

Railways safety management organisation: the Italian case

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Abstract

One of the main consequences brought by liberalisation in the European railway market is the separation between the railway managers and the railway undertakings. Safety professionals of the sector stress that the separation of infrastructure management from rail traffic operations could affect the railways safety performances, bringing confusion into the whole safety management process. In order to mitigate these *side effects*, the EU is strongly committed to defining adequate measures, contained in specific Directives proposals. In order to respond to the European safety regulatory framework, the Italian safety management organisation has been deeply modified: a single entity no longer has full responsibility for safety in the restructured national railway sector. Safety management in Italy concerns the adoption of the EU Directives, the organisation of the subjects involved and the safety investments plan; distinctions between the operative responsibilities of the infrastructure managers and the railway undertakings on one side and the regulatory and supervisory responsibility of the Ministry on the other will be presented. Within this organisation, the paper also presents the work progress of the strong public long-term investments plan adopted in Italy, showing both the main objectives to be reached and the amount invested in these plans. Finally, the paper focuses on the statistics about railway accidents, presenting the Italian safety performances in order to point out the evolution of the rail safety level. The paper also compares the Italian data with the main European rail networks; this sector has been recently modified by the introduction of the EU Regulation 91/2003, the objective of which is to establish common rules for the production of Community rail transport statistics.

Keywords: railways safety management in Italy, railways accidents, infrastructure managers, railways undertakings, EU Regulation 91/2003.



1 The European Directives framework

The current European national railways are the results of a very long development started in the first half of the 19th century; this process has continued to evolve into the complex rail system as we know it nowadays. Due to the fact that railways always played a crucial role in the development of national economies, the technological solutions met just national requirements. This has led to an European railway system consisting of a several badly interconnected national systems.

Therefore, legislative measures at European level were necessary to achieve the goals set out in the Treaty of Rome and the Common Transport Policy. These measures consist of Regulations and Directives, which have been adopted by the European Council.

The European Union has rail at the top of its transport agenda, proposing specific initiatives covering, among others, open access to infrastructure, building a single European supply market and creating a Trans-European Network (TEN). Moreover, in 1996 the European Commission issued the High Speed Interoperability Directive 96/48/EC. The directive aims to ensure high-speed trains can run freely across the European high-speed network and that railway equipment can be traded without restrictions. This Directive sets out a number of 'essential requirements' to be met for interoperability, including safety requirements for products and six subsystems: maintenance, control command and signalling systems, infrastructure, energy, operations and rolling stocks. Technical Specifications for Interoperability (TSI) define the specifications to satisfy these essential requirements for each subsystem. In 2001 also the Conventional Speed Interoperability Directive was published (Directive 2001/16/EC).

As for railways safety, there is a specific draft directive included in the so called “**second railway package**”, proposed by the Commission in January 2002. This draft represents the first relevant attempt in order to introduce an overall European legislation for railway safety to enable a completion of the regulatory framework for an integrated European rail system. This integration is strong required because the European rail system has been designed and developed during a period of more than 150 years and different technologies exist side by side or are stratified one over the other. For example, high-speed trains run on the conventional rail network, ATP may not be affordable on all the various secondary lines and hundreds of thousands of level crossings are reminders of a past era when safety standards were very different.

In general, it is possible to affirm that major accidents have complex causes that often fall back on failures of the organisation, i.e. the railway undertaking or the infrastructure manager as part of the system (or both of them). Behind a SPAD (Signal Passed At Danger), a broken wheel or a broken rail lies normally a chain of events that shows that accidents are caused by failures shared by all people and their organisations.

Professionals of railways filed thus agree that remedial measures must be taken on organisational level. The railway organisation shall move from the



“normative-punitive” approach to an “active-generative” approach. The key point is that a shared-learning and a more open mentality have to be part of the new culture: the accident must be seen as the failure of the whole organisation, and not as a mere mistake of an individual, often located at the end of the production line.

Another important point is to encourage the transformation of rail transport into a service like other network based services. In this way, railways networks should be opened up, competition should be introduced and self-regulation should be replaced by public regulation. If rail wants to challenge the other modes it should work under similar conditions as its competitors; this is particularly true for safety regulation and management. The introduction of the possibility to operate cross-border rail traffic requires that safety issues be transferred to the public domain, where the relevant processes be safeguarded by public authorities. Anyway, the draft directive recognises the ongoing separation of functions, in particular between management of infrastructure and operation of rail transport services.

In summary, the proposed directive on safety addresses four main problem:

1. harmonisation of the safety regulatory structure and the content of safety rules;
2. remaining obstacles to further market opening;
3. transparency and information on safety;
4. investigation of serious accidents and incidents.

It is to be pointed out that this directive is linked to other proposals in this same “second package”, in particular the proposal to amend the directives on interoperability and the proposal to create a European Rail Agency.

To modernise and **harmonise** the safety regulatory structure and the content of safety rules in the Member States means that responsibilities are defined and distributed in a common manner. The directive states also that infrastructure managers and railway undertakings bear together the responsibility for safety on the railway networks and for the control of risks. Moreover, national authorities in the Member States with responsibility to regulate and supervise safety should be created.

The second problem addressed by the directive is the **removal of existing barriers** to the market opening up. The safety certificate is still recognised as the means to achieve access to infrastructure; the draft directive further develops this concept by introducing common requirements of a SMS (Safety Management System) that must be implemented also by infrastructure managers. The safety certificate is divided into two parts: one general (covering the SMS issues) and one specific for each territory (covering national rules and procedures, staff and rolling stock). The final goal is to create a European safety certificate valid all over the Community; to achieve this result, European Commission underlines that it is very important to increase confidence between players market and between Member States. For that purpose the proposed directive introduces a mechanism based on Common minimum Safety Targets (CST) that all railway systems and their different parts should be able to meet.



The third problem concerns **transparency and information** in the railway regulation field. The proposed directive lays down the Common Safety Indicators (CSI); these indicators will make possible to monitor the development of railway safety at European level. Railway undertakings and infrastructure managers will submit annual reports to their national safety authority, which in its turn will publish an annual report, making it available to the European Rail Agency.

The fourth area addressed by the directive is **investigation** of accidents and incidents. It is possible to affirm that rail accidents are quite rare, but when they happen they often have an enormous impact on public opinion. Due to that, technical failures and managerial deficiencies should therefore be more easily detected by making information available within the sector. To achieve this it is important to separate the safety investigation from the judicial (police) inquiry. Safety investigation should be carried out by an independent body; since root causes of an accident often can be traced back to the regulatory framework, this investigation body should also be independent of the safety regulator.

It is important to note that this safety directive proposal must not be seen as an isolated piece of legislation: it continues, on “system level”, what the interoperability directives introduced on “sub-system level”, and it is used for the development of the Technical Specifications for Interoperability (TSI). Thus interoperability and safety will be developed in a consistent and coherent way. This proposed directive is also closely linked to the establishment of the European Rail Agency, as proposed by a separate draft regulation in the “second package”. The directive role is to provide a framework for development of the common approach to safety, whereas the specific contents will be elaborated by the Agency with the close participation of all involved actors (infrastructure managers, railway undertakings and manufacturers).

It should be noted that safety features related to various subsystems are not covered by the safety directive described in this chapter, but by the essential requirements on safety contained in the directives on interoperability (Directive 96/48/EC for high-speed rail and Directive 2001/16/EC for conventional rail).

2 The Italian railways safety organization

Italy has deep changed its own railways organization: following the principles contained in the Directive 91/440/CE, the infrastructure management has been separated from the rail transport services organization. Thus, a deep separation process has been taken place since 1998, leading the Italian railways to a new organization. The single entity Ferrovie dello Stato S.p.A. had the whole responsibility of both the infrastructure management and rail transport services. Nowadays two separated companies exist: RFI S.p.A. as infrastructure manager and Trenitalia S.p.A. as railways undertaking.

In this chapter the organization of Italian railways is contained, focusing on the safety management system adopted by the infrastructure manager. Moreover, the long term safety investment plan implemented by the infrastructure manager will be presented.



2.1 Organization and responsibilities

As mentioned above, the Italian railways organization has suffered a deep transformation process which led the former single entity Ferrovie dello Stato S.p.A. to be separated in two companies. This process has been carried out following the principles contained in the EU Directive 91/440, implemented in Italy by the adoption of the DPR n.277/98 (now substituted by the Dlgs n.188/03). The aim of the Directive was to increase the efficiency of community railways by, among other measures, separating the management of railway operation and infrastructure from the provision of railway transport services. It is to point out that only the separation of accounts was compulsory, whereas organizational or institutional separation was optional.

So Italy, with the adoption of the national law DPR n.277/98, went over the European indications, creating two separated companies (RFI S.p.A. and Trenitalia S.p.A.); in this way, a deep institutional separation between the infrastructure management activities and the rail transport services has been carried out.

To sum up, the present Italian safety organization can be described as follows:

- European Union adopts several Directives on railways transport field (opening of the market, safety certifications, licensing of railways undertakings, infrastructure capacity and charges for its use, etc.); these Directives are subsequently adopted in Member States by national implementation measures (national laws). In case Regulations instead of Directives are adopted, these shall be binding in their entirety and considered directly applicable in all Member States;
- the Italian Ministry of Infrastructures and Transport, after having received the proposals from the infrastructure manager, adopts the safety norms and standards for the Italian railways system following national and European legislation. The same Ministry issues the licences to the railways undertakings;
- the infrastructure manager proposes the safety norms and standards to the Ministry of Infrastructures and Transport; moreover, it grants the safety certificate to the railways undertakings. The safety certificate and the licence are the necessary documents to carry out a rail transport service;
- the railways undertakings must obtain both the licence from the Ministry of Infrastructures and Transport and the safety certificate from the infrastructure manager. Once obtained these documents, they can perform rail transport services while complying the instructions issued by the infrastructure manager.
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The Italian railways safety organization framework above described is illustrated in Figure 1.



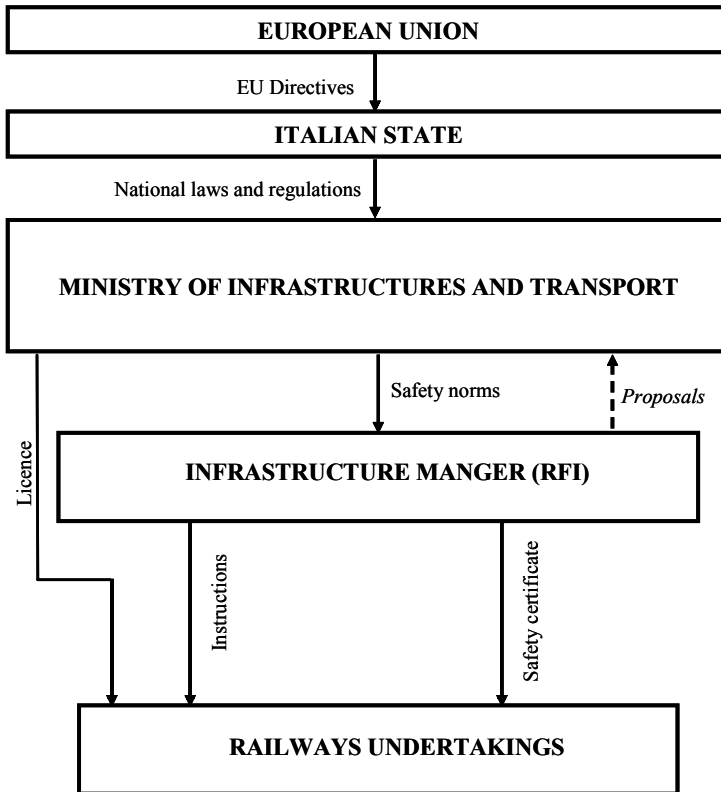


Figure 1: The Italian railways safety framework.

2.2 The safety management system (SMS)

The draft proposal on safety on Community's railways described in Chapter 1 allows, in its article 9, infrastructure managers and railway undertakings establish their safety management systems to ensure that the railway system of their competence is in conformity with CST (Common minimum Safety Targets), CSM (Common Safety Methods) and TSI (Technical Specifications for Interoperability); in the absence of TSI, CST and CSM, the safety management system shall meet requirements laid down in national safety rules.

This proposal focuses on the introduction of a SMS because the directives currently in force have not explicitly required a safety management system (although references to the internal organisation of the railway undertaking could imply the establishment of such a system). The SMS requirements apply equally to railway undertakings and infrastructure managers, whereas only the safety management system of the railway undertaking is subject to certification. Member States are, however, allowed to introduce national certificates or licences for their infrastructure managers.

The safety management system must be documented in all relevant parts and shall in particular describe the distribution of responsibilities within the organisation of the infrastructure manager or the railway undertaking. It shall show how control from the management on different levels is secured, how staff and their representatives on all levels are involved and how continuous improvement of the safety management system is ensured.

Basic SMS elements are described in Annex III of the proposed directive; these requirements can be summarized as follows:

- a) a safety policy approved by the organisation's chief executive and communicated to all staff;
- b) procedures and methods to carry out risk evaluation and implement risk control measures whenever a change of the operating conditions or new material imposes new risks on the infrastructure or on operations;
- c) procedures and formats for how safety information shall be documented;
- d) procedures to ensure that accidents, incidents, near misses and other dangerous occurrences are reported, investigated and analysed and that necessary preventive measures are taken;
- e) provisions for recurrent internal auditing of the safety management system.

As for the Italian case, it is to point out that the Italian infrastructure manager RFI has already introduced a SMS addressed both to the railways undertakings and to two of its own Divisions (Maintenance and Operation). This SMS has been introduced and defined by RFI with the adoption of the Instruction n. 13/01, which contains the same requirements included in the draft directive. So, it is possible to say that, although the SMS defined by the Italian infrastructure manager RFI is not yet fully implemented, the Italian safety organization has indeed anticipated the principles laid down in a European directive still to be adopted. Italy is therefore in the forefront of safety management system, especially considering that other European railways cannot undertake this process while the necessary condition of a clear-cut division between infrastructure managers and railways undertakings is not fulfilled.

2.3 Public long-term investments

Relations and obligations existing between the infrastructure manager RFI and the Italian State are regulated by the so called "Contratto di Programma" (Program Contract), which defines the total amount of investments dedicated to the improvement of the Italian railways network. At present it is in force the Program Contract 2001-2005, which extends and substitutes the former Program Contract 1994-2000. The operative document of the PC (Program Contract) 2001-2005 is represented by the PPI - Piano di Priorità degli Investimenti (Investments Priorities Plan), which covers, besides the investments included in the PC 2001-2005, other important infrastructural investments. These are basically:

- investments included in the PC 1994-2000 that need more financial backing;



- investments included in the special law L.443/01 (so called “Legge Obiettivo”) for strategic infrastructures;
- special investments for strategic infrastructures in the South of Italy.

The total amount of the PPI is 94.229 M€ (considering the Life Cycle Cost of each project); the projects to set up within the PPI cover a 10 years period. These projects are subdivided in four main aspects: conventional rail network (21.373 M€), extraordinary maintenance (2.918 M€), High Speed network (31.761 M€) and, finally, those projects to be undertaken under the special law “Legge Obiettivo” L. 443/01 (38.177 M€).

The methodology adopted to define the investments priorities compared the different impacts originated by each investment; these impacts had been evaluated in terms of:

- transport impacts: the urgency level results from the present performances compared to the expected ones;
- company impacts: the earning performance of each project had been evaluated basing on the expected traffic volumes.

Basing on this criteria, RFI laid down six main goals, listed hereafter in their importance order:

1. safety improvement and law obligations;
2. efficiency and productivity;
3. lines and main junctions bottlenecks elimination;
4. transport offer quality improvement;
5. freight rail network development;
6. investments dedicated to the South of Italy.

Therefore railways safety is at the top of the RFI priorities list; the total amount dedicated to this objective, entirely included in the “conventional rail network” PPI area of investment, is 3.261 M€. Projects related to the Italian signalling and control system SCMT, to the axes of bearing thermic survey and to the safety in rail tunnels are, among others, included in this priority objective.

As well as the mentioned projects, there are also two complementary plans related to the rail safety; these plans are prior to the elaboration of the PC 2001-2005 and consequently of the PPI. These plans are named PSRR (“Piano Straordinario di Revisione della Rete”, extraordinary network overhauling plan) and PSPL (“Piano di Soppressione dei Passaggi a Livello”, level crossings elimination plan).

The first includes works addressed to the infrastructure improvement, and is financed both by the PC 1994-2000 and PC 2001-2005. The second aims at eliminating the 7.500 level crossing still operating on the main lines by 2007; it is financed by the PC 1994-2000 and two specific laws (L.189/83 and L.354/98, which allocate further investments for a total amount of 750 M€).

3 Statistics on railways accidents

Basing on the figures, we can say that rail is a safe mode of transport, especially if compared to another means of transport. Railways safety has greatly improved over the years: available European statistics (providing that they are fully



reliable) show that railway fatality rates have decreased from a total of 2004 in the current EU15 states in 1970 to 957 in 1998. Moreover, most passenger fatalities occur when boarding or alighting trains, not as a result of train accidents. These figures derive from a huge technical and organisational development: manual train dispatching has been replaced by automatic signalling and centralised traffic control; the number of level crossings has been reduced and manual operation have been replaced by modern control technologies. But technological improvement is not enough: it is necessary indeed to promote an “active” safety culture, to be introduced by modern SMS (safety management systems). The combined development of SMS and new technologies will bring certainly huge benefits in rail safety.

As for accidents statistics, it is to point out that the mere number of accidents occurred per year on a certain rail network is not a sufficient parameter to outline a reliable network safety level. Indeed, the number of accidents has to be related to the traffic volumes performed: Table 1 shows the relative accidents data for five main European rail networks. These data derive from the number of accidents divided by the traffic volumes (millions of trains-km).

As it results from the figures, Italian rail network is the safer one; please note that data for 2001 and 2002 are not available for all the European rail networks due to the fact that, till now, accidents data collection and transmission was not mandatory. Anyway, Italy still presents a positive trend: 0,28 and 0,27 are indeed the relative accidents data for the Italian network in 2001 and 2002.

Table 1: Relative accidents data (accidents / millions trains-km).

Rail Network	1993	1994	1995	1996	1997	1998	1999	2000
FS (Italy)	0,63	0,43	0,46	0,50	0,42	0,31	0,30	0,29
SBB (Switzerland)	0,84	0,70	0,50	0,31	0,55	0,33	0,47	0,40
DB (Germany)	0,72	0,72	0,78	0,72	0,69	0,70	n.a.	0,56
RENFE (Spain)	0,66	0,66	0,58	0,55	0,45	0,35	0,42	0,37
SNCF (France)	0,62	0,62	0,62	0,62	0,63	0,64	0,59	0,64

3.1 Regulation EC n. 91/2003 on rail transport statistics

As mentioned before, accidents data were collected in a not mandatory way by the infrastructure national managers and sent to UIC, which provided annual reports about rail accidents in its “Table A91”.



Nowadays precise and reliable statistics on rail safety are required by the European Commission in order to prepare and monitor Community actions in the field of transport safety. Moreover, the restructuring of the rail industry under Directive 91/440/EC, as well as changes in the type of information required by the Commission and by other users of Community statistics on rail transport, renders obsolete the Council Directive 80/1177/EC, which covered just goods transport and presented a low quality statistics level. The situation where some data are supplied under Council Directive 80/1177 while other data are supplied to Eurostat on a voluntary basis is no more acceptable for the forthcoming European internal market.

Therefore Regulation EC n.91/2003 on rail transport statistics (amended by Commission Regulation EC n.1192/2003) establishes common rules for the production of Community rail transport statistics. In particular, Annex H of this Regulation concerns rail accidents: it is basically confirmed the former data organization used by UIC (number and type of accidents, category of persons involved), but there are two relevant additions: the first concerns the introduction of a new type of accident (fires in rolling stocks), while the second adds the table containing the number of accidents involving the transport of dangerous good. The first year reference of Annex H is 2004, and data have to be transmitted by May 2005.

The main expected benefits deriving from this Regulation are basically an higher information quality about the rail transport market: these reliable data can be used by operators both to benchmark their operations against the industry average and to seek finance for major projects. Independently validated statistical data will be indeed very useful to banks since it could give objective information on the viability of projects.

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