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STUDY OF THE SITUATION OF RAILWAYS IN MEMBER COUNTRIES

Transmitted by the Armenian Railways, the Government of Sweden, Turkish Railways and the
Government of the United Kingdom

ARMENIA

Data on past and future developments of rail passenger and goods traffic:

Indicators	2003	2004	2005 (programme)
Freight traffic	2125.5	2629.6	3800.0
Passenger traffic	1086000	847164	880000

Agreements were concluded with the World Bank concerning the credit for renewal of the infrastructure and rolling stock of the Armenian Railway. After significant repair of particularly dangerous and worn-out areas, a 55.5 kilometre track had been delivered for use.

SWEDEN

For data and information on the situation of the railways in Sweden and past and future developments of rail passenger and goods traffic, as well as new developments, including investments in rail infrastructure and railway rolling stock, please consult the report Rail Traffic 2002–2003 issued by the Swedish Institute for Transport and Communication Analysis; http://www.sika-institute.se/databas/data/ss_2004_5.pdf

Information on research activities in the field of railway transport

Banverket is a government agency responsible for the development of the Swedish rail infrastructure. Research, Development and Demonstration are instruments to reach Banverket's overall mission which is a competitive rail transportation system. This means that Banverket has a so-called system responsibility for R. & D., comprising tracks, vehicles, and the protection of the environment, customer relations, door-to-door transport intermodality, design/architecture and more.

In this work, Banverket cooperates with other national funding bodies, listed below. The R. & D. philosophy of Banverket is based on four principles:

- Dialogue between the problem owners and Suppliers of Knowledge
- Knowledge Development for direct support of the Railway System
- Supply of competence to the Railway System
- Long-term knowledge development and support of important national R. & D. bodies.

Banverket has recently presented a new R. & D. programme which contains four parts:

Part 1: Implementation of new knowledge into products and services.

Part 2: Design and promotion of profitable railbound solutions (door-to-door transportation, accessibility to the rail system for all, customer demands, IT, intermodality, vehicles and more).

Part 3: The strengthening of the safety level of the rail systems safety, its security for goods and passengers and its environmental properties (risks, passenger safety, level crossings, safe stations, sustainable mobility, noise/vibrations, preservation of biological diversity and cultural heritage, energy and emissions and more).

Part 4: Development of the fixed infrastructure (civil engineering works, signalling, power supply, traffic control, maintenance, procurement).

Banverket is interested in cooperating within the EU framework programmes for research with R. & D. actors in the new member States. It is a member of ERRAC, European Rail Research Advisory Council. It also participates in the International Union of Railways (UIC) Technical and Research Forum. Banverket sponsors national partners for participating in consortia applying for EU grants.

Banverket is, furthermore, looking into new project ideas:

- Use of modern IT for condition-based maintenance of infrastructure and rolling stock for networks with heavy load and mixed traffic operating under winter conditions;
- New user-friendly rail vehicles. Sweden will put in place a vehicle research programme (Green Train) and welcomes participation from other parties;

- Efficient Freight logistics for new up end market goods, e.g. high-speed freight trains for door-to-door deliveries;
- Port-to-door container handling systems without marshalling;
- The pick up of possible business opportunities from potential customers needs.

National Partners:

Railway Group KTH (Vehicle Topics); Charmec CTH (Wheel Rail Interaction); Uppsala University (Man Machine Interface, Traffic Control); Luleå Technical University LTU (Heavy load, winter conditions); VTI Transport Research Institute (Train simulators, comfort, stations safety); TFK (DUO trains, freight wagons, intermodality); TFK is also the Swedish coordinator of EURNEX; SICS Swedish Institute for Computer Science (capacity, simulations)

Practical experiences with the application of global positioning systems in rail freight transport

As an infrastructure manager, Banverket is using GPS-based geodesy applications for the identification of the national geodetic reference network. In land surveying, GPS is used for measurements of some objects, but not track. It is anticipated to change to a satellite based reference system, and to gradually start using use GPS/Galileo technology to accurately position tracks and fixed installations.

Banverket does not use GPS positioning systems for the tracking of freight vehicles. In Banverket train control system, trains are tracked in the train control system so far as where they are in our network and the EAT, Estimated Arrival Time. However, there is a European Commission Regulation, called TSI TAF, Telematic Applications for Freight, which is aimed at facilitating the tracking and tracing of freight vehicles. Banverket is, at the moment, engaged within the International Railway Union, UIC, in which it is a member, in the work demanded by the Commission in establishing a Strategic European Deployment Plan for the TSI TAF.

However, some private wagon owners use GPS for localising their wagons and for the surveillance of, for example, temperatures for the transport of perishable goods. GPS-equipment can also be found installed in locomotives and in EMU/DMUs.

Railway safety: Risk assessment techniques

The Swedish National Rail Administration (Banverket) has in recent years employed a risk assessment technique known as "Control Self-assessment" (CSA) in order to try to control possible risks that might arise as a result of organizational changes or the introduction of new or changed rules or working methods. The technique, which is based on expert judgments, does not yield any quantitative risk assessment but aims at identifying possible risks associated with changes and finding suitable ways of mitigating those risks.

TURKEY

Data on past and future developments of rail passenger and goods traffic

PASSENGER TRAFFIC

No. OF PASSENGERS	2004 REALIZATION	2005 PROGRAMME
Suburban	50,590,437	60,000,000
Mainline	26,165,499	30,000,000
Main line Inland	26,049,853	29,800,000
Main line International	115,646	200,000
TOTAL	76,755,936	90,000,000

- All trains which are not economical will be cancelled until 2008.
- Ankara-Istanbul Railway Reconstruction Project will be completed in 2007.
- Increasing of capacity of Istanbul suburban railway line (Gebze-Halkali) to three lines and Bosphorus Tube Crossing Project will be completed in 2009.
- Izmir suburban line system will begin operation 2008.

GOODS TRAFFIC

	2002 REALIZATION	2003 REALIZATION	2004 REALIZATION	2005 PROGRAMME
TONS				
Inland	13,125,023	14,040,113	15,408,261	16,900,000
International	1,300,703	1,714,823	2,299,893	2,800,000
Total	14,425,726	15,754,936	17,708,154	19,700,000
Administrative	185,000	181,000	276,300	300,000
Grand Total	14,610,726	15,935,936	17,984,454	20,000,000
TONS/KM (000)				
Inland	6,613,400	7,854,529	8,225,646	9,250,000
International	553,115	757,708	1,106,606	1,250,000
Total	7,166,515	8,612,237	9,332,252	10,500,000
Administrative	55,500	54,300	82,890	90,000
Grand Total	7,222,015	8,666,537	9,415,142	10,590,000

- Block and heavy train use is currently becoming widespread.
- All locomotives and wagons are equipped with automatic draw gears.
- Trains will be structured in accordance with product composition.
- Importance is given to international and combined transport.
- The rotation period will be decreased by 50%.
- The opportunity will be given to the 3rd party to realize passenger and goods transportation on TCDD lines.

New developments

As a result of the reorganization of the railway sector, a Twinning Project has been initiated in January 2005 especially to cover the establishment of new railway companies. An in-situ Project Advisor and Mid-Term Advisor arrived in Turkey and they have started working with Project groups. The Project has been announced to the public and launched in March 2005 with a kick-off meeting. This Project is planned to be completed within 18 months. The Draft Railways Framework Act will be submitted to the Transport Ministry and the use of railways substructures will be free for private companies after the draft is promulgated.

Investments in rail infrastructure, and railway rolling stock

Rail infrastructure

The following investments are planned in TCDD:

- 2,304 km railway reconstruction,
- Construction of 189 km reinforcement items,
- Production of 1,250 pieces railway switches,
- Production of 80,000 pieces of rail welding,
- Building of 3,004 km electricity facility,
- Building of 2,302 km signalling facility,
- Rehabilitation of current railway between Ankara-Istanbul,
- Realization of Ankara-Konya Rapid Train Project.

Railway rolling stock

The following investments are planned in TCDD:

- Revision of 69 pieces electricity suburban train set,
- Manufacturing and provision of 60 pieces main line locomotives with electricity,
- Manufacturing and provision of 71 pieces main line diesel locomotives,
- Supply of 10 pieces of rapid train,
- Production of 340 pieces of passenger wagons and 2,500 pieces of freight wagons,
- 7 pieces of emergency and rescue devices,
- 42 pieces of Rail bus (double),
- 15 set (with 6 pieces) DMU brake set.

Information on research activities in the field of railway transport

Research activities were carried out in the following areas:

- Assessment of economic viability of trains and railway lines,
- Assessment of infrastructure sections with capacity problems and evaluation of potentials for capacity increase,
- Assessment of transport capacity,
- Cooperation with municipalities for operation of suburb lines,
- Cooperation with private sector in manufacturing.

Railway safety: Risk assessment techniques

A Body to grant a railway Security Certificate and a Body for Accident Researches will be established within the scope of the Draft Railways Framework Act.

For transport of dangerous goods on railways, a draft regulation, compatible with the relevant EU Directives, is being prepared.

UNITED KINGDOM

Data on past and future developments of rail passenger and goods traffic

Freight volumes (2004):

Freight moved: 20.2 billion net tonnes km (+8% over 2003)
Freight lifted: 98.6 million tonnes (+10.4% over 2003)

The greatest commodity percentage increase was for coal traffic. The major commodity percentage decrease was for "other traffic", reflecting the reduction in postal traffic by the Royal Mail.

Rail share of total freight market (2003):

Freight moved: 11% of total surface transport market (rail+HGVs)
Freight lifted: 5.2%

Freight Performance and Growth: Trends

According to Network Rail figures, total delays to the majority of freight trains have fallen by 40% over the past 5 years, due to a combination of efficiency and reliability improvements by freight operators and the GB Infrastructure Manager. SRA has not published any recent medium-term forecasts of rail freight traffic growth, given the UK Government's revised focus on mode-neutral sustainable distribution rather than the endorsement of rail freight growth targets. But in the light of the RMMS meeting agenda, SRA has undertaken a time-series analysis of rail carryings of key commodities, adjusted to reflect known changes in trends (i.e. an 'intelligent' projection.) This indicates that total GB rail carryings (tonne-km) should grow by almost 3% pa over the next 6 years (or over 21% in total); rail freight 'lifted' (tonnes hauled) will grow significantly less as bulk commodities are likely not to grow as fast as lower-density general merchandise in containers.

These figures assume a conservative view of trends in cross-Channel rail freight. However, were Channel Tunnel usage arrangements to be resolved appropriately, and a re-launched range of long-distance international freight services to attract traffic in line with the original annual forecasts of 6 million tonnes, then total GB rail freight traffic growth would probably approach 3.5 % pa over the next 6 years.

New developments

Number of active railway undertakings (freight and passenger transport)

23 rail passenger franchise operators - 24 including Merseyrail which is a local authority concession

4 main freight operators (EWS, Freightliner, GB Rail and DRS)

3 smaller freight operators (Advenza Rail Freight Limited, Fastline Limited, Merlin Rail Limited)

Expectations as regards developments in the near future in the light of further market opening

SRA's 2003 Strategic Plan predicted that by 2011, passenger rail travel will be 25-35% greater in passenger kilometre terms than it was in 2000. Rail freight usage is driven principally by the competitiveness of rail services and also by both the level and structure of the economic activity. Increased road congestion and economic growth have contributed to an increase of nearly 50% in rail tonne-kms from the low in 1994-95, after a period in which rail freight withdrew from many historic markets in response to short-term financial pressures. The improved confidence in the future of rail freight that followed privatization and increased market responsiveness by the rail freight operators played an important part in the recovery of rail freight.

Performance

Punctuality has increased from 79.2% in 2003/03 to 81.2% in 2003/04. The latest quarterly figures show this trend continuing with a 5.1% increase. Train delays attributable to the infrastructure manager are falling. A reduction of 16% is expected for the year.

Complaints: The first nine months of 2004/05 have seen a 14.5% reduction in complaints compared to the same period in 2003/04.

Investments in the railway sector (infrastructure; rolling stock)

Rolling stock: £774 million in 2003-04, including £43 million for freight rolling stock. The figure of £1 billion is often quoted for investment in freight rolling stock since privatization.

Other: £4,722 million in 2003-04 (including Government direct grant of £1,448 million to Network Rail and £222 million to LCR to finance part of the investment undertaken by them).

Total: £5,496 million.

Opening of new/refurbished lines

Channel Tunnel Rail Link (CTRL)

CTRL is the first high-speed railway to be built in the UK and the first major new railway to be built in over a century. The CTRL is expected to cost around £5.2 billion in outturn cost (i.e. after inflation). It is being built in two sections: CTRL Section 1 (from the Channel Tunnel to Fawkham Junction in Kent) opened in September 2003 on time and on budget. Section 2 (from Southfleet Junction to St Pancras Station) is around 82% complete and is due to open in

spring 2007. The opening of Section 1 has reduced the journey time from London to Paris and Brussels by 20 minutes. It has also improved the punctuality of Eurostar services. When Section 2 opens in 2007, journey time will reduce by a further 15-20 minutes.

West Coast Main Line (WCML)

Much of this £7.6 billion project is devoted to renewals work. This includes:

- 780 miles of track renewal (out of 1,660).
- 585 miles of power supplies and overhead line.
- Signalling-work along the entire length of the route, including most of the signalling between London and Crewe and on the Manchester and Liverpool routes.

General benefits include:

- Over £1 billion of investment in a fleet of 53 nine-coach Pendolino trains. These are now operating almost 60% of services to and from London Euston. Full availability in June 2005.
- Journey times significantly reduced with sustained 125mph operation from September 2004, e.g. fastest London-Manchester journey now 2h06m.
- When the WCML between London and Manchester is fully upgraded, Pendolinos will be able to tilt over the 176 miles between South Hampstead, just outside London Euston station, and Stockport.
- Enhancements to service frequencies: capacity for 80% more long-distance passenger trains than today and 60-70% more freight traffic. Capacity for other users is also protected.
- Improved performance thanks to new infrastructure and robust timetabling.
- Improved safety along the line.

Information on research activities in the field of railway transport

Overview of Railway Research in the UK

In the UK, railway research is carried out in several ways:

- Government funds a programme of research and development (R.& D.) which is managed by the Rail Safety and Standards Board (RSSB) on behalf of the industry, its customers and funders. The programme is aimed at delivering business improvements and facilitating their implementation by the railway industry. The principal objectives are to find cost-effective ways of improving safety, and to reduce the cost of delivering a safe railway. Much of the R. & D. in this programme is outsourced to specialist research suppliers including consultancies and universities.
- Research is undertaken by individual companies, including Network Rail, London Underground, train operators, manufacturers and suppliers, in support of their company objectives.

- Universities carry out research commissioned by RSSB or other companies, and are also supported by the Engineering and Physical Sciences Research Council (EPSRC). Several universities collaborate through an organization known as Rail Research UK, which is supported by the EPSRC and the railway industry.
- The rail industry in the UK also takes part in a range of collaborative projects on a European and global basis, such as the Framework projects sponsored by the European Commission.

Coordination

Because research is carried out by a range of organizations, it is necessary to ensure that their efforts are suitably coordinated. The Advisory Group for Rail Research and Innovation (AGRRI) carries out this function. It consists of representatives from all sectors of the industry and Government, and has the following objectives:

- maintain an overview of research in the UK and elsewhere
- disseminate knowledge of key research issues and activities
- identify gaps in the knowledge base and areas where research is required
- facilitate co-ordination of research activity across the UK rail industry
- assist the UK rail industry in managing its interface with European research.

Practical experiences with the application of global positioning systems in rail freight transport

The freight company EWS and the passenger train operating companies South Eastern, South Central and Chilterns all have quite interesting and varied experience of GPS. The Rail Safety and Standards Board (RSSB) has been looking at the qualities of GPS in an effort to appreciate its potential.

The basic lessons are:

- (a) Without an agreed data transmission method, it is difficult to establish the wider benefits of GPS/GNSS.
- (b) GPS/GNSS on its own is inadequate to provide the basic dependability that is required for continuous use on the railways. It requires augmentation, and the choice of augmentation is not a simple one. The use of EGNOS (European Global Navigation Overlay System) or DGPS (Differential GPS) is widely thought to be necessary: these are techniques to derive the GPS errors at precisely surveyed locations and extrapolate them over a large area. But the essential element for continuous use on the railway is a form of inertial augmentation – this is the use of inertial devices (gyros, accelerometers) to compensate for GPS gaps.

The EWS application is essentially discontinuous for locomotive fleet management purposes and some traffic monitoring. Other applications for passenger information and door control are more demanding in continuity, but the accuracy requirements are not.

Key differences between applications on the railway and elsewhere are:

- (i) the railway is a one-dimensional problem when a database of track coordinates is available. This introduces the difficulties of database management which is a real issue, but simplifies the locator functions.
- (ii) satellites slip into and out of view far more frequently than in aviation or maritime applications. The "canyon" effects are more marked in the railways than in road applications.

In a European sense, the initiative of the intelligent wagon seems to have stalled. The US, which places a premium on the efficient use of rolling-stock, may have commercial applications in service.

Railway safety: Risk assessment techniques

Safety Decisions

In February 2005 the Rail Safety and Standards Board (RSSB) published a document called 'How safe is safe enough?' as part of the rail industry's Safety Decisions Programme. This document outlines an agreed process to help the industry take consistent, legal, ethical and practical decisions on matters that affect safety. The framework it contains helps to ensure that relevant decisions are always taken and recorded (even if the decision is to do nothing), by the right people within an organization, using professional judgment on what is reasonably practicable in the prevailing circumstances. Members can apply the framework to any relevant circumstances – from corporate planning (e.g. investment choices) to front-line operational decisions – to give decision makers the tools and confidence to make choices that achieve a proper balance between safety, performance and cost.

Safety Risk Model

The Safety Risk Model (SRM) is a risk management tool for industry stakeholders, and is used to quantify the significant causes and consequences associated with each of the 122 identified hazardous events. This enables users to identify key areas of risk associated with their operations and to prioritize their investment in safety, using a justifiable risk based approach. Amongst other developments, version 4 of the SRM includes:

- improved modelling of consequences for level crossings and buffer stops;
- separate modelling of risk to train drivers, track workers and other staff; and
- explicit modelling of risk from runaway vehicles and train divisions.

Risk Profile Bulletin

Information on risk drawn from the SRM is reported in the industry's Risk Profile Bulletin (RPB), which was published in January 2005. The Bulletin is used by Members to assist their own risk assessments and safety decision-making. The RSSB reports to members on risk profile and safety performance through a series of general and topic based reports. During 2004/05, the range of reports was expanded significantly to cover station safety, level crossings and road

vehicle incursions, workforce safety and railway crime. Each of the reports is now supported by a four-page overview that summarizes the main issues raised in the full report.

Strategic Safety Plan

The Strategic Safety Plan (SSP) outlines the priority risk areas facing the industry during 2005– based on the SRM’s analysis of the current risk profile on the railway – and explains how the industry is intending to address these priorities over the course of the year. The document moves away from the aspirational targets of previous plans and introduces a common framework within which Members and other rail industry companies can plan their own risk management activities. The SSP will be updated each year in line with the changing risk profile and priorities across the railway. The SSP for 2005/06 will be published later in 2005.

Further information on all of these topics can be found on RSSB’s website www.rssb.co.uk.
