		2
Maintenance	5	
Renewals	0	
Electrification		24
Maintenance		
AC	10	
DC	10	
Renewals		
AC	35	
DC	41	

Source: BAH, 1999, p.32

- The capacity charge (β) allocates additional congestion costs[113] to different service groups (i.e. services with similar unitary congestion costs).

  This charge was introduced for the first time for the control period 2000-2004 (ORR, 2000a), in order to recover the additional performance regime costs arising from the difficulty of recovering from disruption on a more congested network. It also intended to avoid the transaction costs resulting from the case-by-case negotiations between Railtrack and the franchised operators. Initially the charge was designed to vary by route section and time band, reflecting the costs of the so-called "Congested Related Reactionary Delay (CRRD)". Three years later, ORR introduced the average rate per service group as a simplification able to improve its practical implementation, namely the development of a suitable billing system.

  The calculation of the additional congestion costs relies on the assumption that there is a relationship between capacity utilization and delay. This relationship is approached through a statistical analysis for every route section and time band[114] building on the broad operational data sets provided by the information

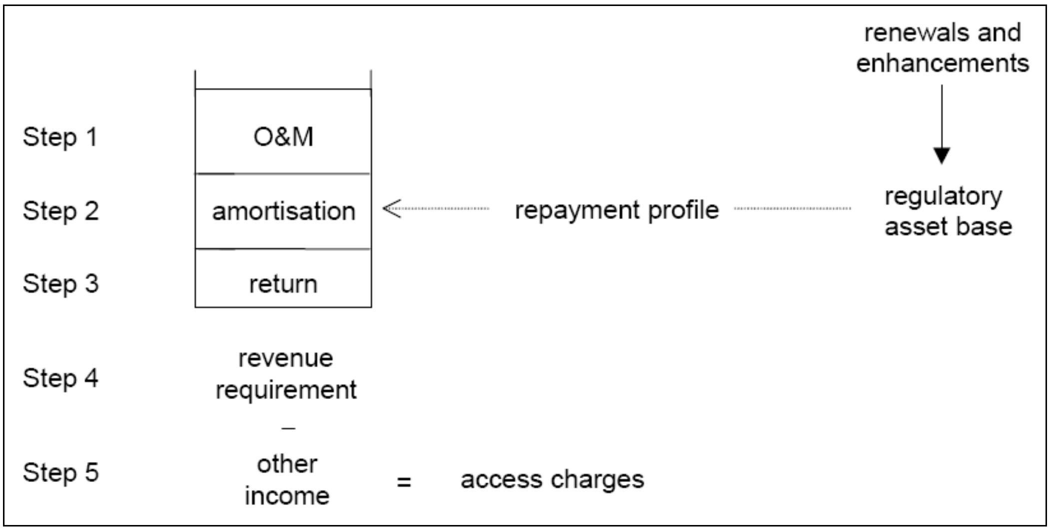
[113] The pricing system in Britain includes a performance regime that already takes into accout part of the costs arising in the network because of delays. The capacity charge is aimed to recover the network effects of delays that are not already covered by the performance regime.

[114] The congestion costs are calculated for 2.500 route sections and 13 time bands defined around a week.

systems of the infrastructure manager. The costs are then calculated for every section and time band as the product of the additional delay caused by the operation of an additional train in the network (obtained from the capacity utilization – delay relationship) and the costs arising from that delay (ORR, 2000b, pp. 1-3). Under the current simplification, these detailed costs are averaged for different service groups and allocated according to mileage. Freight operators are granted a 10% discount over the charge applied to franchised passenger operators, which reflects their greater flexibility in pathing their services.

- The fixed charge (γ) is obtained as a residual figure intended to cover the gap between ORR's determination of Network Rail's total revenue requirement and all the other sources of revenue (variable track charges to franchised passenger train operators, station charges, freight and open access charges, property income and government grant). ORR calculates it for the five-year period following a standard "building block" methodology (see Fig. 83).

Fig. 83: Determination of the fixed charge in the United Kingdom



Note: O&M – Operation and Maintenance.
Source: ORR, 2003a, p.31

This methodology calculates the revenue requirement of Network Rail as the sum of allowed expenditure on operation and maintenance of the network, the amortization of the regulatory asset base (RAB) and the allowed return on assets, minus the projected income from other sources. The fixed charges are calculated by allocating the revenue requirement to routes and then dividing it among franchised passenger train operators on the basis of the vehicle miles operated. As a final step in the calculations, the Regulator checks again that the level of access charges he is proposing does not make it unduly difficult for Network Rail to finance its relevant activities.

The charging scheme applied by Network Rail has been synthesized through expression [4]:

$$C = \sum \alpha(V) + \beta(S,L,P) + \frac{\gamma(S,O)}{T} + \delta(M) \cdot \frac{Energy\_consumption}{train-km} \qquad [4]$$

Where:

C	*track access charge (per train-km)*
V	*vehicle*
S	*type of service*
L	*line or section*
P	*time period*
O	*operator*
T	*traffic*
M	*type of traction*

The values of the coefficients appearing in expression [4] for the period 2007-2008 are listed in Table 42.

Table 42: Charges adopted by ORR for the period 2007-2008

α (Usage charge)	0,02-0,81	€ /vehicle-km
β (Capacity charge)	0,00-1,33	€ /train-km
γ (Fixed charge)	29.549.085-907.144.644	€ /year
δ (Electrification charge)	0,013	€ /kWh

Note: Exchange rate 1 GBP = 1,33 EUR; 1mile = 1,609 km.
Source: own elaboration from Network Rail 2008, p.43-44, ORR 2003b and ORR 2003c

From the abovementioned figures it appears clear the relevance of the fixed charge, which is only applied to franchised services (i.e. passenger services). On average, and for the previous year 2006-2007, the fixed charge amounted 10,05 €/train-km[115]. As regards the relevance of the variable charge, we rely on the recent estimation performed by Geoff Jones for two different standard services running on the British rail network (Table 43). The first service (service 1) is a fast inter-city along the West Coast Main Line operated with a class 390 “Pendolino”; the second service (service 2) is a coal train hauled by class 66 locomotives with a total laden weight of 3.000 tons. The calculation takes into account a distance of 150 km for both services.

[115] According to ORR, the total amount due for the fixed charge in year 2006-2007 equalled 3.502.444.702 GBP (ORR 2003c, p.2) while the traffic scheduled by the passenger operators in that period amounted 463.500.000 timetabled train-km (ORR 2007, p.18)

Table 43: Estimation of unitary track access charges to be paid by some standard services under Network Rail's charging scheme for the timetable 2007-2008.

	Service 1 (Intercity on the West Coast Main Line operated by a class 390 Pendolino)	**Service 2** (3.000 tons freight service hauled by class 66 locomotives)
α (Usage charge)	2,07	8,83
β (Capacity charge)	0,80	0,00
δ (Electrification charge)	1,27	0,07
TOTAL	**4,14**	**8,90**

Note: Figures in €/train-km; Exchange rate applied: 1 GBP = 1,33 EUR.
Source: adapted from EIM and CER, 2008, p.38

6.4.4 Banverket (Sweden)

Sweden was the first country in the world to separate operation and infrastructure management. This separation started in 1988, well before the Directive 91/440, when the Transport Policy Act took the infrastructure management role away from the integrated company Statens Järnvägar (SJ), to give it to the newly created Swedish National Rail Administration (Banverket)[116].

Fig. 84: Regulatory structure of the Swedish Railway Sector in 1988 and in 2005

Part of the market	1988	2005
Passenger services		
Regional (unprofitable)	SJ has monopoly and receives subsidies	Competitive tendering (competition *for* the tracks)
Interregional (unprofitable)	SJ has monopoly and receives subsidies	Competitive tendering (competition *for* the tracks)
Interregional (profitable)	SJ has monopoly	SJ has monopoly
Freight services	SJ has monopoly	Open access on all lines

Source: Alexandersson et al. 2006

Since then the railway sector has evolved from a regulatory structure characterized by the presence of a single monopolist in all market segments (SJ) to a structure in which freight services are opened to competition on the tracks, unprofitable passenger services (regional and interregional) are awarded under a competitive tendering procedure and

[116] Further information on the first steps of the Swedish railway reform can be found in Alexandersson and Hultén, 1999.

profitable regional services are still operated under the monopoly of SJ (Fig. 84). Within this arrangement, the State assumes new investments and the major part of infrastructure costs (upgrading and renewal). Banverket is mainly funded through State contributions, which cover the residual costs, while the regional railway services are funded directly by the competent regions.

Banverket is an authority under the Ministry of Industry, Employment and Communication, aimed to ensure the financing of railway infrastructures, the technical management of the network and the regulation of the access to it on behalf of the Ministry of Transport. All of these activities are steered by the Swedish national transport policy goals, which seek "*to secure a transport system for the general public and industry throughout Sweden that is both socio-economically efficient and sustainable in the long term*" (Banverket, 2007a, p.23). In turn, this overall goal is decomposed in six long term sub-goals, namely: an accessible transport system, a high quality of transport, safe traffic, a sound environment, a positive regional development and a transport system that offers equal opportunities. Furthermore, Banverket delivers the user licenses, allocates the operation slots for the full timetable and is in charge of the calculation and levying of infrastructure charges, which have to be approved by the Swedish Parliament.

The principles ruling the setting of railway infrastructure charges are laid down in the chapter 7 of the Railway Act 519/2004, which basically transposes the contents of Directive 2001/14/EC, though clearly stating the marginal cost principle as the basis of the overall charging scheme. Consequently with the application of this principle, the economic relevance of track access in year 2006 was limited, representing the 7,34% of Banverket operational expenditures in the period[117] (Banverket 2007b, pp.57-63).

Since the first implementation of the Railway Act, the railway infrastructure charging scheme applied by Banverket has remained unchanged for the timetables 2007, 2008 and 2009 both in structure and values. As said, the charging scheme is based on the recovery of short run social marginal costs, which are levied through the sum of three different fees: a *track charge* levied per gross ton-km, an *accident charge* levied per train-km and an *emission charge* levied per litre of diesel fuel and dependent on the type of diesel traction. These fees are complemented by a *train path charge* and *two special charges* aimed to the partial recovery of fixed infrastructure costs: a special charge for passenger traffic levied per gross ton-km and a special charge per crossing of the Oresund Link levied only to freight trains per crossing (Banverket, 2008, pp.65-70).

[117] Ratio of incomes from track access charges over operating expenditures. Depreciation and financial expenditures are excluded.

The calculation procedures followed by Banverket to define the value of these charges are well documented:

- The track charge (α), reflects the maintenance and operation average marginal costs identified by Andersson through an econometric analysis on the Swedish rail network (Andersson, 2006)
- The accident charge (β) has been determined by studies on the change of the socio-economic costs associated with accidents involving railways when traffic volumes change. Suicide is not included in the calculation (Banverket, 2008, p. 67).
- The emission charge (γ) has been set at a level that corresponds to a gradual rise over ten years to a level based on the carbon dioxide tax on diesel fuel that applies to road traffic[118]. It is based on a study focusing on fuel consumption among different types of vehicles (Banverket, 2006, p.75).

There is no so much public information on the train path charge (δ) and the special charge on passenger traffics (ε), though they seem to be related in some way to the costs arising from the construction of the Öresund link. That is clearly the case for the second special charge, levied on the freight trains crossing the bridge.

The charging scheme applied by Banverket on a standard link of the network (i.e. different from the special section of the Öresund link) has been synthesized through expression [5]:

$$C = \alpha \cdot W + \beta + \gamma(M) \cdot \frac{fuel\ \ consumption}{train - km} + \delta + \varepsilon(S) \cdot W \qquad [5]$$

Where:

C	*track access charge (per train-km)*
W	*gross weight*
S	*type of service*
M	*type of traction*

The values adopted by Banverket in its 2009 network statement for the coefficients appearing in expression [5] are indicated in Table 44.

[118] In spite of this definition, the values recovered for this concept have remained unchanged over time. In fact, the network statements for 2008 and 2009 do not refer the same definition.

Table 44: Charges adopted by Banverket in its 2009 Network Statement.

α (Track charge)	0,032	€ cents/ gross ton-km
β (Accident charge)	7,1	€ cents/ train-km
γ (Emission charge)	2,4-4,3	€ cents/ litre of fuel
δ (Train path charge)	2,75	€ cents/ train-km
ε (Special charge)	0-0,086	€ cents/ gross ton-km

Note: Exchange rate 1 SEK = 0,11 EUR.
Source: own elaboration with data from Banverket, 2008, p.70

In order to assess the relative relevance of the charging components of the Banverket's charging scheme, a quick calculation has been performed for three different standard services (Table 45): Service 1 – passenger service with electric traction; Service 2 – freight service with electric traction; and Service 3 – freight service hauled by a diesel locomotive.

It appears that the more relevant variable is the gross weight of the train, which acts through the track charge (α) in the case of freight services and through a combination of the track charge (α) and the special charge (ε) in the case of passenger services. It is also noticeable the effect of the emission charge, which in the example represents an increase of more than 20% in the final price for a diesel freight train (under the hypothesis of a consumption equal to 0,015 l/ton-km).

Table 45: Estimation of unitary track access charges to be paid by some standard services under Banverket's charging scheme for the timetable 2009.

	Service 1 (passenger, electric traction, 450 tons)	**Service 2** (freight, electric traction, 1.500 tons)	**Service 3** (freight, diesel, 0,015 l/ton-km 1.500 tons)
α (Track charge)	1,31 (26,6%)	4,35 (97,8%)	4,35 (80,3%)
β (Accident charge)	0,07 (1,4%)	0,07 (1,6%)	0,07 (1,3%)
γ (Emission charge)	0,00 (0,0%)	0,00 (0,0%)	0,97 (17,9%)
δ (Train path charge)	0,03 (0,6%)	0,03 (0,6%)	0,03 (0,5%)
ε (Special charge)	3,51 (71,4%)	0,00 (0,0%)	0,00 (0,0%)
TOTAL	**4,91**	**4,45**	**5,42**

Note: Figures in €/train-km; Exchange rate applied: 1 SEK = 0,11 EUR; For every charging component, the figure in brackets shows its contribution to the total charge applied to the service considered.
Source: own calculations from Banverket 2008, p.70

Accordingly to these values, the charging scheme applied by Banverket seems to provide strong incentives for the operators to reduce the gross weight of the trains as well as to improve the fuel efficiency and the traction system of their rolling stock.

6.4.5 REFER EP (Portugal)

In April 1997, Portugal started the institutional reconfiguration of the railway sector by enacting the Decree 104/97, which created REFER E.P. (Rede Ferroviaria Nacional) as an infrastructure manager independent from CP (Comboios de Portugal). Few months later the new framework was completed with the creation of an independent regulatory body, the INTF (Instituto Nacional do Transporte Ferroviario).

Since the vertical unbundling of the sector, the property of the network is supported by the State, whereas its operation, maintenance and conservation are provided by the infrastructure manager as a public service. Up to date only one operator other than CP has obtained the license to operate in Portugal[119].

REFER is the public business entity responsible for managing the infrastructure of the Portuguese Railway System, in terms of construction, conservation, maintenance, management of property assets and capacity management in order to provide the market with a competitive, efficient, safe and environmentally sound transport infrastructure. REFER reports directly to the Ministries of Finance and of Public Works, Transportation and Housing and to the regulator INTF, who, among other tasks, is responsible for the approval of track access charges.

The principles ruling the setting of railway infrastructure charges were first fixed in Decree-Law 270/2003, which adopted the legal content of Directive 2001/14/EC, and then developed through the INTF regulation 21/2005. In its chapter III, the regulation remarks the “direct cost principle” and provides in a very precise way the methodology that should drive the calculation of the basic charge for the minimum access package in the Portuguese rail network. It also provides guidance on the application of other elements foreseen in the European legislation, such as mark-ups, scarcity charges or performance regimes[120].

The charging scheme for the minimum access package applied by REFER is oriented to recover the direct costs related to the use of the infrastructure (which constitutes a proxy for the marginal costs). This objective is fulfilled through the so-called *charge for*

[119] The referred company is Fertagus, which was awarded with the concession of the operation of the suburban line *Eixo Ferroviário Norte/Sul* near Lisbon for 30 years after an international competitive tendering procedure (http://www.barraqueiro.com and http://www.fertagus.pt; 2008-07-15).

[120] It is noticeable the degree of development and consistency of the mentioned regulation in the definition of principles and methodologies that should drive the calculation of track access charges. Though until now only a performance regime has been added to the basic charge, the norm goes well beyond the Directive 2001/14/EC in the definition of costs to be included in the charges, the market conditions to be respected when applying mark-ups or the inclusion of incentives for the reduction of infrastructure management costs.

essential services, levied per train-km and dependent on the line used, the type of railway service and the type of route (electrified/non-electrified). In addition, a cancellation charge and a performance regime based on delay minutes accountancy are also applied (REFER, 2007, pp.41-49). The overall charging scheme has remained stable over the last three years, with some variations in the values levied (see REFER 2006, pp.41-49 and REFER 2005, pp.43-52).

The calculation of the charge for essential services has been done according to the methodology proposed by the Universidade Autonoma da Lisboa and the Universidade Catolica do Porto and reflected in Regulation 21/2005. This procedure is based on the definition of homogenous groups (that is, sections with equal technology and operation conditions, equal type of services provided and equal cost structures) and the allocation of traffic dependent cost categories to them. Then unitary charges are calculated for every homogeneous group by dividing the costs that are directly related to each essential service by the useable capacities in every part of the network where the services are offered. It is remarkable that costs are calculated for the reference optimal network management conditions and for a full use of capacity. Furthermore a transitional mark-up is set to guarantee the cost recovery in present conditions (UAL & UCP, 2000).

The current system is based in 9 homogeneous groups and allows the recovery of seven cost categories: track maintenance, bridges and tunnels maintenance, traffic control costs, telecommunications, signaling maintenance, level crossings and general costs directly related with traffic. The allocation of costs to each of the operators and homogeneous groups is done according to expression [6]:

$$TU_i = \sum_{g=1}^{G}(CKA_i^g \cdot C1_g) + \sum_{g=1}^{G}(f_i^g \cdot C2_g) + \sum_{c=1}^{C}(f_i^c \cdot C1_g) + f_i \cdot C4 + M_i \qquad [6]$$

Where:

- TU_i *Track use charge for operator i*
- CKA_i^g *Weighted km circulated by operator i in homogeneous group g (weighting coefficient = 1 (passenger), 2,56 (freight)*
- $C1_g$ *Estimated track maintenance cost in homogeneous group g*
- f_i^g *Proportion of CKA run in homogeneous group g done by operator i*
- $C2_g$ *Estimated signalling, stations (operation and control, telecommunications, tunnels and bridges, and level crossing costs in homogeneous group g*
- f_i^c *Proportion of CKA run in the influence area of control post c done by operator i*

$C3_c$ *Estimated cost for control post c.*

f_i *Proportion of CKA run in the whole network by operator i*

$C4$ *General costs directly related with traffic*

M *Transitional mark-up*

The C coefficients are calculated for the reference optimal network management conditions and a transitional mark-up is set to guarantee the cost recovery in current conditions. The mark-up is considered to tend to zero over a stated period (7 year) as a result of cost efficiency improvements (UAL & UCP, 2000, pp.122-132).

In spite of the complex calculation procedure shown above, the charging scheme applied by REFER adopts a rather simple form for the operator, that can be synthesized through expression [7]:

$$C = \alpha(L, S, M) \qquad [7]$$

Where:

C *track access charge (per train-km)*

L *line or section*

S *type of service*

M *type of traction*

Table 46: Unitary track access charges to be paid under REFER's charging scheme for the timetable 2009.

Line	Service 1 (passenger, electric traction)	Service 2 (passenger, non electric traction)	Service 3 (freight, electric traction)	Service 4 (freight, non electric traction)	Average
HG 1	1,46	1,35	1,52	1,41	**1,44**
HG 2	1,38	1,33	1,41	1,35	**1,37**
HG 3	1,2	1,12	1,27	1,15	**1,19**
HG 4	1,37	1,29	1,38	1,31	**1,34**
HG 5	1,52	1,49	1,53	1,5	**1,51**
HG 6	1,57	1,39	1,6	1,44	**1,50**
HG 7	1,23	1,08	1,27	1,13	**1,18**
HG 8	---	1,77	---	1,95	**1,86**
HG 9	---	1,32	---	1,57	**1,45**
Average	**1,39**	**1,35**	**1,43**	**1,42**	**1,40**

Note: Figures in €/train-km; HG: homogeneous group.
Source: REFER, 2008, p.42

According to REFER's network statement for year 2009, the value of α varies between 1,08 and 1,77 €/train-km for passenger trains and between 1,13 and 1,95 €/train-km for freight trains, mainly depending on the line used and only to a minor extent on the type of traction (Table 46). Roughly speaking, the unitary values of the charge for essential services remain included within a band of 1,4 €/train-km ± 20%, with the exception of the services running on the lines included in homogeneous group 8. This group gathers non-electrified lines with low levels of traffic (less than 50 trains per day).

6.4.6 Rete Ferroviaria Italiana (Italy)

The reform of the Italian railway sector took off in year 2000, with the enactment of the Ministerial Decree 138-T of October 31st 2000, which renewed the concession of the management of the rail network to the national railway company Ferrovie dello Stato (FS) with the condition of transferring it to a specifically created infrastructure management company (Art. 1.2). In December 2000 the entity Ferrovie dello Stato Holding was created and entitled with the activities other than the infrastructure management, which remained within FS. On July 1st 2001, FS changed its name to Rete Ferroviaria Italiana (RFI) and the Italian Treasury Ministry transferred its property to Ferrovie dello Stato Holding, which then changed its name to Ferrovie dello Stato As a result of this process, the infrastructure management activity remained in RFI, a company belonging to the national holding FS.

The operation of transport services is performed by Trenitalia, the public operator integrated within the holding FS, and a number of new entrants, particularly actives in the trans-Alpine freight transport market. At the end of year 2006, 44 railway undertakings were in possession of a license and 16 among them had the safety certificate (http://ec.europa.eu/transport/rail, 2008-07-26). The market share of the new entrants in that year represented the 8% of the train-km run in the network, though it reached the 25-30% in the Alpine passes (Macchiati, 2008, p.6).

RFI performs its activity under the supervision of the State, which has defined its financial contributions to the infrastructure manager within a framework agreement (Contratto di programma 2007-2011). RFI defines its mission as "*the execution of investments dedicated to the building of new lines*" and also remarks other objectives as "*ensuring the safety of the operation in the whole network, to develop the technology of systems and materials, and to provide the maintenance of an efficient network*" (RFI, 2004, p.7). The relevance given in this statement to the construction activity is in line with the efforts performed in the last years for the extension of the High speed / High capacity network (Fig. 85).

RFI is in responsible for the levying of track access charges in its network. The charges are fixed by the Ministry of Infrastructure and Transport after their approval by the

CIPE (*Comitato Interministeriale per la Programmazione Economica*). The CIPE is a pan-governmental institution that carries out the determination and evaluation of the charging system for the access to national infrastructure (including both railways and motorways). The CIPE also approves all investment projects that are undertaken in Italy, assessing their feasibility. According to the TREND project, the responsibility of the infrastructure manager in the definition of the charge level is likely to increase in a near future, becoming freer from governmental approval (Gruppo Class, 2005, p.25).

Fig. 85: Extension of the high speed / high capacity network in Italy

Source : [http ://www.rfi.it](http://www.rfi.it) *(2008-07-26)*

The structure of the infrastructure charges to be levied in the Italian network was defined as early as in March 2000 through the Ministry Decree 43/T, complemented by the Ministry Decree 44/T. The main principle underlying this scheme was the recovery of the operation costs arising from the use of a technologically efficient infrastructure. The difference between their amount and the total operation costs should be covered by the State through a discount. This discount would be decreasing in time as the railway infrastructure improved its condition (CIPE, 1999a).

This framework remained unaltered when the three Directives of the First Railway Infrastructure Package were transposed into national law with the Legislative Decree N.188 of 8 July 2003. In its article 17.3 the decree specifies that the determination of the charge for the minimum access package takes into account the direct and indirect costs of circulation and the costs of the energy used by the infrastructure manager in its activity, as well as the direct general expenses and the quote of the indirect ones. In order to state the final charge, eventually compensations and public contributions are deducted.

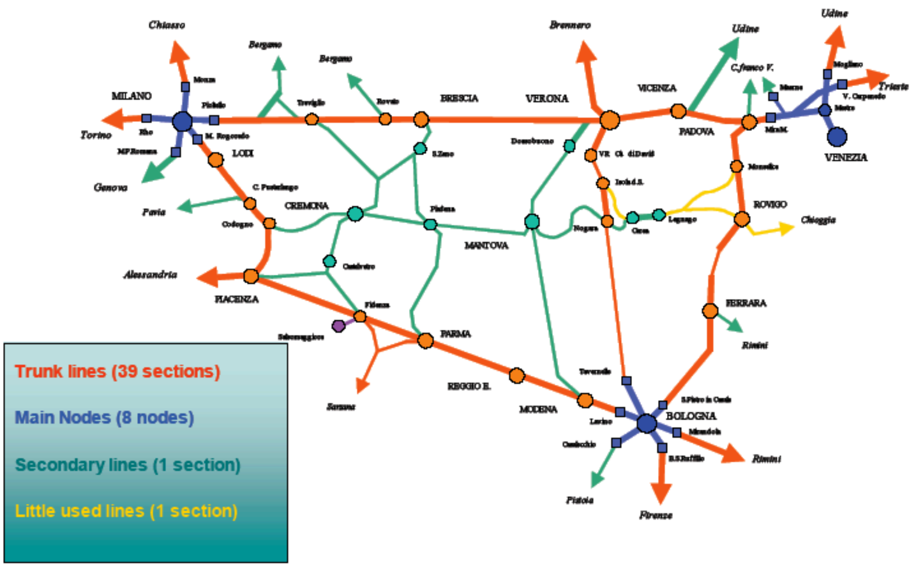
Therefore the charging scheme applied today by RFI in its network is still the one specified in the Decree 43/T, though since 2000 its levels have been updated twice (Decree 11 April 2003 and Decree 18 August 2006). Accordingly with the cost basis underlying the scheme, the cost recovery attained is limited. In year 2007, the incomes from track access charges represented the 22% of the operating expenditures (RFI, 2008a, p. 199 and p. 211).

The charging scheme applied by RFI is differentiated according to three types of line (trunk lines, complementary lines and nodes). For each type a *fixed access charge* (α) and a *variable charge* (δ) are defined. The fixed access charge takes into account the quality of the railway infrastructure and is dependent on the section used. The parameters taking part in the variable charge depend on the type of line: for trunk lines traffic density, wear and tear causation and speed deviation are taken into account; for complementary lines type of infrastructure is considered; for nodes the use of stations and the time spent at the node are relevant (RFI, 2006a, Annex). Furthermore, the charging scheme includes a performance regime in the form of a delay-minutes accountancy system based on the outcomes of the European Performance Regime, managed by RFI for the UIC since 2000.

The Italian Administration follows a top-down approach to define the track access charges, which starts with the definition of the total amount to be recovered and its allocation to the fixed and variable parts of the charge. The amount to be distributed among the charges is equal to the operational cost basis (as mentioned in decree 43/T) reduced by an amount *K1*, equal to a compensation from the State to the infrastructure manager because of the increased costs derived from the bad technological condition of the network. A 40% of the resulting amount is allocated to the fixed access charge (α), while the remaining 60% is allocated to the variable charge (δ).

The *fixed access charge* (α) is then differentiated according to the type of line and the technical characteristics of the section. As it has been mentioned before, the Italian charging scheme distinguishes three types of lines, internally broken down into sections (Fig. 86). The groups taken into account in the distribution of the fixed charge are: main nodes, trunk lines (double track – maximum speed 250 km/h), trunk lines (double track – maximum speed 200 km/h), trunk lines (conventional double track lines), trunk lines (single track lines), complementary lines (secondary lines), complementary lines (low traffic lines) and complementary lines (shuttle lines).

Fig. 86: Example of infrastructure classification for charging purposes in the Italian network



Source: Marzioli, 2004, p.8

The *variable charge* (δ) is made of two components: a distance-dependent component (β), applied in types of line other than the main nodes and a time-dependent component (γ) applied in the main nodes. The distance dependent component has been defined as a unitary rate (€/train-km) that is affected by a modulator. The modulator integrates three variables, all with the same weight (1/3 each): *P1* – speed deviation from optimal speed, *P2* – saturation of the section, and *P3* – deterioration of the infrastructure (15% allocated to the catenary and 85% allocated to track). Though the expressions retained for each of the variables are continuous, as detailed in [8], [9] and [10], the values applied in the charging scheme are organized within bands.

$$P1_{ij} = \frac{|speed_{ij} - optimal\_speed_{ij}|}{optimal\_speed_{ij}}$$ For section *j* in period *i* [8]

Where:

speed$_{ij}$ — *commercial speed of the train running on section j in period i*

optimal speed$_{ij}$ — *optimal commercial speed defined for section j in period i*

$$P2_{ij} = \frac{trains\_running_{ij}}{capacity_{ij}}$$ For section *j* in period *i* [9]

Where:

trains_running$_{ij}$ — *number of trains running on section j in period i*

capacity$_{ij}$ — *capacity defined for section j in period i*

$$P3_j = \frac{\beta_1 \cdot \left(speed_j^{\,2} \cdot weight_j\right) + \beta_2 \cdot \left(speed_j \cdot n\_pantographs_j\right)}{\beta_1 \cdot \left(speed\_t^2 \cdot weight\_t\right) + \beta_2 \cdot \left(speed\_t \cdot n\_pantographs\_t\right)} \quad [10]$$

Where:

β_1	*weight for track deterioration*
β_2	*weight for catenary deterioration*
$speed_j$	*speed of the train running on section j*
$weight_j$	*weight of the train running on section j*
$n\_pantographs_j$	*number of pantographs of the train running on section j*
$speed\_t_j$	*speed of the reference train*
$weight\_t_j$	*weight of the reference train*
$n\_pantographs\_t_j$	*number of pantographs of the reference train*

The time-dependent component has been obtained as a unitary rate (€/train-min) affected by a modulator dependent on the time period and the category of the stations used within the node.

It is noticeable that the described top-down cost allocation procedure followed does only establish the equivalence between costs and charges at the national level, and therefore it does not guarantee cost relatedness for specific lines. This fact is referred by the Italian Administration as the "network solidarity" principle (CIPE, 1999b, p.3).

The differentiation criteria included in the charging scheme are clearly oriented to the provision of adequate incentives to the operators. More precisely they are oriented to promote the behaviors listed in Table 47.

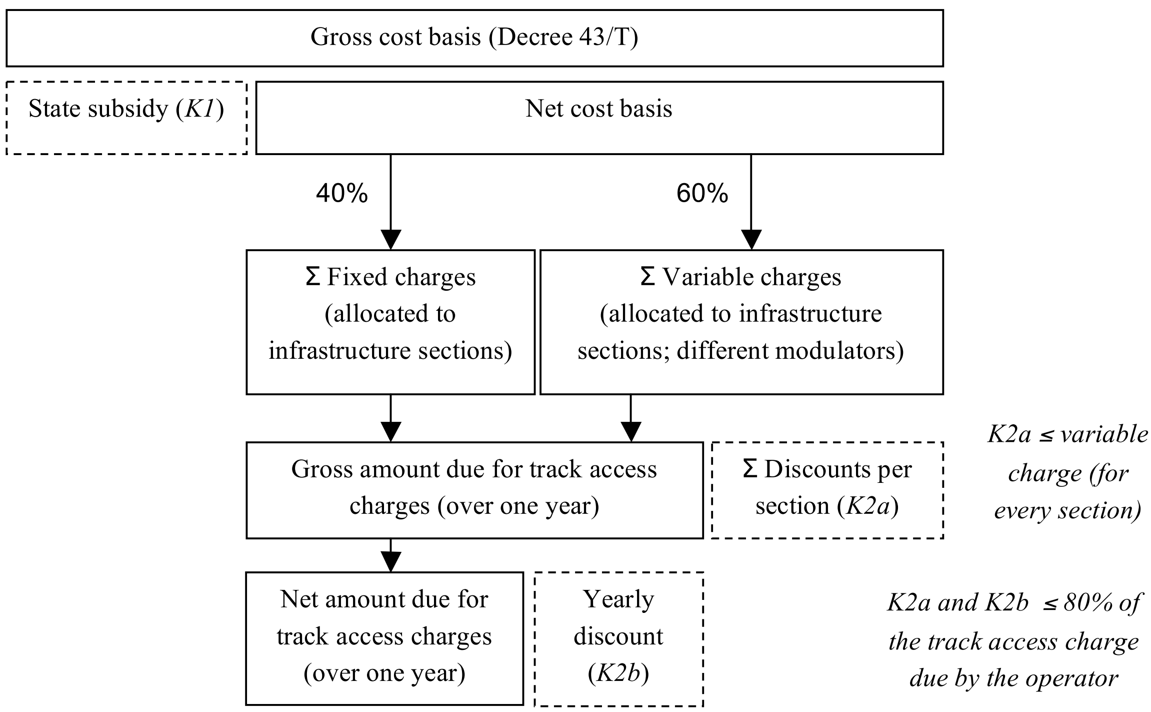
Table 47: Incentives foreseen in the Italian charging scheme

Incentive	Provision adopted in the charging scheme
Avoid misuse of reserved capacity	The fixed charge is levied as a reservation charge
Avoid partial use of the reserved capacity	The fixed charge makes the overall payment degressive with distance
Avoid diverging speeds in the network	Parameter P1 – Speed deviation
Avoid infrastructure deterioration	Parameter P2 – Infrastructure deterioration
Avoid misuse of scarce capacity	Parameter P3 – Saturation of the section
Avoid excessive node use	Time dependent charge in nodes
Promote distribution of demand over time	Consideration of different time periods
Promote use of alternative routes	Price differentiation between trunk and secondary lines
Promote use of secondary stations at nodes	Price differentiation for main stations within a node

Source: adapted from CIPE 1999b, pp. 9-10

On the top of the amounts defined for the track access charge, the State provides a subsidy to the railway operators in the form of a discount (*K2*) administered by the infrastructure manager. This discount is structured in two components, one depending on the number of train-km run in sections with bad technological conditions (*K2a*), and another linked to the total volume of traffic run by the railway operator (*K2b*). The component *K2a* is linked to the additional costs resulting from the need of two drivers in several sections of the network and is calculated as the direct and indirect salary costs of the second driver, distinguishing day and night shifts. The amount due for this concept cannot be greater than the variable part of the charge (δ). The component *K2b* is paid yearly to the operators as an indemnity for difficulties in connections, in train formation and non-scheduled stops. The application of the discounts *K2a* and *K2b* to the operators has been the origin of several ongoing disputes between RFI and the new entrants in the market[121].

Fig. 87: Calculation of track access charges in the Italian rail network



Source: own elaboration

[121] According to Decree 44-T, the discount *K2* should be applied until the technological conditions of the network allow the running of trains with a single driver. In several sections RFI has already accomplished the works updating the signalling systems to this condition, but it has not issued the regulations allowing for the use of a single driver. In this scenario RFI has refused the discount to several new entrants, who in turn have raised a number of complaints to the Italian Antitrust Agency (AGCM). In view of the facts, the Agency has promoted an infringement procedure against FS and RFI (AGCM, 2007). In order to clarify the situation, the Transport Ministry has enacted the Ministerial Decree 92-T, which links the application of the discount *K2* to the issuing of the adequate regulations but also to its remboursement to RFI by the State.

The whole calculation procedure followed by the Italian Administration in order to define the charging scheme to be applied by RFI is graphically presented in Fig. 87. This complex procedure is not perceived directly by the operator, who is confronted with a charging scheme as the one synthesized in expression [11]:

$$C = \frac{\alpha(L)}{l} + \beta(L,P,s_1,s_2,W,g) + \gamma(L,P)/s_2 \qquad [11]$$

Where:

C	*track access charge (per train-km)*
L	*line or section*
l	*length of the route*
P	*time period*
s	*speed (s1: running speed, s2: commercial speed)*
W	*gross weight*
g	*number of pantographs*

The values adopted in 2008 by the Italian Administration for the coefficients appearing in expression [11] are indicated in Table 48.

Table 48: Coefficients and charges adopted for the Italian network in the 2008 timetable

α (Fixed charge)	0,00-66,58	€ /train path
β (Distance dependent component)	0,68-3,40	€ /train-km
γ (Time dependent component)	0,82-5,36	€/min

Source: own elaboration with data from RFI 2007c

An analysis has been conducted in order to estimate the relevance of each of these coefficients (α, β, γ) in the formation of the final unitary price.

The amount of the fixed access charge (α) depends on the type of line and the technical characteristics of the section used by the train. However, its impact on the unitary charge (i.e. per train-km) is determined by the distance effectively run by the train in the section considered. Table 49 provides some estimation of the fixed access charge unitary values, obtained by dividing the access charge by the average length of the sections within each type of line (therefore implicitly assuming that train runs all over the section).

The amount due for the distance-dependent component (β) is linked to the type of line and, only when the train runs on trunk lines, to modulation parameters relying on other technical variables. In this case, each of the modulation parameters considered in the charging scheme (*P1*, *P2* and *P3*) has a different weight in the final amount of the distance dependent component (β). This fact can be appreciated in Table 50, which shows the contribution of each modulator to the unitary amount of β.

Table 49: Unitary fixed access charges to be paid in the Italian network in the 2008 timetable

Type of line	Technical characteristics of the section	Fixed charge (€)	Unitary charge (€/train-km)
Main nodes [a]	Main node	53,26	1,17
Main network [b] (trunk lines)	Double track – Maximum speed 250 km/h	66,58	0,43
	Double track – Maximum speed 200 km/h	58,58	0,38
	Conventional double track lines	55,92	0,36
	Single track lines	50,59	0,33
Complementary network [c]	Secondary lines	47,93	n/a
	Low traffic lines	0,00	n/a
	Shuttle lines	23,24	n/a

Note: a) Average length calculated as length of node lines obtained from RFI 2008b (910 km), divided by the number of links associated to the nodes according to RFI 2006a (40) and multiplied by 2 (the train runs on two links before leaving the node); *b) Average length calculated as length of the trunk lines obtained from RFI 2008b (6034 km) divided by the number of sections included in this category according to RFI 2006a (39); c) In the complementary network, the access charge is only paid once and not in every section, making impossible to provide a reliable estimation at this stage; n/a non applicable.*
Source: own elaboration with data from RFI 2008b and RFI 2006a

Table 50: Influence of the modulators P1, P2 and P3 in the unitary amount of the distance dependent component (β) in the Italian charging scheme for year 2008

	Parameter P1	Parameter P2	Parameter P3	TOTAL (β)
Variables included	L, P, s_2	L, P	W, g, s_1	
Contribution to the distance dependent component (β)	0,34-1,70 €/train-km	0,10-0,51 €/train-km	0,24-1,19 €/train-km	0,68-3,40 €/train-km

Note: L – line or section, P – time period, s_2 – commercial speed, W – gross weight, g – number of pantographs, s_1 – running speed.
Source: own elaboration with data from RFI 2006a

In the case of the modulation parameter *P1*, the type of section (*L*) and the time period (*P*) define the preferred operation conditions in the line and set a benchmark that is to be compared against the commercial speed of the train (*s2*). The value of the modulator reflects the speed deviation from the benchmark in a progressive way until a maximum value for deviations greater than 100%[122]. The operator can influence the value of *P1* by choosing a route more adapted to the conditions of its services or/and adapting their commercial speed to the optimal speed of the section.

In the case of the modulation parameter *P2*, the type of section (*L*) and the time period (*P*) directly define its value, which can only be influenced by the operator through the rerouting or rescheduling of its services.

In the case of the modulation parameter *P3*, the deterioration of the infrastructure (both track and catenary) produced by the trains running on the network is compared against the deterioration produced by a reference train[123]. The expression driving the value of the modificator reveals the low importance of the number of pantographs and the predominant role of the running speed and the weight in the relative deterioration[124]. However, the modulator *P3* caps the influence of the relative deterioration for values greater than 3,5. The operator can reduce the effect of the modulation parameter *P3* through the reduction of the weight or the running speed of the services operated in the network.

The amount due for the time dependent component (γ) is only relevant in the main nodes and is related to the time period and the category of the stations within the node used by the train. When analyzed on a unitary basis (per train-km), it is necessary to introduce the commercial speed within the node (including stops at stations) to reflect the time dependent nature of γ. Table 51 provides some estimation of the time dependent component unitary values in the time period 9:00-22:00, presented for different values of the commercial speed and categories of station.

[122] Implicitly, the values adopted by the modulator P1 penalize more the speed deviations when the train runs faster than the optimal reference speed (only case when the deviation can be greater than the optimal speed itself).

[123] The characteristics of the reference train are weight (*W*) equal to 500 tons, running speed (s_1) equal to 80 km/h and number of pantographs (*g*) equal to 1 (RFI, 2006a).

[124] Neither the Ministerial Decree 43-T or the RFI's Network Statement specify the units to be considered in the calculation of *P3*, but if the units to be adopted are the ones used to define the reference train (tons and km/h), the deterioration produced on the catenary appears to be negligible and the variable *g* irrelevant.

E.g. for the train type the deterioration, calculated according to [10] is:

$$Deterioration = 0{,}85 \cdot \left(80^2 \cdot 500\right) + 0{,}15 \cdot \left(80 \cdot 1\right) = 2.720.000 + 12$$

In these circumstance the deviation in the deterioration could be approached with the expression $k \cdot W \cdot s_1^2$, with $k = 3{,}125 \cdot 10^{-7}$ $\mathrm{h^2/ton \cdot km^2}$.

Table 51: Estimation of some unitary time dependent charges (γ) to be paid in the Italian network in year 2008

	Commercial speed at the node (including stop at station)		
	10 km/h	30 km/h	50km/h
Central stations	24,77 €/train-km	8,26 €/train-km	4,95 €/train-km
Other stations	6,19 €/train-km	2,06 €/train-km	1,24 €/train-km

Source: own elaboration with data from RFI 2006a

Lastly, a synthetic calculation has been performed to assess the amount of track access charges to be paid by some standard services running on the Italian network. The estimation has studied six different services (three passenger services of 450 tons running at 80, 120 and 160 km/h and three freight services of 1.500 tons running at 60, 80 and 120 km/h) running on links of the main and complementary network at different time periods. The implicit hypotheses for the estimation are: 1) that the commercial speed in the link is equal to the running speed (therefore no stops are considered); 2) that the density factor driving modulator *P2* is more than 75% in the time periods 6:00-9:00 and 9:00-22:00 and is between 50% and 75% in the time period 22:00-6:00.

Table 52: Estimation of unitary track access charges to be paid by some standard services under RFI's charging scheme for the timetable 2008

Time period 6:00-9:00 **Trunk lines**	Passenger 80 km/h 450tons	Passenger 120 km/h 450tons	Passenger 160 km/h 450tons	Freight 60 km/h 1500tons	Freight 80 km/h 1500tons	Freight 120 km/h 1500tons
Double track (Maximum speed 250 km/h)	1,72	2,58	3,15	2,00	2,58	2,58
Double track (Maximum speed 200 km/h)	1,57	3,10	3,78	1,95	2,42	3,10
Conventional double track lines	1,55	3,09	3,77	1,83	2,40	3,09
Single track lines	2,20	3,73	3,73	1,89	3,05	3,73
Secondary line	1,03	1,03	1,03	1,03	1,03	1,03

Time period 9:00-22:00 **Trunk lines**	Passenger 80 km/h 450tons	Passenger 120 km/h 450tons	Passenger 160 km/h 450tons	Freight 60 km/h 1500tons	Freight 80 km/h 1500tons	Freight 120 km/h 1500tons
Double track (Maximum speed 250 km/h)	2,30	2,58	2,47	2,58	3,15	2,58
Double track (Maximum speed 200 km/h)	1,67	2,42	2,52	1,95	2,52	2,42
Conventional double track lines	1,55	2,51	3,09	1,93	2,40	2,51
Single track lines	1,52	3,05	3,73	1,79	2,37	3,05
Secondary line	1,03	1,03	1,03	1,03	1,03	1,03

Time period 22:00-6:00 **Trunk lines**	Passenger 80 km/h 450tons	Passenger 120 km/h 450tons	Passenger 160 km/h 450tons	Freight 60 km/h 1500tons	Freight 80 km/h 1500tons	Freight 120 km/h 1500tons
Double track (Maximum speed 250 km/h)	1,55	2,30	2,41	2,41	2,41	2,30
Double track (Maximum speed 200 km/h)	1,50	2,93	3,61	1,67	2,35	2,93
Conventional double track lines	1,49	3,60	3,60	1,66	2,34	3,60
Single track lines	2,03	3,56	3,56	1,72	2,88	3,56
Secondary line	1,03	1,03	1,03	1,03	1,03	1,03

Note: Figures in €/train-km, includes access charge and distance related component.
Source: own calculations with data from RFI 2006a

The results of the estimation (Table 52) range between 1,03 €/train-km and 3,75 €/train-km and reveal a joint effect of the access charge and the modulation parameters which not always provides a clear signal to the operators. E.g. a slow heavy freight train may pay a lower charge than a fast light passenger train when running in the 6:00-9:00 period (given the reduced optimal speed in that time period and the weight of the speed when defining the relative deterioration of the infrastructure).

As referred previously, the values resulting from the calculation of the charges should be reduced by the amount of the discount *K2a* (as defined in Decree 44-T). It should be noticed that the values of the discounts applied are high in relation to the average fees, ranging between 0,145 and 1,703 €/train-km for trains running distances up to120 km and between 0,206 and 1,703 €/train-km for trains running distances greater than 120 km.

6.5 Synthesis

The selection of case studies able to illustrate and challenge the assumptions made in the proposed framework has been performed through three steps. First the importer and jurisdiction has been chosen taking into account the *availability of information*, as way to proxy the informational conditions expected for the transferability assessment. Then the exporter jurisdictions has been selected through the application of a threefold criterion including the *maturity* achieved in the practice of rail infrastructure charging, the *size* of the railway infrastructure market and the *geographical proximity* to the importer jurisdiction. Finally, the objects to be transferred have been selected on the basis of their distribution across the levels defined in the conceptual framework (pricing principles, charging scheme and charging practice) and the representativeness of the object transferred in the exporter jurisdiction. According to this methodology, the network currently managed by ADIF has been selected as importer jurisdiction and the networks managed by RFF (France), DB Netz (Germany), RFI (Italy), Network Rail (UK), Banverket (Sweden) and REFER EP (Portugal) as exporter jurisdictions, setting the basis for the development of *six case studies*.

The charging systems currently applied in the importer jurisdiction and the exporter jurisdictions have been characterized in detail, confirming the *high level of diversity* among the practices followed in the EU as regards their objectives, principles, structures, levels and calculation procedures. This variety of options confirms the starting point of this research, i.e. the potential interest of transferability, and is considered an adequate starting point for the formation of case studies able to explore its limitations.

The charging system currently applied in the *importer jurisdiction* (network managed by ADIF in Spain) is strongly conditioned by financial considerations linked to the ongoing expansion of the high speed network and the future opening to competition of the passenger railway market. The overall regulation of the charges applied has been designed in order to fulfill the conditions set in the European system of accounts ESA-95 to avoid the consolidation of ADIF and RENFE-Operadora with the general government sector. The principles followed to determine the charge mainly rely on a cost related basis for freight, suburban, regional and long distance services and on the ability to pay of operators for the high speed services. The structure adopted follows a two-part tariff with a yearly access charge dependent on traffic and variable reservation and operation charges. High speed traffic is charged as well a traffic charge. The levels of the unitary charge applied to services are found to vary approximately in a proportion of 1 to 90 between the cheapest and the more expensive service.

The charging systems applied in the *exporter jurisdictions* have been generally set on the basis of domestic policy objectives and financial considerations. They provide a good sample of different regulatory conditions, pricing principles (marginal cost pricing, social marginal cost pricing, marginal cost plus mark-ups or full cost minus subsidies), charging components and variables (Table 53), charging levels (within a range approximately going from 0,5 to 20 €/train-km depending on the specific conditions of the service) and calculation procedures. The French charging system is found to have many points in common with the Spanish one, as regards its focus on financial considerations. The German system seeks full cost recovery through a complex specification able to transmit a wide range of incentives to the market and related to both the supply and the demand side. The British charging system is coordinated with a large and experienced regulatory mechanism. It is based on marginal cost estimations and includes a specific mark-up levied on franchised train operators and intended to ensure full cost recovery. The Swedish system is based on short run social marginal costs and detailed cost calculation methodologies, though it appears simple as regards charge differentiation. The Portuguese pricing system is oriented to recover marginal costs related to the use of the infrastructure through a straightforward but efficient differentiation of charges. Finally, the Italian system is based on a full cost recovery minus State subsidies principle applied to the market through an elaborate scheme able to provide complex incentives through the consideration of infrastructure, vehicle, operation and time related variables.

Table 53: Synthesis of charging structures applied in the studied jurisdictions

IM	Charging structure
ADIF	$C = \frac{\alpha(T)}{T} + \beta(P,L,S) + \gamma(L,S) + \delta(P,L,S) \cdot \frac{seats}{train}$
RFF	$C = \alpha(L) + \beta(L,P) \cdot \gamma(S,s,l) + \delta(S)$
DB Netz	$C = \alpha(L) \cdot \beta(S,H) \cdot \gamma(L) \cdot \delta(s) \cdot \varepsilon(S,L) + \varphi(W)$
Network Rail	$C = \sum \alpha(V) + \beta(S,L,P) + \frac{\gamma(S,O)}{T} + \delta(M) \cdot \frac{Energy\_consumption}{train-km}$
Banverket	$C = \alpha \cdot W + \beta + \gamma(M) \cdot \frac{fuel\ \ consumption}{train-km} + \delta + \varepsilon(S) \cdot W$
REFER	$C = \alpha(L,S,M)$
RFI	$C = \frac{\alpha(L)}{l} + \beta(L,P,s_1,s_2,W,g) + \gamma(L,P)/s_2$

Note: C – Unitary charge (per train-km), T-Traffic volume, P – Time period, L – Line or section, S – Type of service, s – Speed, H – Type of path (priority), W – Train weight, V – Type of vehicle, O – Operator, M – Type of traction, l – Length of the route, s_1 – Running speed, s_2 – Commercial speed, g – Number of pantographs; α, β, γ, δ, ε and φ express functional dependency.

Source: own elaboration with data from sections 6.3, 6.4.1, 6.4.2, 6.4.3, 6.4.4, 6.4.5 and 6.4.6

Chapter 7

DEVELOPMENT OF CASE STUDIES

7.1 Introduction

The analysis of the case studies performed in this chapter is conceived as a way to test the validity and assumptions of the transferability assessment framework proposed in chapter 5. Building on the selection and the detailed characterization of importer and exporter jurisdictions produced in chapter 6, for every case study the analysis identifies the basic elements stated on the conceptual framework and explores the application of the transferability criteria there enounced.

The aim of the case studies developed in this chapter is not to provide the result of the transferability assessment (i.e. say if the selected object is transferable or not), but to examine if the framework proposed seems robust enough to support the analysis of every case. In line with this goal, every case has explored first the main elements retained relevant for the analysis and then studied their consideration within the framework.

Accordingly, the presentation of the case studies has adopted the following structure: 1) *Preliminary analysis* – this first section introduces the case, details the characteristics of the object being transferred and exposes the more basic considerations that should be taken into account when transferring it. It is an analysis performed <u>outside</u> of the framework proposed and will serve as a reference to conclude on its validity for that case; 2) *Elements of the transfer network* – this second section presents the basic elements of the problem according to the framework proposed (section 5.3.3); 3) *Level of analysis* – this section identifies the level of analysis adopted for the case study according to the framework proposed (section 5.3.4); and 4) *Transferability criteria* –

this final section explores the application of the four transferability criteria previously defined to the case study (section 5.3.5).

Table 54: Summary of selected case studies

Case study number	Importer jurisdiction	Exporter jurisdiction	Object
1	ADIF (Spain)	RFF (France)	Charging scheme for high speed services
2	ADIF (Spain)	DB Netz (Germany)	Charging scheme for freight services
3	ADIF (Spain)	Network Rail (UK)	Congestion cost calculation and allocation procedure
4	ADIF (Spain)	Banverket (Sweden)	Marginal social cost pricing principle
5	ADIF (Spain)	REFER (Portugal)	Infrastructure cost calculation and allocation procedure
6	ADIF (Spain)	RFI (Italy)	Full cost minus subsidy pricing principle

Source: own elaboration

Each of the following sections is dedicated to one of the case studies indicated in Table 54: section 7.2 analyzes the transfer of the high speed charging scheme applied by RFF in France; section 7.3 studies the transfer of the charge structure levied by DB Netz to freight services; section 7.4 examines the possible introduction of the cost calculation procedures used by ORR to determine the capacity charge applied in the UK; section 7.5 focuses on the transfer of the Swedish marginal social cost pricing principle; section 7.6 details the transfer of the cost calculation and allocation procedure used to determine the charge for essential services levied by REFER EP; section 7.7 analyzes the potential implementation of the full cost minus subsidies pricing principle applied in the Italian network; Finally section 7.8 resumes the conclusions derived from the case studies.

7.2 Case 1: Charging scheme for high speed services

7.2.1 Preliminary analysis

This first case study seeks to frame the assessment of transferability of the charging scheme applied to high speed services in France to the Spanish network. The aim of the transfer, undertaken by the Spanish Public Works Ministry, is to increase the overall cost recovery ratio on high speed services by applying a structure and general level inspired in the French ones.

Though it is not possible to provide an average figure of the level of track access charges for high speed services in France and Spain (given the aggregation of figures publicly available), the comparison between the charging levels can be established on the basis of an average service. Taking as a reference the charge for a conventional high speed train, in Spain it ranges between 6,51-6,88 €/train-km (Table 24) if it runs in the normal time period, while in France it amounts to 8,03 €/train-km (Table 37). Hence, it can be assumed as hypothesis for the case that the introduction of the new scheme is likely to rise about 20% the average level of the charges on high speed services.

The differences between the charging schemes (both in level and structure) currently applied in the Spanish and the French networks to high speed services are indicated in Table 55. Both schemes present similar components, though they differ in the variables and the levels associated to each of them.

Table 55: Differences between existing and transferred charging schemes for high speed services

	Importer jurisdiction (Ministerio de Fomento)		Exporter jurisdiction (Ministère de l'Equipement)	
	Structure	**Level**	**Structure**	**Level**
Access charge	$\frac{\alpha(T)}{T}$	0,01	$\alpha(L)$	1,051
Reservation charge	$\beta(P,L,S)$	0,72-3,54	$\beta(L,P)$	0,908 – 15,137
Modulation coefficient	---	---	$\gamma(S,s,l)$	1 (factor)
Operation / running charge	$\gamma(L,S)$	0,72-2,08	$\delta(S)$	1,428
Traffic charge	$\delta(P,L,S)$	2,345-4,585	---	---

Note: Level expressed in €/train-km; Levels calculated for high speed services only; Levels of access charge and traffic charge in the importer jurisdiction estimated for Renfe-Operadora and 350 seats/train; T – Traffic volume; P – Time period; L - Type of line; S – Type of service; s – Speed; l – Length of the route; α, β, γ and δ express functional dependency.
Source: own elaboration with data from Ministerio de Fomento 2007h and RFF 2007d

The consecution of the average increase in cost recovery will depend on the ability of the imported structure to exploit the willingness to pay of the demand in the new context and the effective ability to pay of the operators. The first issue mainly depends on the railway transport market segmentation and characteristics, while the second is mostly related to the economic equilibrium of the railway operators. This equilibrium is in turn conditioned by the characteristics of the final transport market (elasticity to price of final users), the cost and income structure of the operation business (ability to absorb the increase in infrastructure charges) and the regulatory framework for the transport operation business (e.g. allowance of cross subsidies, existence of State subsidies, etc.).

At present, the high speed services rendered by RENFE-Operadora are the only market segment able to generate operational profits for the company without subsidies (2,7 €/ train-km in 2005 - Table 29) and, in a near future, they will probably increase their net contribution. It is therefore important to take into consideration the effect that any rise in the infrastructure charge levied on this segment will have on the overall financial situation of the company, particularly on the financing of its investment commitments.

Additionally, the introduction of a different charging scheme may alter the existing incentive structure, both through the variables considered for differentiation and the levels adopted for track access charges. With respect to this circumstance, it should be noted that for high speed services, the French scheme differentiates the charges according to the type of line and the time period, while the Spanish scheme also takes into account the type of service. Moreover, the variations according to the time period and the type of line observed in the French scheme are greater than those observed in the Spanish scheme (see Table 25 and Table 37).

The success in the implementation of the new charging structure in the importer jurisdiction will also depend on other issues as the political context framing the decision-making process, the acceptability of the changes proposed or the cost of introducing the new structure.

7.2.2 Elements of the transfer framework

The analysis of this case study through the framework proposed, requires first to define its fundamental elements. They have been characterized in Table 56.

Table 56: Case 1 - Elements of the transfer framework

Importer jurisdiction	General Interest Railway Network (REFIG) managed by ADIF
Importer entity	Ministry of Public Works (Spain)
Exporter jurisdiction	Railway network managed by RFF
Exporter entity	Ministry of Transport (France)
Aim of the transfer process	Increase in cost recovery to fund the infrastructure management
Sources of transfer	Preselected
Object being transferred	Charging scheme for high speed services (both level and structure)
External influences	EU railway reform (liberalization of passenger market), EU legislation on railway infrastructure pricing (Dir. 2001/14/EC), EU accounting criteria (ESA-95), Spanish Railway Law.
Context conditions	Transport market volume, Transport market trends, Intermodal competition conditions, Type of separation, Railway market segmentation, Level of saturation, Differences in cost structure (operators), Level of State funding, Other commercial revenues.

Source: own elaboration

7.2.3 Level of analysis

As the transfer process studied involves the import of a global level of charges and differentiation criteria, it may be classified within the *tactical level* according to the transferability framework proposed. This classification implies that the transfer process will be framed by the general objectives set for the pricing policy and the pricing principles already selected. On the other side, this level of analysis still leaves freedom to decide on aspects related to the operationalization of the charge and its implementation.

7.2.4 Transferability criteria

The framework proposed relies on the examination of four different transferability criteria in order to provide a preliminary estimation of the feasibility of the transfer from the exporter to the importer jurisdiction. In this case study, the application of the criteria could be as follows:

1) *Indifference to context variations*

The introduction of the French charging scheme in the Spanish context should be tested against those relevant context variations between the importer and the exporter jurisdiction that could alter the final objective of the transfer: an increase in the cost recovery rate. This approach excludes the examination of the contextual variables that are similar in both contexts or those that lead to differences without influence on the transfer.

Some of the main contextual differences that should be examined in this case are:

- *Transport market volume* – The volume of high speed transport performed in France is largely superior to the one performed in Spain (in 2005 RENFE-Operadora transported 2.325 million passenger-km on high speed services, the SNCF 42.700 millions). Therefore, the final amount of additional incomes due to an increase in the charge levied on high speed services will be lower in the Spanish case (i.e. the same increase of charges will probably produce greater incomes in the French case, rising faster the cost recovery).
- *Transport market trends* – The high speed rail market in France is rather mature, while in Spain is still taking off. The ambitious plan for expanding the network in Spain will surely drive the evolution of railway demand for the next years. This contextual difference may determine the viability of the new charge in the medium and long term.

- *Intermodal competition conditions* – The conditions for intermodal competition differ in both countries as regards the existence of alternative transport modes, the infrastructure charges they bear, fuel tax, etc. They will have a strong influence on the behaviour of the final consumer, setting a cap to the final market price and limiting the ability to pay of operators.
- *Type of separation* – Though formally separated, under the French arrangement, the incumbent operator SNCF performs network management tasks on behalf of RFF. This situation provides to the operator a sound source of incomes and a way to exert pressure on the infrastructure manager that may balance the net cash flow between both entities. Such situation does not exist in the Spanish case.
- *Railway market segmentation* – High speed services in Spain also include high speed regional services, with different characteristics and market conditions than the "long distance high speed services". They are not distinguished in the French scheme (as the variable type of service is not included). They could be negatively affected by the new scheme.
- *Level of saturation* – The French network is intensively used and close to capacity in some high speed links (e.g. Paris – Lyon line with more than 250 daily services – López Pita 2008b, p.3). This is not the case in Spain. The difference may alter the willingness to pay of operators in those parts of the network where congestion and scarcity costs are relevant. This contextual difference will show its full extent once the passenger transport segment will be open to competition in both countries.
- *Differences in cost structure (operators)* – Relevant differences in the cost structures of the high speed business services in Spain and France may show different abilities to absorb a charge increase by the operators (see Fig. 69 and Fig. 73).
- *Level of State funding* – Differences in the level of State funding for the operation business may alter the financial capability of the operator to absorb greater level of charges. Though high speed services did not receive any direct subsidy to operation in either country, there are strong levels of public subsidization to both operation companies (RENFE-Operadora and SNCF).
- *Other commercial revenues* – As noted before, the SNCF disposes of greater sources of incomes other than transport operation. In year 2006, it received 2.597 million € from RFF for network management activities. The same year, RENFE Operadora received 47,5 million € from ADIF (Table 34). The lower level of incomes outside transport operation for the Spanish operator may alter

its ability to absorb increases in the railway infrastructure charge at the company level.

2) *Indifference to external influences*

The introduction of the French scheme should as well be free from external influences acting on the importer jurisdiction.

The main external pressure arises from the current European legal framework for the pricing of rail infrastructure, concerning the "market can bear" rule and the potential discrimination of new entrants through the application of access charges. The first of these conditions may limit both the overall level of the charge and its differentiation (they should guarantee that efficient operators are not priced off the network). The second may impede any rising on the level of the access charge component (the component α in Table 55). The relative importance of these provisions will increase as the liberalization trends continue and the opening of the railway transport market becomes a reality (2010).

Other external pressure arises from the accounting criteria of the ESA-95, which sets the "50% rule". This rule defines the accounting and profitability conditions driving the price setting procedure in Spain. Though these conditions have been voluntarily assumed for the domestic rail sector in Spain, it is out of the range of action of the Public Work Ministry to change them (as they are central to the arrangement of the Spanish railway sector decided by the whole Government).

A similar reasoning applies to the Spanish Railway Law (that cannot be changed by the importer entity alone). The law specifies the structure of track access charges and the relation between the components and the costs of the infrastructure manager. Therefore, it does not seem possible to transfer the new structure without introducing changes in its current writing (thus re-opening the whole political debate).

3) *Horizontal compatibility*

The adoption of the French scheme to charge high speed services on the Spanish network should not be in open contradiction with the rest of the charging scheme.

The main horizontal incompatibility may arise from the fact that the French scheme charges high speed services on the basis of the infrastructure they use (defined according to the level of saturation), while the Spanish scheme only introduces a slight distinction through the infrastructure variable (defined according to quality) and relies on the type of service variable to target high speed services. Moreover, in France the high speed network is only opened to high speed services, while in Spain it may also be opened to other services (e.g. long distance passenger services or even freight traffic).

The problem would be then to reconcile the incentives transmitted to the trains running on the network and the application of the increase in cost recovery only on high speed services. A priori, the consecution of this goal would require the introduction of changes on the imported scheme.

In fact, on the one hand the incentives should be aligned for all trains running on the network as regards the use of the existing capacity and the reduction of the damage produced to the infrastructure. On the other hand, they should be differentiated to avoid hindering the development of new services (for instance, reservation charges set too high may difficult the development of on demand freight services).

Additionally, the introduction of the French scheme would change the application of mark-ups to high speed services. The present mark-up based on the type of service and the number of seats available, conceived as a proxy to willingness to pay of different services, would be changed to a mark-up based on the link used. This circumstance could alter the type and mix of rail services offered in the network.

4) *Multilevel compatibility*

The introduction of the French scheme must be in agreement with the pricing principle, as well as with the objectives set by the Spanish Public Works Ministry for the railway sector.

The pricing principles set for railway infrastructure charges in Spain seem to be compatible with the charging scheme transferred. In fact, the consideration of market conditions and financial equilibrium mentioned in the Railway Law suggest the application of mark-ups where the market can bear them (which has been already done in the current scheme through the traffic charge). As regards the objectives set by the Public Works Ministry for the transport policy in the PEIT, it should be verified that the new scheme does not affect the competitive position of rail in relation to air transport or the ability of freight traffic to run on those high speed links with low demand volumes.

7.3 Case 2: Charging scheme for freight services

7.3.1 Preliminary analysis

This case study is aimed at framing the assessment of transferability of the charging scheme applied to freight services running on the DB Netz network to the network managed by ADIF. The goal of the transfer, undertaken by the Spanish Public Works Ministry, is to increase the number and efficiency of the signals transmitted to freight operators running on the Spanish network. To reproduce the incentives, priority is given to the transfer of the structure and the variables present in the German scheme. Levels could also be changed in order to back the incentivization effect of the structure, but not necessarily with the scope of increasing the cost recovery on rail freight services.

Without taking into consideration the access charge, the Spanish scheme allows to differentiate two operational situations: the freight train running on peak hour and the freight train running on non-peak hour (either normal or valley). On the contrary, the German scheme consists of four multiplicative factors and one additive term able to reflect 192 different operational situations for freight services (according to the variables type of infrastructure, priority, speed, level of congestion and weight of the train). Both schemes are reflected in Table 57.

Table 57: Differences between existing and transferred charging schemes for freight services

	Importer jurisdiction (Ministerio de Fomento)		**Exporter jurisdiction (DB Netz AG)**	
	Structure	**Level**	**Structure**	**Level**
Access charge	$\frac{\alpha(T)}{T}$	0,01-0,125	---	---
Reservation charge	$\beta(P,L,S)$	0,05-0,32	---	---
Operation charge	$\gamma(L,S)$	0,06	---	---
Basic price	---	---	$\alpha(L)$	1,86-4,12
Product multiplier	---	---	$\beta(S,H)$	0,5-1,65 (factor)
Utilization factor	---	---	$\gamma(L)$	1-1,2 (factor)
Minimum speed factor	---	---	$\delta(s)$	1-1,5 (factor)
Payload component	---	---	$\varphi(W)$	0-0,92
Functional form	Additive		Multiplicative / Additive	

Note: Level expressed in €/train-km; Levels calculated for freight services only; Levels of access charge estimated for Renfe-Operadora and a new entrant carrying 500.000 train-km/year; T – Traffic volume; P – Time period; L - Type of line; S – Type of service; s – Speed; H – Type of train path (priority); W – Train weight; α, β, γ, δ and φ express functional dependency.

Source: own elaboration with data from Ministerio de Fomento 2007h and DB Netz 2007b

The incentives provided by the German scheme are oriented towards a better use of the capacity available in the network (through the utilization factor γ), a reduction of the damage produced to the network (through the payload component φ) and a better operational performance (through the minimum speed factor δ). Moreover, the German structure is also shaped by the consideration of the cost structure of the infrastructure management business (the basic price α) and the exploration of the demand's willingness to pay through a self-selection mechanism (the product multiplier β).

The introduction of a new incentive scheme for freight services based on the German structure requires the inclusion of new variables (priority, speed, train weight), the adoption of a multiplicative functional form for the charging scheme, the adaptation of the values to the local conditions taking into account the relative importance of every incentive and the maintenance of the current cost recovery ratio. Moreover, it should be able to reflect the cost-related and demand-related specificities of the Spanish railway network.

The effectiveness of the transferred scheme in the importer jurisdiction will depend on two key issues: the existence of the same incentivization needs (as the conditions and situation of freight traffic may be different in both networks) and the ability to provide them.

7.3.2 Elements of the transfer framework

The basic elements that are needed in order to apply the framework proposed are indicated in Table 58.

Table 58: Case 2 - Elements of the transfer framework

Importer jurisdiction	General Interest Railway Network (REFIG) managed by ADIF
Importer entity	Ministry of Public Works (Spain)
Exporter jurisdiction	Railway network managed by DB Netz AG
Exporter entity	DB Netz AG (Germany)
Aim of the transfer process	Better incentivization of freight traffic
Sources of transfer	Preselected
Object being transferred	Charging scheme for freight services (both level and structure)
External influences	EU legislation on railway infrastructure pricing (Dir. 2001/14/EC), EU accounting criteria (ESA-95), Spanish Railway Law.
Context conditions	Railway market segmentation, Degree of competition, Network utilization, Network characteristics, Level of saturation, Access regulation, Type of rolling stock

Source: own elaboration

7.3.3 Level of analysis

According to the transferability framework proposed, the level of analysis adopted in this case study is the *tactical level*. As in the previous case (Case 1), the adoption of this level implies that the transfer process involves the import of the differentiation criteria, still leaving freedom to decide on the final form of the charges and their implementation. On the other side, this level has no possibility to challenge the strategical level (e.g. policy objectives and pricing principles).

7.3.4 Transferability criteria

The framework proposed requires the examination of four different transferability criteria in order to provide a preliminary estimation of the feasibility of the transfer from the exporter to the importer jurisdiction. As regards the import of the German freight charging scheme in Spain, the application of the criteria could be as follows:

1) *Indifference to context variations*

The introduction of the DB Netz freight charging scheme in the Spanish context should be tested against some relevant context variations that could alter the final objective: a better incentivization of freight services. The main contextual differences that should be examined are (not exhaustive):

- *Railway market segmentation* – The share of rail freight transport is relatively more important in Germany than in Spain (24,2% and 20,6% respectively). The presence of international rail freight services and combined transport is more relevant on the German network than on the Spanish one.
- *Degree of competition* – The number of new entrants in the German rail freight transport market is greater than in Spain (20% market share in Germany, very small in Spain). The diversity of operators and services may condition the differentiation required from the charging scheme.
- *Network utilization* – The intensity of use of the network by freight trains is greater in the German network (estimated in 4.698 train-km/track-km year for Germany and 2.100 train-km/track-km year for Spain - Table 7). The constraints on the optimization of the use of the network may be more relevant in the German case.
- *Network characteristics* – Both networks have a different distribution and proportion of links as regards the maximum speed allowed; the maximum length of freight trains is shorter in the Spanish network; the different network

structures (grid) may affect the formation of train paths. These differences may influence the application of some technical variables (e.g. maximum weight, type of infrastructure, priority). They may also provide a different cost structure for the infrastructure business.

- *Level of saturation* – The German network presents strong levels of traffic in some relevant links of the network, which is not the case in Spain except for the Mediterranean corridor and some urban areas. The incentives related to the use of capacity may differ in both countries.
- *Access regulation* – While the Spanish capacity allocation system starts from the existing train-paths, the German system is initially opened to any path requirement from the operators. The production of different quality paths may require changes in the capacity allocation process.
- *Type of rolling stock* – The distribution of the characteristics of the rolling stock used for the operation of freight services may differ between both networks. This fact may condition the need for incentives oriented to minimize cost causation to the network.

2) *Indifference to external influences*

The introduction of the German scheme should not go against external influences acting on the importer jurisdiction.

The main external pressure arises from the principles driving the pricing of rail infrastructure in the EU, particularly as regards the potential discrimination of new entrants in the freight transport market through a biased differentiation (i.e. the introduction of the new variables could be set in such way as to favor the incumbent against its competitors). Additionally, the “market can bear” rule also applies in this case study, as part of the differentiation is not based on costs but on the demand’s willingness to pay (through the selection of a given priority). Under the mentioned rule, it could be arguable whether a new entrant able to pay strictly the cost of its train running on the network should be relegated to a “low quality” train path if there is no scarcity of capacity in the network.

The criteria linked to the application of the ESA-95 accounting rules, would only apply if in the consecution of the incentivization effect entails a relevant increase in the average level of charges.

As in the previous case, the detail of the provisions included in the Spanish Railway Law sets a barrier to the introduction of changes on the structure of track access charges, as it specifies the components and variables admitted (i.e. the writing of the Law should be changed in order to accommodate the new variables speed, priority and weight).

3) *Horizontal compatibility*

The adoption of the German scheme to better incentivate freight services running on the Spanish network should not be in open contradiction with the rest of the charging scheme.

The main horizontal incompatibility may arise from the mixed use of the infrastructure. In fact, the existence of different incentivation schemes for trains running on the same infrastructure could lead to dysfunctions in the network. For instance, on the conventional network passenger trains would be subject to different charges depending on the time band (thus they are provided with an incentive to change the moment in time in which they run), while freight trains would be subject to different charges depending on the links of the network they use (thus they are provided with an incentive to change the route they use). The question then is to know whether the combination of temporal incentives on passenger trains and spatial incentives on freight trains will lead to a better use of the infrastructure.

Another incompatibility may regard the existence of two different systems of producing and selling train paths. In fact, the introduction of the German scheme would require the definition of different train path qualities for freight services while train paths for passenger services would not be differentiated according to priority.

4) *Multilevel compatibility*

The introduction of the German scheme must be in agreement with the pricing principle, as well as with the objectives set by the Spanish Public Works Ministry for the railway sector.

The pricing principles governing track access charges in Spain do not seem incompatible with the introduction of further differentiation in the charges applied to freight services, as far as they do not produce discrimination among operators. The exploration of the demand's willingness to pay is allowed, as well as the pricing of congestion in the network.

As regards the objectives of transport policy, the new structure is aligned with the improvement of the quality standards offered by rail, in line with freight market's demand. At the time of adapting the German scheme to the Spanish conditions, it will also be necessary to introduce provisions favoring both intermodal and international freight services.

7.4 Case 3: Congestion cost calculation and allocation procedure

7.4.1 Preliminary analysis

This case study is aimed at framing the assessment of transferability of the congestion cost calculation and allocation procedure used in the UK to determine the variable capacity charge to the infrastructure managed by ADIF. The goal of the transfer, undertaken by the Spanish Public Works Ministry, is to improve operational efficiency through the pricing of congestion according to the British practice. The transfer of the practice implies the introduction of the cost calculation and allocation procedures adopted by ORR to determine the final form of the tariff.

The current charging practice in Spain does not take into consideration congestion costs in the network and does not have a specific component related to it (i.e. there is not an equivalent of the *capacity charge* in the Spanish charging scheme). Two possibilities can be defined then: either the Public Works Ministry introduces a new component in the Spanish charging scheme in order to levy the congestion costs in the network, either it introduces the British calculation procedure with the aim of reflecting the congestion costs through one of the existing components. The second hypothesis is assumed here: the Spanish Public Works Ministry imports the cost calculation and allocation procedure implemented by ORR to set the capacity charge in the UK with the objective of calculating and allocating congestion costs in the Spanish network and levying them through the *operation charge*.

The capacity charge levied by Network Rail is based on a complex calculation procedure that requires the establishment of a statistical relation between capacity utilization and delay in different route sections and time bands. The results are simplified through their allocation to different service groups, which reflect a combination of type of service, route and time band. The level of the charge varies between 0 and 1,33 €/train-km, and is intended to recover the extra costs caused to the infrastructure manager because of congestion.

The implementation of such charging practice needs as a first step the determination of empirical relations between capacity utilization and delay. At this point there might be found the more relevant barriers to the transfer, as the British practice requires the availability of historical series of operational data in an adequate format to define a sound statistical relation between both variables. If they were not available, then it would be essential to modify the current information systems to produce them. Additionally, it will be necessary to segment the whole data obtained according to routes and time bands in such a way as to differentiate relevant variations in such relation.

Once again, the performance of the information systems implemented by ADIF will be a relevant factor for the correct implementation of the practice.

As a second step, the British practice determines the unitary cost of the delay caused to other trains running on the network, applying the delay valuation considered in the performance regime (in turn based on a societal rate for the delay minutes, depending on the route and type of service). The implementation of the British practice would require the development of a similar valuation methodology in Spain, able to differentiate delay costs per route and service type.

Once obtained the extra costs of congestion in the Spanish network according to route sections and time bands. It will be necessary then to allocate them to a limited number of service groups, in order to simplify the practical implementation of the practice through the *operation charge*.

The main constraints to the feasibility of the transfer come from the probable limitations of the current information systems available to the Spanish infrastructure manager and the implementation costs of the British practice. Furthermore, it should be verified that congestion generates a level of costs as high as to justify the introduction of the ORR's procedure.

7.4.2 Elements of the transfer framework

The analysis of this case study through the framework proposed, requires first to define its fundamental elements (Table 59).

Table 59: Case 3 - Elements of the transfer framework

Importer jurisdiction	General Interest Railway Network (REFIG) managed by ADIF
Importer entity	Ministry of Public Works (Spain)
Exporter jurisdiction	Railway network managed by Network Rail
Exporter entity	Office of Rail Regulation (UK)
Aim of the transfer process	Improve operational efficiency in the network
Sources of transfer	Preselected
Object being transferred	Congestion cost calculation and allocation procedure
External influences	EU legislation on railway infrastructure pricing (Dir. 2001/14/EC), Spanish Railway Law.
Context conditions	Type of regulation, Type of regulator, Average delay, Network utilization, Technical characteristics of the network, Traffic mix, Information systems.

Source: own elaboration

7.4.3 Level of analysis

According to the transferability framework proposed, the analysis performed in this case study involves the *operational level*. In fact, the congestion cost calculation and allocation methodology imported will participate in the definition of the final form of the charge in the market.

7.4.4 Transferability criteria

The framework proposed relies on the examination of four different transferability criteria in order to provide a preliminary estimation of the feasibility of the transfer from the exporter to the importer jurisdiction. In this case study, the application of the criteria could be as follows:

1) *Indifference to context variations*

The introduction of the calculation procedure set by the ORR in the Spanish network should be tested against some relevant context variations that could alter the final objective: the improvement of the operational efficiency in the network. The main contextual differences that should be examined are (not exhaustive):

- *Type of regulation* – The approaches to service quality and price regulation seem to be different in both jurisdictions. In the Spanish system the incentives to an efficient operation are currently being provided through the Service Level Agreement signed between ADIF and RENFE-Operadora. In the British system they are included within the charging scheme (either through the performance scheme or the capacity charge).
- *Type of regulator* – The ORR has a higher degree of independence from the Government than the CRF, as well as greater means and a fully specialized staff. This contextual difference may favour the gathering, verification and processing of the detailed cost information required by the transferred practice, as well as the examination of the eventual complaints from the operators.
- *Average delay* – Available data on delays is not directly comparable[125]. The punctuality achieved, together with the traffic volume in the network will define

[125] In year 2006 the average delay on the Network Rail infrastructure was equal to 1,77 min/100 train-km (passengers) and 3,93 min/100 train-km (freight). In the same year, the services running on the Spanish network achieved punctuality indexes ranging between 95,7 and 99,7. The data gathered on the punctuality of services in the UK and Spain at the occasion of the BOB case study are neither fully comparable. They show however differences in the punctuality achieved in both networks.

the economic interest of recovering congestion costs applying a capacity charge; the average delay will affect as well the level of the charges related to capacity costs.

- *Network utilization* – The intensity of use of the network is greater in the infrastructure managed by Network Rail (8.107 passenger train-km/track-km in Spain, 14.800 passenger train-km/track-km estimated for the UK). The greater intensity of use in the UK results in large parts of the timetable being fragile, with large knock-on effects when maintenance work or train delays impact other train operators' performance. The lower intensity of use in the Spanish network may result in lower congestion costs imposed on the infrastructure manager, challenging the interest of considering congestion costs.
- *Technical characteristics of the network* – Differences in the technical characteristics of the network (particularly presence of double tracks and sidings, the type of signalling systems) will produce different capacities. Moreover, the structure of the network will condition the number and length of possible operational sections. Different section lengths and capacities may condition the utility derived from the application of the British practice, particularly against alternative measures for the optimization of capacity use.
- *Traffic mix* – As in the previous case, the relation between capacity utilization and delay may be altered by the mix of services running in the network.
- *Information systems* – Differences in the information systems used by each of the infrastructure managers may limit the effective implementation of a detailed cost calculation methodology. This observation is also extensive to the series of historical data available.

2) *Indifference to external influences*

The introduction of the British cost calculation and allocation charge should as well be free from external influences acting on the importer jurisdiction.

Given the alignment of the practice being introduced with the determinations of Directive 2001/14/EC and the transparency of the calculation procedure, it seems rather unlikely that it could go against the principles set in the EU legislation. Indeed, it is cost related and provides incentives for a better operational performance. However, the franchising system adopted in the UK favors the correlation between services and operators. This means that the costs derived from congestion can be allocated to the service (i.e. to the single operator running them) without any consideration on the responsibility for these costs. Within a liberalized scenario with on track competition, the same services could be performed by various operators with different responsibilities for the congestion costs, making discriminatory the levying of a flat rate on the service (as an alternative, the calculation procedure should also include the variable "operator").As regards the current determinations of the Spanish Railway Law, the consideration of congestion related costs is in line with the pricing principles enounced in Art. 73.5, but seems to fall outside the writing "variable maintenance, operation and management costs of rail infrastructure" set for the establishment of the *operation charge* (in fact, the congestion cost may be regarded as an external cost to the infrastructure manager).

3) *Horizontal compatibility*

The adoption of the British congestion cost calculation procedure to improve the operational efficiency of the services running on the Spanish network should not be in contradiction with the rest of the charging practice.

The intervals adopted for the time period variable in other cost allocation procedures used in the Spanish charging system do not find an explicit correlation with the operational situation in the network (it has been in fact inherited from the previous arrangements existing within RENFE[126]). The definition of a new system of time bands related to the operational conditions in the network, may lead to two different sets of values for the same charging variable, depending on the component in which they appear. The same problem may arise with the definition of services (the current charging practice only distinguishes type of services). The double scale for the same variables may pose problems to the design and operation of information systems in the network.

A second point of friction may arise as regards the relative level of detail and complexity achieved through the different calculation procedures. In fact, the calculation of congestion costs according to the British methodology is highly complex as regards the valuation of the costs and the disaggregation applied. The ability to improve operational performance embedded in a so detailed calculation may be outweighed by the outputs of less detailed procedures used to calculate the remaining costs reflected in the charge.

[126] Spanish track access charges consider different time periods, but they result from a historical convention and they are not currently related to congestion. Formerly they were used to allocate train paths among the different operating business units and to differenciate the final user charge.

4) *Multilevel compatibility*

The introduction of the British congestion cost calculation procedure must be in agreement with the pricing principles and charging schemes already in place, as well as with the objectives and principles set by the Spanish Public Works Ministry for the railway sector.

The inclusion of the congestion costs calculated according to the British practice within the operation charge, will produce an increase in the level of the charge, will need the inclusion of a temporal variable and will require a greater differentiation in the variables adopted. Otherwise, the refined cost calculation methodology will not transmit its full incentivization potential to the market. The adoption of an aggregated variable as the service group would be able to integrate the three dimensions (infrastructure, service and time period) in a single variable, but will also increase the difference between the operating charge and other components of the Spanish charging scheme.

As regards the pricing principles, the imported practice does not seem incompatible with any of them as far as it does not rises the level as to alter the "financial equilibrium in the rendering of services". The implementation of the practice should guarantee as well the non-discrimination of operators. As regards the objectives of transport policy, the new structure is aligned with the improvement of the quality standards offered by rail, as it promotes a better use of the available capacity.

7.5 Case 4: Marginal social cost pricing principle

7.5.1 Preliminary analysis

The aim of this case study is to frame the introduction of the social marginal cost pricing principle applied by Banverket in the Swedish network in the network managed by ADIF. In line with the recommendations of the welfare economic theory, the aim of the transfer is to increase the socio-economic efficiency of railway transport and to favor a better competitive position for railways.

The introduction of the Swedish pricing principle requires the shift to a cost-related approach for the whole charging system, thus avoiding the application of terms based on costs other than marginal or the willingness to pay of demand. This approach would need the change of the current Spanish charge definition procedures (the relation to fixed and variable costs indicated in the Railway Law and the prevailing price regulation mechanism) so that they become able to reflect marginal costs in the network.

At a more detailed level of definition, the adoption of the marginal cost principle will require the establishment of a sound calculation methodology for infrastructure costs. As well, the inclusion of external costs in the charge will need a specific consideration as regards their determination, allocation to the market and their impact on intermodal competition conditions.

The implementation of the marginal cost principle may have strong implications for the financial equilibrium of the infrastructure business. As the level linked to the application of the marginal cost principle implies a reduction in the overall cost recovery (as fixed costs are not recovered), the infrastructure manager will need to reach financial equilibrium through other incomes or State funds. The average charge applied in the Swedish network in 2006 amounts 0,67 €/train-km, while the average charge applied in the Spanish network in the same year was equal to 1,15 €/train-km[127]. Supposing the same level of marginal costs (which is probably not the case), the financial requirements of the new principle can be estimated at least in 67 million €[128]. Moreover, in the years to come the application of the marginal cost principle will imply the renounce to the incomes generated by the mark-ups on high speed traffic, a basic input for the financing of the IM and the investments in new infrastructure.

Additionally, the introduction of the Swedish marginal cost pricing principle will require that the differentiation of charges in the market is performed according to cost causation criteria. Thus, the variables and charging units included in the charging scheme should strictly be related to cost causation (limiting the application of time bands or the consideration of seat-km in the charge).

7.5.2 Elements of the transfer framework

The analysis of this case study through the framework proposed, requires first to define its fundamental elements (Table 60).

[127] Own calculation on the basis of Banverket (2007b, p.10 and p.37) and sections 6.3.11 and 6.3.13.4. Includes minimum access package and track access to essential facilities.

[128] According to Directive 2001/14/EC the incomes obtained through environmental charges cannot remain within the infrastructure manager and should therefore be transferred to the State. Moreover, a mark-up on passenger traffic is included in the figure. Hence, the average figure found for Banverket is greater than the unitary income for the infrastructure manager and then the estimation is a lower bound.

Table 60: Case 4 - Elements of the transfer framework

Importer jurisdiction	General Interest Railway Network (REFIG) managed by ADIF
Importer entity	Ministry of Public Works (Spain)
Exporter jurisdiction	Railway network managed by Banverket
Exporter entity	Banverket (Sweden)
Aim of the transfer process	Increase in socio-economic efficiency, Improve competitiveness of railways in the intermodal market
Sources of transfer	Preselected
Object being transferred	Social marginal cost principle
External influences	EU accounting criteria (ESA-95), Growth and Stability pact, Macroeconomic priorities, Spanish Railway Law.
Context conditions	Intermodal competition conditions, Type of competition, State funding availability, Other commercial revenues, Network characteristics, Type of services, Rolling stock, State of maintenance and renewal, Enhancement/enlargement projects, Acceptability.

Source: own elaboration

7.5.3 Level of analysis

According to the transferability framework proposed, the level of analysis adopted in this case study is the *strategical level*. The adoption of this level implies that the transfer process involves the import of principles, leaving freedom to decide on their implementation through schemes and practices.

7.5.4 Transferability criteria

The framework proposed relies on the examination of four different transferability criteria in order to provide a preliminary estimation of the feasibility of the transfer from the exporter to the importer jurisdiction. In this case study, the application of the criteria could be as follows:

1) *Indifference to context variations*

The introduction of the social marginal cost principle adopted by Banverket in the Spanish network should be tested against some relevant context variations that could alter its feasibility (not exhaustive):

- *Intermodal competition conditions* – The conditions for intermodal competition are different in both countries. The effects that the introduction of the new pricing principle may have on the intermodal market share of railway will probably not be the same in Spain as those observed in Sweden.

- *Type of competition* – The Swedish administration has promoted competition for the market in the case of unprofitable regional and long distance services. The effects on efficiency derived from the application of a marginal cost principle are not relevant under these conditions, as access is not opened and the level of track access charges is equilibrated through the conditions set in operation contracts. The mentioned services are still closed to competition in Spain.
- *State funding and other commercial revenues* – In both countries the State currently assume the greatest part of the infrastructure management costs, either through payments for the services rendered or through additional grants. In the year 2006, track access charges only covered 5,0% of the total operational expenditures in Sweden, and 8,6% in Spain.
- *Network characteristics* – The difference in some relevant technical characteristics between the Swedish and Spanish network may condition both the level of marginal cost-based charges and the level of total costs. This can be the case for the degree of electrification (59% in Spain, 78% in Sweden) or the layout parameters (e.g. curvature radii).
- *Type of services* – The differences in the type of services running in the network may have an influence on the level of marginal costs. This can be the case for freight services (20,6% in Spain, 35,5% in Sweden).
- *Rolling stock* – Relevant differences in the type of rolling stock running on both networks may as well change the level of marginal costs (e.g. through different axle loads).
- *State of maintenance and renewal* – Though it is not possible to provide comparable figures on the state of the network in both countries, it would be necessary to consider it as a relevant context variable. The overall state of maintenance and renewal of the network conditions the costs that arise on it (both marginal and total costs), influencing the level of marginal costs and the required financial support for the implementation of the marginal cost principle.
- *Enhancement / enlargement projects* – The level of investment in the network foreseen for the next years is different in both national railways. Spain is engaged in the ambitious investment program stated in the PEIT, while Sweden is defining its next investments on a more regular path. The conditions required in both networks to guarantee the financial equilibrium of the infrastructure manager will also be different.

- *Acceptability* – The degree of acceptability of environmental issues seems to be more developed in Sweden than in Spain. The reactions from the operators and the public with respect to the consideration of social costs in the charges may be different. The situation is similar as regards the acceptance of a lower price level for rail against other transport modes.

2) *Indifference to external influences*

The adoption of a social marginal cost principle for the pricing of railway infrastructure in Spain seems to be in perfect agreement with the most common interpretation of Directive 2001/14/EC. Thus it does not seem a relevant external influence for this case.

On the other side, the framework set by the accounting system ESA-95 may lead to the infrastructure manager ADIF being classified as a non-market producer if it only recovers the marginal cost through charges. The risk of this situation to happen may be increased in the years to come, as the current arrangement is based on the future incomes in infrastructure charges due to the expansion of the high speed network. This external influence may lead to the incompatibility between the national debt objectives (in line with the Stability and Growth pact and other macroeconomic priorities) and the application of the marginal cost pricing principle.

Moreover, the implementation of the marginal social cost pricing principle would require changes in the writing of the Spanish Railway Law, as it currently makes reference to the recovery of variable and fixed costs related to the maintenance, operation and infrastructure management of the railway network. It also makes reference to the application of mark-ups. The application of the marginal social cost pricing principle is not compatible with the recovery of fixed or capital costs.

3) *Horizontal compatibility*

The adoption of the Swedish pricing principle to infrastructure charges in Spain, should be aligned with the objectives and resource availability for other rail and transport policies.

The more clear point of conflict arises with the planned development of the network, as ADIF is undertaking part of the investments on its own resources and, in the long term, should be able to return the capital contributions received from the State. A diminution in the level of incomes derived from the change in the pricing principle may put at risk part of the investments[129].

The inclusion of social costs in the railway infrastructure charge may go against the revitalization of this mode whenever they are not assumed as well by the competing transport modes.

4) *Multilevel compatibility*

According to the assessment framework proposed, as the object transferred is a pricing principle, it would prevail over existing structures and levels and thus would not be subject to multilevel incompatibilities.

7.6 Case 5: Infrastructure cost calculation and allocation procedure

7.6.1 Preliminary analysis

This fifth case study is aimed at framing the assessment of transferability of the cost calculation and allocation procedures applied by the INTF to determine the *charge for essential services* levied on the Portuguese network to the *operation charge* levied by ADIF on the Spanish network. The goal of the transfer, undertaken by the Spanish Public Works Ministry, is to improve the cost reflectivity of the Spanish charging practice (i.e. the allocation of costs according to cost causation).

The charge for essential services applied by REFER EP is based on a detailed calculation procedure that requires the definition of homogeneous groups and the allocation of traffic dependent cost categories to them. Then unitary charges are calculated for every homogeneous group by dividing the costs by the useable capacities available for the specific homogeneous group. Furthermore, costs are calculated for the reference optimal network management conditions and for a full use of capacity.

The implementation of the Portuguese practice in Spain would require as a first step the definition of homogeneous groups according to the technical and service characteristics of the infrastructure. The feasibility of this step will depend on the information systems implemented in the network and may lead, in the Spanish case to a different number of

[129] It must be remembered here that increases on demand due to the reduction in the price level on the network do not have any effect on the financial equilibrium of the infrastructure manager, as the charges paid equal the cost introduced in the network (i.e. the marginal cost).

homogeneous groups (given the greater extension and diversity of the network). A priori, this step does not seem to generate any specific barrier to the transfer.

A greater difficulty may arise at the time of selecting and calculating the costs to be included in the charge. The practice of the INTF relies on the accounting system to produce the cost information associated to seven cost categories: track maintenance, bridges and tunnels maintenance, traffic control costs, telecommunications, signaling maintenance, level crossings and general costs directly related with traffic.

A barrier may arise from the specific definition of cost categories adopted by the infrastructure manager ADIF. In fact, the more likely situation is the one in which the Spanish accounting system will use cost categories different from the Portuguese ones. Additionally, even in those cases where the cost categories may be apparently coincident, they will be diversely defined as regards the recognition of costs belonging to them (e.g. this is generally the case when it is necessary to distinguish maintenance activities from renewal or operation activities). Furthermore, the differences in the information and accounting systems may lead to a different level of disagregation of cost figures (according to track segments, lines, etc.) and to a dissimilar consideration of the variability of costs with respect to traffic.

A second hindrance may be originated by the determination of the level of efficient costs. The Portuguese practice calculates the level of efficient costs, taking into account the minimum operation costs already observed in the network and setting a transitional mark-up decreasing with time. The import of the practice would require the definition of efficient operation costs in ADIF's network and the likely evolution of efficiency in the infrastructure management segment over time.

Once calculated the costs, the import of the Portuguese practice will require the allocation of costs to services. Two different models should be implemented to perform the allocation: 1) a model weighing the train-km run in the network according to the type of train (in the Portuguese case applies a factor equal to 2,56 to freight trains); 2) a model estimating the capacity available in every service group. The capacity model calculates the available capacity as the product of the maximum theoretical capacity (once considered the capacity consumed by maintenance tasks) and three factors respectively modeling the effect of the different service types, the guaranty that certain services are not crossed by other trains and the effect of non-existing demand in certain sections. These models should be put into place prior to the transfer of the INTF methodology to the Spanish charging practice.

7.6.2 Elements of the transfer framework

The analysis of this case study through the framework proposed, requires first to define its fundamental elements (Table 61).

Table 61: Case 5 - Elements of the transfer framework

Importer jurisdiction	General Interest Railway Network (REFIG) managed by ADIF
Importer entity	Ministry of Public Works (Spain)
Exporter jurisdiction	Railway network managed by REFER EP
Exporter entity	Instituto Nacional do Transporte Ferroviario (Portugal)
Aim of the transfer process	Improve the cost reflectivity of the charging system
Sources of transfer	Preselected
Object being transferred	Cost calculation and allocation procedures used in the determination of the charge for essential services
External influences	EU legislation on railway infrastructure pricing (Dir. 2001/14/EC), Spanish Railway Law
Context conditions	Type of regulation, Type of regulator, Information systems, Accounting systems, Network length, Network utilization, Network complexity, Technical characteristics, Type of services

Source: own elaboration

7.6.3 Level of analysis

According to the transferability framework proposed, the level of analysis adopted in this case study is the *operational level*. The adoption of this level implies that the transfer process involves the import of the cost calculation and allocation procedures as they have been implemented in the exporter jurisdiction. Obviously, there is still some flexibility to particularize them to the importer jurisdiction. On the other side, this level has no possibility to challenge the tactical (i.e. the structure, variables or level of the operation charge) or the strategical level (i.e. the pricing principles driving the Spanish charging practice).

7.6.4 Transferability criteria

The framework proposed relies on the examination of four different transferability criteria in order to provide a preliminary estimation of the feasibility of the transfer from the exporter to the importer jurisdiction. In this case study, the application of the criteria could be as follows:

1) *Indifference to context variations*

The introduction of the infrastructure cost calculation and allocation practice adopted by REFER EP in the Spanish network should be tested against some relevant context variations that could alter its feasibility (not exhaustive):

- *Type of regulation* – The approaches to service quality and price regulation seem to be different in both jurisdictions. The Spanish Public Works Ministry provides efficiency incentives to the infrastructure manager basically through the framework agreement, while the INTF provides them as well through the charging scheme (as the practice transferred is based on efficient costs).
- *Type of regulator* – The Portuguese regulator INTF has a higher degree of independence and autonomy from the Ministry than the Spanish regulatory body. It is also equipped with more means. This contextual difference may favour the consecution, verification and processing of the detailed cost information required by the transferred practice.
- *Information systems* – Differences in the configuration of the information systems of ADIF and REFER EP may condition the number of homogeneous groups and the precision of their determination (this is particularly true as regards the definition of the basic infrastructure segments in the network).
- *Accounting systems* – REFER EP and ADIF already publish their financial accounts according to different standards (Portuguese and Spanish GAAP). Their analytical accounting systems will surely differ in the cost categories, cost centres and level of aggregation of the cost information adopted. This contextual difference may suppose a critical barrier for the transferability of the Portuguese practice.
- *Network length* – The notably difference in the extension of both rail networks (12.991 km for ADIF and 2.839 km for REFER) may condition the implementation of the Portuguese practice in Spain as regards the size of the homogeneous groups and the complexity of the capacity model.
- *Network complexity* – The differences in network complexity (e.g. number of links and nodes, number of stations, number of links with different technical characteristics, etc.) may have a similar effect as the differences in network length.
- *Technical characteristics* – The diversity in the technical characteristics of both networks (e.g. ADIF's network has three different track gauges, while REFER has two) will condition the formation and number of homogeneous groups as well.

- *Network utilization* – The inclusion of service considerations in the formation of homogeneous groups drives the attention on the differences between the network utilization in both railways, particularly as regards the number of "suburban" areas (while in Portugal only Porto and Lisbon are distinguished, in Spain it is possible to differentiate up to 11 urban areas with suburban services).

2) *Indifference to external influences*

The implementation of the Portuguese cost calculation and allocation procedure in the Spanish *operation charge* should be indifferent to the action of external influences.

The practice being transferred seems to be aligned with the main determinations of the EU legal framework, as it seeks to proxy marginal infrastructure costs through a detailed cost allocation methodology, applies a cost causation allocation to the market and includes incentives for efficiency in the infrastructure management activity. The only concern could arise from the distribution of the variable costs among all the available capacity. If it is true that it provides an incentive for the infrastructure manager for increasing the activity in the network, it is also true that it may lead to charge the remaining services well below the cost they introduce in the network.

The current writing of the Railway Law as regards the costs that should be recovered through the operation charge *("variable maintenance, operation and management costs of rail infrastructure*") seems perfectly compatible with the Portuguese practice.

3) *Horizontal compatibility*

The adoption of the Portuguese practice should not be in contradiction with the rest of the charging practice.

Though there is no precise information available on the cost calculation and allocation procedures currently applied by the Public Works Ministry in order to define the final form of the other charging components included in the Spanish charging practice, it is possible to hypothesize possible points of friction at this level. A first concern may result from the definition of variable and fixed infrastructure costs: the criterion adopted to define variable costs in the calculation of the operating charge should be complementary with the criterion adopted to define fixed costs in the calculation of the reservation charge. A second conflict may arise at the moment of allocating costs: the costs of maintenance, operation and management of rail infrastructure not allocated to the operation charge, should be allocated to the reservation charge. This condition suggests the convenience of adopting the same cost categorization for the calculation of both components.

4) *Multilevel compatibility*

The introduction of the Portuguese cost calculation and allocation procedure must be in agreement with the pricing principles and charging schemes already in place, as well as with the objectives and principles set by the Spanish Public Works Ministry for the railway sector.

The Portuguese practice does not seem incompatible with the Spanish *operation charge*. In fact, the level of this component should be linked to variable costs (which is done by the imported procedure) and should be differentiated according to type of infrastructure and type of service (both variables are taken into account in the imported procedure). As regards the level of the charge, the imported procedure should lead to a similar volume of incomes as the one currently used. As regards the differentiation applied, the imported practice could distinguish two types of passenger services in order to achieve a greater consistency with the other components of the Spanish charging scheme.

As far as the imported practice does not introduce any relevant change in the charging scheme, it is deemed to be compatible with the Spanish pricing principles and objectives set for the transport policy. Only in the case that it would lead to relevant changes in the level of the charge, it should be tested against the financial stability of the infrastructure manager and the feasibility of the investment plan foreseen in the network or the development objectives for the operation segment.

7.7 Case 6: Full cost minus subsidies pricing principle

7.7.1 Preliminary analysis

This case study analyzes the introduction in the Spanish network of the pricing principle applied by the Italian Ministry of Infrastructure and Transport in the network managed by RFI. The scope of the transfer is to increase the control on the State funding of infrastructure services, avoiding possible deviations in the medium and long term.

The Italian principle is based on the recovery of operation costs arising from the use of a technologically efficient infrastructure. The principle is based on two benchmarks, the real operation costs and the estimated efficient operation costs, and a public subsidy covering the difference and the remaining costs arising in the network (maintenance, renewal, investment). The part of the subsidy related to the recovering of operation costs takes the form of a discount and is expected to decrease in time as the railway infrastructure improves its condition (providing a strong incentive to the infrastructure manager if adequately modulated over time). This principle may be described as a "full cost minus subsidies".

The adoption of the Italian pricing principle in Spain will introduce a conceptual change in the system currently applied. Both systems are based on financial considerations related to the State and the public agencies performing the railway services, but while the Spanish price setting procedure takes into account the ability to pay of the demand (in order to define the mark-ups applied on high speed services), the Italian system *first* selects the level of costs and then allocates it to the demand.

Moreover, the implementation of the Italian pricing principle in Spain could have strong implications for the transport operators, that would have to bear a "non-customized" level of costs (that can be well below, close or even above their willingness to pay). Additionally, the implementation of the principle together with the selection of the operation costs as its basis, may lead to relevant increases in the level of access charges borne by the operators. As a reference, the average charge in the Italian network in 2006 was 2,56 €/train-km[130], while in the Spanish network reached 1,15 €/train-km. If operational costs were similar in both jurisdictions, the average increase in access charges would be greater than 120%. However, the final level implemented in Spain would depend on the level of subsidization foreseen by the Spanish Public Works Ministry. If the subsidy is to be maintained at its present level, then the introduction of the Italian pricing principle will have a low effect on the current charge level, though it may have financial consequences in the future. If priority is given to pass the full efficient operation costs to the operators, the introduction of the principle will generate a strong impact. According to the finality of the transfer, the second option is assumed here.

The consecution of the control objective on public funding will be dependent on the setting of clear rules for the awarding of subsidies, able to be maintained over time and able to provide adequate incentives to the infrastructure manager and the railway operators. These rules fall in the field of price regulation and the framework contracts signed between the State and the infrastructure manager. If additionally the implementation of the pricing principle results in changes in the costs allocated to the different operators and the level of the charges, then the successful implementation of the Italian principle will need to consider the final transport market (elasticity to price of final users), the cost and income structure of the operator or the level of competence in the market.

[130] Calculation based on RFI (2006b, p.44) and FS (2007, p.38 and p.80).

7.7.2 Elements of the transfer framework

The analysis of this case study through the framework proposed, requires first to define its fundamental elements (Table 62).

Table 62: Case 6 - Elements of the transfer framework

Importer jurisdiction	General Interest Railway Network (REFIG) managed by ADIF
Importer entity	Ministry of Public Works (Spain)
Exporter jurisdiction	Railway network managed by RFI
Exporter entity	Ministry of Infrastructure and Transport (Italy)
Aim of the transfer process	Increase the control on the State funding of infrastructure services
Sources of transfer	Preselected
Object being transferred	Full cost minus subsidy pricing principle for all the network
External influences	EU accounting criteria (ESA-95), EU Directives on railway infrastructure pricing (Dir. 2001/14/EC)
Context conditions	Type of regulation, Type of regulator, Type of separation, Transport market trends, Intermodal competition conditions, Network characteristics, Differences in cost structure (operators)

Source: own elaboration

7.7.3 Level of analysis

According to the transferability framework proposed, the level of analysis adopted in this case study is the *strategical level*. The adoption of this level implies that the transfer process involves the import of principles, leaving freedom to decide on their implementation through schemes and practices.

7.7.4 Transferability criteria

The framework proposed relies on the examination of four different transferability criteria in order to provide a preliminary estimation of the feasibility of the transfer from the exporter to the importer jurisdiction. In this case study, the application of the criteria could be as follows:

1) *Indifference to context variations*

The introduction of the full cost minus State subsidy adopted by RFI in the Spanish network should be tested against some relevant context variations that could alter its feasibility (not exhaustive):

- *Type of regulation* – The approaches to service quality and price regulation seem to be different in both jurisdictions. The Spanish Public Works Ministry provides efficiency incentives to the infrastructure manager basically through the framework agreement, while the CIPE provides them as well through the pricing principle. The coordination between the current regulation mechanisms and the pricing principle may be different in both jurisdictions, challenging its effectiveness.
- *Type of regulator* – The Italian regulator has a high degree of independence and autonomy, while the effective functioning of the Spanish CRF has not been established yet. This contextual difference may favour the gathering, verification and processing of the detailed demand and cost information required to implement the transferred pricing principle without too high impacts on the infrastructure manager and the operators.
- *Type of separation* – The Italian Administration has promoted partially integrated separation in the railway sector. Though accounting separation guarantees a fair reflection of the operation and infrastructure management activities, the consolidation of accounts within the same holding may lead to different incentivization effects than in a fully separated structure (like in the Spanish case).
- *Transport market trends* –The ambitious plan for expanding the network in Spain will surely drive the evolution of railway demand for the next years. This contextual difference may determine the financial viability in the medium and long term of a charging system only levying operational costs.
- *Intermodal competition conditions* – The conditions for intermodal competition differ in both countries as regards the existence of alternative transport modes, the infrastructure charges they bear, fuel tax, etc. The effects of changes in the infrastructure pricing principles on intermodal competition may be different in both countries and may set a relevant barrier if the operators are not able to absorb the eventual increases in the level of the charge.
- *Network characteristics* – The difference in some relevant technical characteristics between the Italian and Spanish network may condition the level of subsidization of the operation costs, as the "efficiency scenario" will be different in both cases.
- *Differences in cost structure (operators)* – Relevant differences in the cost structures of the railway operators in Spain and Italy may show different abilities to absorb an eventual redistribution or increase in the level of the charge.

2) *Indifference to external influences*

The introduction of the full cost minus State subsidies scheme should as well be free from external influences acting on the importer jurisdiction.

The main external pressure arises from the current European legal framework for the pricing of rail infrastructure, concerning the explicit mention to the marginal cost pricing principle, the "market can bear" rule and the potential discrimination of new entrants through the application of access charges.

Though it is true that the current interpretation of the Directive 2001/14/EC does also allow charging above the marginal cost level, it is as well true that it requires doing it through the application of mark-ups related to the willingness to pay of every service and not through the direct allocation of costs to the network. Additionally, the full cost minus subsidies principle must be implemented in such a way as to guarantee that no service able to pay its marginal cost is excluded from the network. This point is particularly important as regards the future liberalization of the passenger transport segment, as new entrants should not be discriminated in their access to the network.

Other external pressure arises from the profitability condition established on the railway operators as a result of the ESA-95 accounting criteria. In fact, the expected increase in the average level linked to this principle may put at risk their profitability.

From the perspective of the Government, this pricing principle guarantees the stability of the State funding over time, as it passes the cost risk to the infrastructure manager and, indirectly, to the rest of the system. However, if the final market is not strong enough as to absorb the increase in the charges, then the accounting criteria may result unfulfilled and the capital grants to the sector consolidated as debt. It is probable that under this scheme, the Public Works Ministry will calculate the level of subsidies in such a way as to guarantee that the ESA-95 criteria are met. This is basically the current approach.

As regards the Spanish Railway Law, its current writing seems to suggest that total maintenance, operation and railway infrastructure management costs are recovered in addition to the levying of part of the capital costs. However, the levels set for the charge are clearly below this limit. Probably it should be changed in order to include a mention to the availability of subsidies.

3) *Horizontal compatibility*

The adoption of the Italian pricing principle to infrastructure charges in Spain, should not be in open contradiction with the objectives and resource availability for other rail and transport policies.

Obviously, its implementation would need a change in the current principles driving the setting of track access charges. In fact, the social marginal cost principle prevails on the "*market conditions*" indicated in Art. 73. Moreover, it may enter into conflict with the "*economic feasibility*" and the "*financial equilibrium in the rendering of services*" if there are not alternative funding sources to fill the gap in revenues for the infrastructure manager.

The implementation of the principle may conflict as well with the objectives stated in the PEIT for the development of railway services, particularly where additional investments will be required on the part of the operators.

4) *Multilevel compatibility*

According to the assessment framework proposed, as the object transferred is a pricing principle, it would prevail over existing structures and levels and thus would not be subject to multilevel incompatibilities.

7.8 Synthesis

The case studies developed in this chapter have applied the conceptual framework proposed for the assessment of transferability to *six transfer problems* involving different exporter jurisdictions, aims and objects. Additionally, every case has been examined through a set of basic considerations formulated outside of the framework proposed, in order to be able to conclude on its ability to reflect them and on its robustness with respect to the objective pursued (i.e. the assessment a priori of how likely is the transferred object of being successfully implemented in the importer jurisdiction).

The *formal approach* proposed by the framework has revealed its utility to structure the analysis in every case, as well as to normalize the comparison between different transfer objects and to ensure the completeness of the information used in the preliminary stages of the transfer process. The identification of the elements of the transfer obliges the importer jurisdiction to explicitly state the object of the transfer (e.g. a charging scheme, a charging scheme together with a calculation procedure, a principle, etc.) and the objective sought with it. The definition of the level of analysis requires to clarify the dimension of the change wanted with the transfer (strategical, tactical or operational). The application of the transferability criteria forces the consideration of the relation between the transfer, the context and the charging system already in place.

The *elements* included in the framework have shown their utility for the assessment of transferability, with the only exception of the item *source of transfer*. This element, intended to provide information on the preselection criteria applied prior to the transferability assessment, is probably more adapted to the problem of selecting an object to transfer among those resulting from a preselection and less to the consideration of individual cases as those developed in this thesis. As well, the application of the framework has evidenced some ambiguity as regards the identification of *external influences* and *context conditions*. In fact, in some occasions it is not possible to identify the effective ability of the importer jurisdiction to modify external influences (e.g. national legislation) or the relations between both types of factors (e.g. up to what point the regulatory framework is a context condition or the result of external influences?). A more precise definition of these elements seems advisable in future developments of the framework.

The *levels of analysis* proposed by the framework seem appropriate to take into account the specificities related to the possible objects of transfer within the field of railway infrastructure charging (pricing principles, charging schemes and charging practices). The underlying multilevel structure clarifies the boundaries of the transfer process and articulates the relation between the object transferred and the current charging systems already in place, helping for the identification of impacts derived from the transfer and inconsistencies in the final outcome.

The *transferability criteria* enounced in the framework have shown their utility at the time of detecting possible barriers to the implementation of the transferred object in the importer jurisdiction. Although in some cases they have not been able to provide a final statement on the transferability of the object (partly because of the preliminary nature of the information available at this stage of the transfer process), they act as a screening tool able to detect points where further attention should be paid.

During the development of the case studies, some concerns have arisen as well as regards the ability of the framework to incorporate some comprehensive economic concepts, the added value of the comparative approach to the contextual variables or the consideration of transfer costs.

The first question has been supported by the evidence that some economic principles with great explanatory power with respect to the feasibility of a transfer cannot be easily expressed in terms of context factors or external influences. This is the case, for instance, of the notion of *willingness to pay*, essential for establishing the feasibility of a transfer aimed at increasing the cost recovery of the charging system. This straightforward and unitary economic concept finds a difficult coordination with the framework proposed, as it is dependent on a wide number of context factors (intermodal competition in the final market, total volume of demand, expected market trends, cost structure of the operating companies, etc.). It is also truth that the evaluation of the willingness to pay will require the analysis of the whole number of factors through a detailed study, out of the scope of the initial position occupied by the transferability assessment in the transfer process flow. In this case, the disaggregated approach offered by the framework may be used to rise warnings at an early stage related to particular aspects that could be treated with greater detail in more advanced steps of the transfer process.

The second consideration arises from the fact that in order to assess the transferability of a given object from the exporter to the importer jurisdiction, it would suffice with the characterization of the object and the context of the importer jurisdiction. According to this rationale, the criterion *indifference to context variations* should be converted in *compatibility with the domestic context*. Though this second approach would result in lower information requirements, the analysis of the cases has shown the usefulness of the comparative approach in relation to a number of aspects. In fact, the comparative approach favours a better understanding of the object being transferred (as it allows to establish a link between the object and the context conditions in the exporter jurisdiction), may simplify the identification of barriers to transferability without requiring a detailed analysis (as the contextual differences can be easily detected) and maintains the focus on the results achieved in the exporter jurisdiction as benchmark to evaluate the success of the transfer process.

The third consideration arises from the evidence that some transfers may require large modifications in the importer jurisdiction in order to ensure the correct implementation of the object transferred (e.g. changes in information systems, changes in the national legal framework, etc.). The *costs* resulting from these changes, as well as other costs linked to the transfer do not find a specific treatment among the criteria enounced. Indeed, it is believed that they should remain outside of the methodology proposed, as the information available at this stage would produce inaccurate cost estimations and the more costly modifications will be already detected in the form of differential context conditions.

As a concluding remark, it must be noted that the experience obtained through the case studies has pointed out some aspects of the framework that could be further refined (e.g. the abovementioned considerations), but has not been able to contest in any case its ability to establish necessary conditions on the objects transferred. Accordingly, the framework proposed for the assessment of transferability remains useful as a screening procedure to be applied in the early stages of the transfer process, though it seems unable to produce sufficient conditions granting the transferability of a given object (as it was expected).

Chapter 8

CONCLUSIONS

8.1 Main findings

The characterization of the charges for the use of railway infrastructure produced in this research has shown their sensitiveness to a *full array of economic and political factors*, that intervene in their definition through a complex chain including the objectives set for the railway sector, the structure of the infrastructure market (i.e. type of competition, separation or ownership adopted), the regulatory regime enforced (i.e. direct, indirect or mixed regulation), the price regulation mechanisms (e.g. direct setting, revenue cap, price cap, etc.), the pricing objectives and principles (e.g. marginal costs, average costs, etc.), the charging structure, the charging levels or their final implementation in the market.

When observed for the European scenario, the whole of these factors reflects the opposed effects of *integration and differentiation dynamics*, the first ones introduced by the legislative efforts of the EU railway reform and the second ones derived from the inertia of the national railway systems and the predominance of domestic interests. On the one hand, the European law has established the fundamental structure of railway infrastructure markets and determined the essential approach to their regulation, through the setting of access charges and priority rules at the interface with operators and the constitution of regulatory bodies able to supervise their application. It has set as well the pricing principles and the basic elements allowed in the charge. On the other hand, the inherited technical and operational characteristics of the national rail networks, the inertia of the existing institutional arrangements or the ambiguity embedded in the common regulations have favoured the customization of the structural and regulatory characteristics of railway markets and the implementation of tailored infrastructure charges. The result so far is a great dispersion among the price regulation provisions, pricing principles, charging structures, and charging levels applied throughout the EU.

It is in the conflicting relation between harmonization and national specificities that this research has detected the lack of comprehensive approaches and found the opportunity to *introduce the concept of transferability* in the field of rail infrastructure charges. This notion is seen as a tool able to guide the search of higher levels of convergence and consistency among the pricing policies of several Member States, particularly in combination with the best practice approach promoted by the EU.

As a first step, this research has *reviewed the notion of transfer* as developed in other disciplines, notably in comparative politics and management science. The efforts of comparative politics have been focused on the development of the *policy transfer* concept, still open as regards its relation to similar notions (e.g. policy learning, policy diffusion, convergence, etc.). The basic conceptual contributions of this literature are found in the relation between transfer and policy-making, the consideration of rationality and coercion in the transfer process or the analysis of transfer failure. As regards the operationalization of the transfer concept, it has developed a multilevel approach to transferability, has assumed the absence of comprehensive rationality in the process and has defined three basic steps for policy transfer (information, evaluation/adaptation and decision /implementation). Management science has produced the notion of *benchmarking*, also subject to debate because of its dynamic nature and increasingly extended application. The most valuable inputs provided by this literature result from its large operational experience, that has consolidated aspects as the cyclical steps of learning and transfer, the specific attention devoted to the monitoring and understanding of internal practices, the ordered and formal approach to the comparison process or the strong orientation towards a clear objective.

The presence of the learning and transfer steps in the benchmarking literature and the apparent overlapping of concepts such as policy learning, policy transfer and policy benchmarking has suggested a *link between the two literatures* explored. This research understands both literatures as different approaches to the same "transfer problem", with the view arising from comparative politics being a top-down approach and the view arising from management science being a bottom-up approach. Furthermore it proposes to define the relation between the notion of transferability and both literatures according to three dimensions: the *sphere* where the transfer question lies (management or policy-making spheres, with the management sphere clearly related to benchmarking); the *policy definition dimension* (referred to the point of the policy-making process where the transfer problem has arisen); and the *complexity dimension* (related to the specific complication of the transfer problem). According to these dimensions, the notion of transferability should be related to the benchmarking literature in the management sphere or when the transfer is located in well defined and lowly complex steps of policy-making, and to the policy transfer literature otherwise. This view is in harmony with the development of the benchmarking concept, eminently practical, which reached the policy sphere only after succeeding as a management tool.

As a second step, this research has proposed the *operationalization of the transfer notion* through the concepts of *transfer problem* and *transferability*. The first has been defined as the situation where an entity wants to transfer a policy or practice already successfully applied by another entity in another jurisdiction to its own jurisdiction. The second has been defined as the condition of being transferable from the exporter jurisdiction to the importer jurisdiction, meaning that the transferred policy or practice can be successfully implemented in the importer jurisdiction (i.e. it is able to achieve there the outcomes that it has already attained in the exporter jurisdiction). Accordingly, the assessment of transferability has been conceived as *a prospective exercise that tries to determine a priori how likely is an imported policy or practice of being successfully implemented in the importer jurisdiction*.

In this operationalization, several assumptions have been formulated as regards the position of the *transferability assessment* with respect to the literatures reviewed, the transfer process and the policy-making process. As regards its relation to the literature, a *high degree of complexity* has been postulated for the transfer exercise, which entails the limitation of the quantitative and defined approach of the benchmarking literature to the practice level, with the contribution of the policy transfer literature prevailing at the policy and measure levels. As regards its relation to the transfer process, this research proposes a five-step sequence (definition, selection, learning, adaptation and action) and assumes that the transferability assessment happens at the *selection phase*. Transferability is thus conceived as a *necessary condition* that must be fulfilled by the policies or practices studied in order to continue through the next stages of the transfer process. Finally, it is assumed that the relation between transferability assessment and the policy-making process takes place through the transfer process, likely to start at any point of the policy-making cycle, and particularly at the steps of *definition of options* and *implementation*.

As a third step, this research has defined a *general framework for the assessment of the transferability* of policies, measures and practices between different jurisdictions. The framework is conceived as a set of elements, levels and criteria. The *elements* are defined as the basic inputs that should be available in order to assess transferability. They are six: the jurisdictions and entities involved; the aim of the transfer process; the object being transferred; the sources of policy transfer; the external influences acting on the importer jurisdiction; and the context conditions prevailing in the importer jurisdiction. The *levels of analysis* are defined with the aim of particularizing the assessment of transferability for the different stages of the policy-making process. They are three: the strategical level (focused on the transferability assessment of policies and the decision-making process involved in their definition), the tactical level (focused on the transferability assessment of measures) and the operational level (focused on the transferability assessment of practices). The *transferability criteria* represent necessary conditions to be fulfilled by the object being transferred in order to be suitable for transfer to the importer jurisdiction. An object should be qualified as transferable to the importer jurisdiction if it is able to fulfill the criteria of *indifference to context variations* (i.e. the contextual differences between the importer and the exporter jurisdiction do not affect its outcomes), *indifference to external influences* (i.e. the external influences do not prevent its implementation), *horizontal compatibility* (i.e. it does not enter in conflict with other objects located in its same level in the policy-making process) and *multilevel compatibility* (i.e. it does not enter in conflict with other objects located in superior levels).

The particularization of this framework for the specific field of railway infrastructure charging has relied on a thorough characterization of this phenomenon according to its theoretical and practical dimensions. The comprehensive analysis of the political and economic rationales underlying the setting of track access charges has revealed the strong interrelation between this activity and other important fields of action (e.g. transport regulation, financial and budgetary issues, environmental objectives, etc.) as well as its widespread effects on a number of institutions, actors and society at large. Based on this evidence, this research proposes the *conceptualization of railway infrastructure pricing as a political decision*. The detailed study of a wide number of national charging practices in the EU-27 through the review of a very fragmented number of sources (legal frameworks, regulatory decisions, network statements, financial reports, accounting standards, etc.) has supported the identification and description of pricing principles, charging structures, charging levels and charging practices as they happen in reality. This practical experience has been incorporated to the formulation of a *decision-making process for railway infrastructure pricing policies*, able to bring together the basic "blocks" found in the theory.

The interaction between the general transferability framework and the detailed characterization of railway infrastructure pricing, has allowed the particularization of its elements, levels and criteria. The *transfer problem* is now referred to entities with decision-power about the pricing policies implemented on a given railway infrastructure. The type of objects likely to be transferred and the corresponding levels of analysis have been identified with the *pricing principles* (strategical level), the *charging schemes* (tactical level) and the *charging practices* (operational level). The context conditions have been established with respect to categories like geography, transport market, railway market, regulation, railway network, operation conditions, financial conditions, etc. The external influences have been identified with larger *structural processes* affecting the railway sector (e.g. the Europeanization dynamics embedded in the EU railway reform). The transferability criteria have been adapted to the particularities of the context conditions and the external influences, as well as to other pricing principles, charging schemes or charging practices already acting on the importer jurisdiction.

Finally, this particular framework has been tested through the development of six different case studies built on the real practice followed by an importer jurisdiction and different exporter jurisdictions. To characterize the charging practices in the various jurisdictions, the research has gone against two relevant difficulties, the first one related to the *high dispersion and low availability of the information* related to real practice followed by the national railway administrations (particularly as regards the incentives sought, the rationale behind the segmentation of the demand, the cost calculation and allocation procedures, etc.) and the second one derived from the lack of comparability of the different national practices. To overcome as much as possible these difficulties, this research has dedicated a particular attention to the collection of reliable sources on the national practices and has established a *valuable basis for the comparison* through the development of a common and structured approach to the description and analysis (both qualitative and quantitative) of the different national charging practices

The application of the transferability assessment framework proposed to the case studies has revealed the *utility of its formal approach to organize the analysis of transferability*, as well as to normalize the comparison between different "transfer problems" and to ensure the completeness of the information used in the preliminary stages of the transfer process. In fact, the identification of the elements of the transfer obliges the importer jurisdiction to explicitly state the object of the transfer and the objective sought with it, while the definition of the level of analysis requires clarifying the dimension of the change wanted with the transfer (strategical, tactical or operational). Furthermore, the application of the transferability criteria forces the consideration of the relation between the transfer, the context and the charging system already in place.

The *elements* included in the framework have shown their utility for the assessment of transferability, with the only exception of the item source of transfer, intended to provide information on the preselection criteria and probably more adapted to the problem of selecting an object to transfer among various than to the consideration of individual cases as those developed in this thesis. As well, the application of the framework has evidenced some ambiguity as regards the identification of external influences and context conditions. Indeed, in some occasions it has not been possible to identify the effective ability of the importer jurisdiction to modify external influences or the relations between both types of factors. A more precise definition of these elements seems advisable in future developments of the framework.

The *levels of analysis* proposed by the framework seem appropriate to take into account the specificities related to the possible objects of transfer within the field of railway infrastructure charging (pricing principles, charging schemes and charging practices). The underlying multilevel structure clarifies the boundaries of the transfer process and articulates the relation between the object transferred and the current charging systems already in place, making easier the identification of impacts derived from the transfer and inconsistencies in the final outcome. The *transferability criteria* enounced in the framework have shown their utility at the time of detecting possible barriers to the implementation of the transferred object in the importer jurisdiction. Although in some cases they have not been able to provide a final statement on the transferability of the object (partly because of the preliminary nature of the information available at this stage of the transfer process), they act as a screening tool able to detect points where further attention should be paid.

During the development of the case studies, some concerns have arisen as well as regards the ability of the framework to incorporate some comprehensive economic concepts, the added value of the comparative approach to the contextual variables or the consideration of transfer costs.

The first question has been supported by the evidence that some economic principles with great explanatory power as regards the feasibility of a transfer cannot be easily expressed in terms of context factors or external influences. This is the case, for instance, of the notion of *willingness to pay*, essential for establishing the feasibility of a transfer aimed at increasing the cost recovery of the charging system. This straightforward and unitary economic concept finds a difficult coordination with the framework proposed, as it is dependent on a wide number of context factors (intermodal competition in the final market, total volume of demand, expected market trends, cost structure of the operating companies, etc.). It is also truth that the evaluation of the willingness to pay would require the analysis of the whole number of factors through a detailed study, out of the scope of the initial position occupied by the transferability assessment in the transfer process flow. In this case, the disaggregated approach offered by the framework may be used to rise warnings at an early stage related to particular aspects that could be treated with greater detail in more advanced steps of the transfer process.

The second consideration arises from the fact that in order to assess the transferability of a given object from the exporter to the importer jurisdiction, it would suffice with the characterization of the object and the context of the importer jurisdiction. According to this rationale, the criterion *indifference to context variations* should be converted in *compatibility with the domestic context*. Though this second approach would result in lower information requirements, the analysis of the cases has shown the usefulness of the comparative approach in relation to a number of aspects. In fact, the comparative approach favours a better understanding of the object being transferred (as it allows to establish a link between the object and the context conditions in the exporter jurisdiction), may simplify the identification of barriers to transferability without requiring a detailed analysis (as the contextual differences can be easily detected) and maintains the focus on the results achieved in the exporter jurisdiction as benchmark to evaluate the success of the transfer process.

The third consideration arises from the evidence that some transfers may require large modifications in the importer jurisdiction in order to ensure the correct implementation of the object transferred (e.g. changes in information systems, changes in the national legal framework, etc.). The *costs* resulting from these changes, as well as other costs linked to the transfer do not find a specific treatment among the criteria enounced. Indeed, it is believed that they should remain outside of the methodology proposed, as the information available at this stage would produce inaccurate cost estimations and the more costly modifications will be already detected in the form of differential context conditions.

As a concluding remark, it must be noted that the experience obtained through the case studies has pointed out some aspects of the framework that could be further refined (e.g. the abovementioned considerations), but has not been able to contest in any case its ability to establish necessary conditions on the objects transferred. Accordingly, the framework proposed for the assessment of transferability remains useful as a screening procedure to be applied in the early stages of the transfer process, though it seems unable to produce sufficient conditions granting the transferability of a given object (as it was expected).

8.2 Future research

From the theoretical and empirical work done, it has been possible to conclude that the proposed framework is sufficiently robust for its implementation in diversified contexts. However, some of the assumptions formulated at the time of designing the framework and the experience obtained through the case studies have pointed out some aspects that could be subject to further research.

The areas where it has been detected insufficient knowledge, with a particular relevancy for the further expansion and improvement of the proposed framework are:

- The development of a more precise definition of *external influences* and *context conditions*, possibly particularized for the different levels of analysis foreseen in the framework.
- The development of a better understanding of the *interdependencies* arising among the transferability criteria and particularly the relations existing between context conditions, external influences and the charging systems currently implemented in some railway administrations.
- The improvement of the ability of the proposed framework to incorporate some *comprehensive economic concepts* like the willingness to pay within its formal structure.
- The formal inclusion of *dynamic considerations* in the framework. Based on them, the evaluation of transferability should also try to reflect on the evolution of the local policies and contexts or external influences to foresee if the limitations to transferability will still be valid at the effective moment of implementation.
- The exploration of possible *sufficient conditions* related to the aim of the transfer and specific to each level of analysis able to guarantee the successful implementation of the transferred object in the importer jurisdiction.
- The development of a more detailed assessment procedure, coordinated with the present framework, able to provide relevant inputs to decision-makers during the *adaptation phase*. It should be able to determine whether and how the transferability conditions associated to a specific transfer could be improved.
- The enlargement of the case studies basis used for the *conceptual validation* of the framework proposed. If possible, the validation already done should be completed with documented cases of transfer of charging policies or practices between railway administrations.

Abbreviations

§	Paragraph
ADIF	*Administrador de Infraestructuras Ferroviarias* (Spanish Infrastructure Manager)
AEFP	*Asociación de Empresas Ferroviarias Privadas* (Private Railway Companies Association - Spain)
AEG	*Allgemeines Eisenbahngesetz* (General Railway Law - Germany)
AGCM	*Autoritá Garante della Concorrenza e del Mercato* (Competition Agency - Italy)
App.	Appendix
APQC	American Productivity and Quality Center
Art.	Article
AT	Austria
ATOC	Association of Train Operating Companies
AZP	*Agencija za Zeleznice Promet Republike Slovenije* (Slovenian Infrastructure Manager)
B.U.	Business unit
BE	Belgium
BEST	Benchmarking European Sustainable Transport (EU thematic network)
BG	Bulgaria
BGBI	*Bundesgesetzblatt* (German Official Journal)
BOE	*Boletín Oficial del Estado* (Spanish Oficial Journal)
CEO	Chief Executive Officer
CES	*Consejo Económico y Social* (Economic and Social Council - Spain)
CfIT	Commission for Integrated Transport (UK)
CFL	*Société Nationale des Chemins de Fer Luxembourgeois* (Luxembourg Railways)
CFR	*Compania Nationala de Cai Ferate*

	(Romanian Railways)
CIPE	*Comitato Interministeriale per la Programmazione Economica* (Interministerial Committee for Economic Planning - Italy)
CMPS	Centre for Management and Policy Studies (UK)
CP	*Caminhos de ferro Portugueses* (Portuguese Railways)
CRF	*Comité de Regulación Ferroviaria* (Railway Reguation Committee - Spain)
CRRD	Congested Related Reactionary Delay
CZ	Czech Republic
D.R.	*Diário da República* (Portuguese Official Journal)
DB	*Deutsche Bahn* (German Railways)
DE	Germany
DfT	Department for Transport (UK)
DG	Directorate General
DGF	*Dirección General de Ferrocarriles* (Directorate General for Railways - Spain)
DGTREN	Directorate General for Transport and Energy (EU)
EC	European Commission
ECMT	European Conference of Ministers of Transport
EGTM	Equivalent Grosse Tonne Mile
EE	Estonia
EES	European Employment Strategy
EIB	European Investment Bank
EIBV	*Eisenbahninfrastruktur-Benutzungsverordnung* (Railway Infrastructure Use Regulation - Germany)
EICIS	European Infrastructure Charging Information System
EIM	European Rail Infrastructure Managers
EL	Greece
EPIC	*Établissement Public Industriel et Commercial* (Public Business Entity - France)
ERA	European Railway Agency
ERDF	European Regional Development Fund

ES	Spain
ESA	European System of Accounts
EU	European Union
EU-12	Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and United Kingdom
EU-15	EU-12 + Austria, Finland and Sweden
EU-25	EU-15 + Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic and Slovenia
EU-27	EU-25 + Bulgaria and Romania
EWS	English, Welsh and Scottish Railway
FEVE	*Ferrocarriles Españoles de Vía Estrecha* (Narrow Gauge Spanish Railways)
FC	Full Cost
FC-	Full Cost less State Contribution
FI	Finland
FR	France
FS	*Ferrovie dello Stato* (Italian Railways)
GAAP	Generally Accepted Accounting Principles
GDP	Gross Domestic Product
GIF	*Gestor de Infraestructuras Ferroviarias* (High speed Infrastructure Manager - Spain)
HLGB	High Level Group on Benchmarking (EU)
HLOS	High Level Output Specifications (UK)
HOV	High Occupancy Vehicle
HSL	High speed Line
HSR	High speed Rail
HU	Hungary
IE	Ireland
IM	Infrastructure Manager
INTF	*Instituto Nacional do Transporte Ferroviário* (Portuguese Rail Regulatory Body)
IT	Italy
IVW	*Inspectiedie Verkeehr en Waterstraat* (Dutch Safety Inspectorate)

J.O.R.F.	*Journal Officiel de la République Française* (French Official Journal)
KPI	Key Performance Indicator
LDZ	*Latvijas Dzelzcelsh State* (Latvian Infrastructure Manager)
LG	*Lietuvos Gelezinkeliai* (Lithuanian Railways)
LGV	*Ligne à grande vitesse* (High speed Line)
LRMC	Long Run Marginal Cost
LU	Luxembourg
LV	Latvia
MC	Marginal Cost
MC+	Marginal Cost Plus Mark-ups
MTO	Medium Term Budgetary Objective
n.d.	No date
n/a	Non applicable / Non available
NL	The Netherlands
NS	*Nederlandse Spoorwegen* (Dutch Railways)
OBB	Austrian Railways
OECD	Organization for Economic Co-operation and Development
OMC	Open Method of Coordination (EU)
ORR	Office of the Rail Regulator / Office of Rail Regulation (UK)
OSS	One Stop Shop
p./pp.	Page / pages
Pax-km	Passenger-km
PEIT	*Plan Estratégico de Infraestructuras y Transporte* (Infratructure and Transport Strategic Plan – Spain)
PL	Poland
PLK	*Polskie Linie Kolejowe* (Polish Infrastructure Manager)
PSO	Public Service Obligation
PT	Portugal
RAB	Regulatory Asset Base

RDC	Railroad Development Corporation
Rec.	Recital
REFER	*Rede Ferroviária Nacional* (Portuguese Infrastructure Manager)
REFIG	*Red Ferroviaria de Interés General* General Interest Railway Network (Spain)
RENFE	*Red Nacional de los Ferrocarriles Españoles* (Spanish Infrastructure Manager)
RFF	*Réseau Ferré de France* (French Infrastructure Manager)
RFI	*Rete Ferroviaria Italiana* (Italian Infrastructure Manager)
RHK	*Rahatallintokeskus* (Finnish Infrastructure Manager)
RNE	RailNetEurope
RPI	Retail Price Index
ROR	Rate of Return Regulation
ROSCO	Rolling stock leasing company
RSSB	Rail Safety and Standards Board
RU	Railway Undertaking
SE	Sweden
SEITT	*Sociedad Estatal de Infraestructuras del Transporte Terrestre* (National Agency for Land Transport Infrastructure - Spain)
SI	Slovenia
SJ	*Statens Järnvägar* (Swedish Railways)
SK	Slovakia
SME	Small and Medium Enterprises
SNCF	*Société Nationale des Chemins de Fer* (French Railways)
SPI	Strategic Planning Institute
SRA	Strategic Rail Authority
SRMC	Short Run Marginal Cost
SZDC	*Správa železniční dopravní cesty* (Czech Infrastructure Manager)
TEN-T	Trans European Transport Network

TEU	Transport Equivalent Unit
TQM	Total Quality Management
TOC	Train Operating Company
Ton-km	Tonne-Kilometre
TSI	Technical Specifications for Interoperability
UIC	International Union of Railways
UK	United Kingdom
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
US	United States of America
WTP	Willingness to pay
ZSR	*Zeleznice Sloveskej Republiky* (Slovak Infrastructure Manager)

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