

DAVID TURNOCK, D. Sc.
University of Leicester
Department of Geography
Leicester LE1 7RH, UK
E-mail: dt8@le.ac.uk

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ROMANIA'S RAILWAYS UNDER TRANSITION: REORGANISATION REHABILITATION AND REGIONAL DEVELOPMENT

ABSTRACT

The paper attempts a review of the Romanian Railways during transition. The first half of the paper considers the fall in traffic and the resulting financial problems which have made it difficult to maintain the system and continue with any development. The organisation has been restructured so that separate freight and passenger companies can now concentrate on specific business and compete on the market while the infrastructure company is catching up on the maintenance backlog and is proceeding slowly with further electrification. The second section concentrates on the European project for high-speed transport corridors and especially the interest of Romania's railways in Corridors Four and Nine. Although there have been delays over several years in starting the complex work of upgrading, contracts for the first phase of Corridor Four (Bucharest-Câmpina) have now been signed, a new passenger coach running 200 km/h is in service and locomotive upgrades are underway. The significance of all this for regional development lies in the fact that remarkably little of the 1989 network has been closed and the system has remained basically intact to cope with the upswing in the economy that has taken place from 2000 onwards. The high-speed corridors, which include a number of variants, comprise sufficient axes to afford direct links with the economic macroregions while additional projects are on hand to improve cohesion on the eastern frontier where the most serious development challenges exist.

KEY WORDS

railways, rehabilitation, regional development, reorganisation, Romania, transition, transport corridors

1. INTRODUCTION

The Romanian Railways ('Căile Ferate Române': CFR) are long-established and have contributed substantially to the country's development (Turnock 2001) (Table 1) (Figure 1). The first railway on the present Romanian territory was a mineral line conceived at the time of the Crimean War to distribute coal found in the Steierdorf-Anina area of Banat. However, by 1870 this isolated line was connected

with the network of the Habsburg Empire extending across the Hungarian Plain and into the western Transylvania. Meanwhile, railways in the Romanian Kingdom were linking Bucharest with Giurgiu and northern Moldavia was connected with the Austrian

Table 1 - Profile of Romanian Railways

Network Length kms (2000)	11,073
Single Track lines kms (2000)	8,108
Double Track lines kms (2000)	2,965
Electrification kms (2000)	3,950
Single Track lines kms (2000)	1,531
Double Track lines kms (2000)	2,298
Traction Sub-Station	78
Stations (2001)	1,900
Ditto with Electro-Dynamic Interlocking	672
Ditto with Electro-Mechanical Interlocking	91
Wagon Fleet Total	140,793
Ditto Covered Wagons with two or four axles	35,296
Ditto Open/Platform wagons with two or four axles	70,536
Ditto Tank Wagons	11,989
Passenger Coaches	6,657
Locomotives	3,318
Ditto Electric Locomotives (mainly 5,100 kW)	1,060
Ditto Diesel Electric Locomotives (mainly 2,100 hp)	1,497
Ditto Diesel Hydraulic Locomotives (450-1,250 hp)	761
Telephone/telegraph overhead lines kms	4,776
Telephone/telegraph cables kms	11,730

Source: 1996 CFR Annual Report <<http://www.cfr.ro>> except where other dates are stated

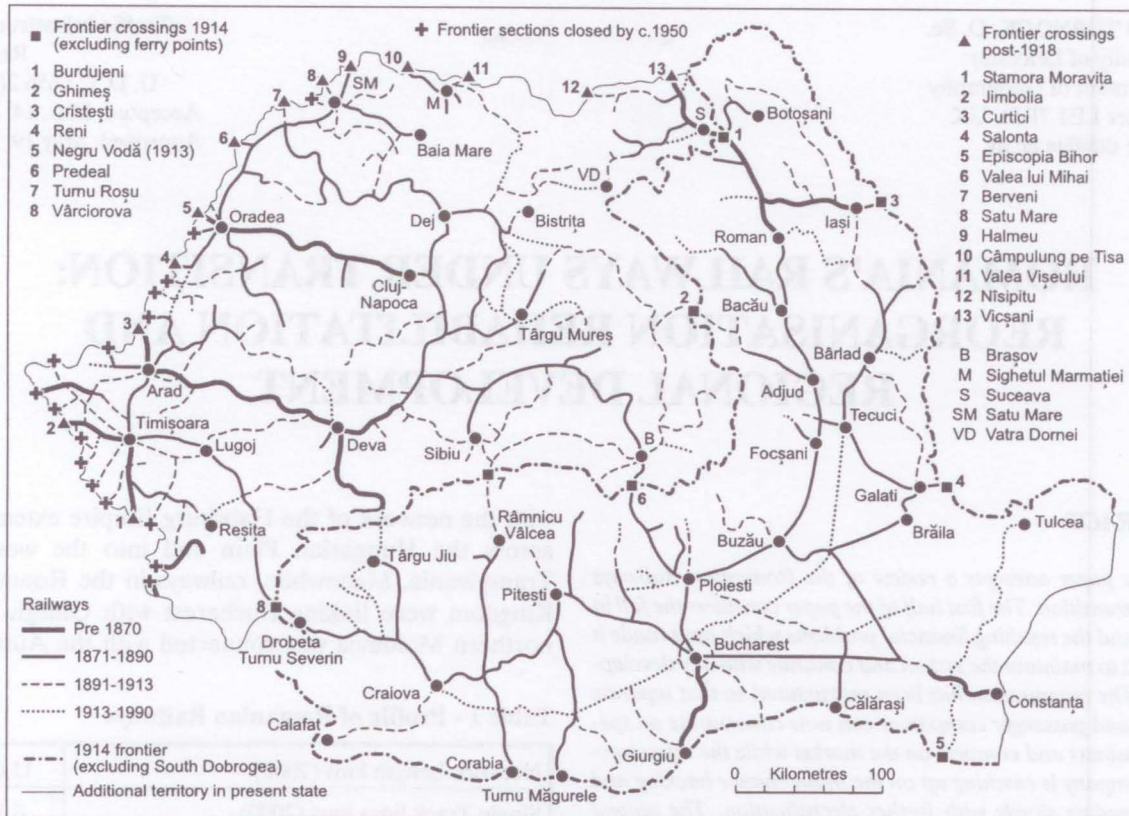


Figure 1 - Evolution of the railway network

Source: Modified from Turnock 1999 p.14

network in Bucovina and Galicia. The 'portage' railway across Dobrogea (Cernavodă-Constanţa) - administered directly by the Porte at the time - should also be noted. After the concessionaires had built several lines in the Kingdom, the independence in 1878 brought an acceleration of growth and contacts were made across the Carpathians with an expanding Habsburg network and there was a spate of branch-line construction over the two decades before the First World War, especially in Banat and central Transylvania (Plate 1). Since 1918 there have been efforts to complete the network to meet the requirements of an enlarged Romania, but only a fraction of the lines considered have been completed (Turnock 1979; 1999). This arises from the enormous costs of building railways across the Carpathians, with complex problems in unstable areas prone to landslides, which restricted attention to the most pressing priorities (Plate 2). The direct lines from Bucharest to Craiova and Tecuci should be highlighted along with the Jiu Valley line (Târgu Jiu to Livezeni (Petroşani) and the connection with Maramureş (Salva-Vişeu de Jos). (Table 1; Plates 1-2).

Under communism there was a modest increase in the total route length from 10,853 km to 11,348 (1950-1990) (Table 2), but at the same time a massive increase in capacity (Plate 3). High investment levels

were maintained but official figures deal only with transport as a whole and when a rising share of total investment capital is noted (9.1% in 1971-5; 9.7% in 1976-80; and 10.8% in 1981-4; falling slightly to 9.4% in 1986-7) reference must be made to canal building projects: first the Danube-Black Sea Canal and more recently the Bucharest-Danube Canal (currently in abeyance). However, railways certainly gained from the higher priority accorded to transport, linked with emphasis on industrial growth, which was very noticeable until the renewed drive for energy spending took hold in the 1980s. Railway development involved the whole complex of track, control, traction and rolling stock provision which attracted heavy investments through the 1960s and 1970s (Botez 1977 pp. 336-63). The welding of heavier rails accommodated faster trains (up to 160 km/h) with higher axle weights and capacity was maximised by improved control systems with the scope for direct communication with the train crews. Diesel and electric locomotives and a new generation of rolling stock built for higher speed running were also given priority. Foreign-built prototypes were preferred for the first diesel (2,100hp) and electric (5,100Kw) locomotives, obtained from Sulzer of Winterthur, Switzerland and ASEA of Vasteras, Sweden respectively. However, the production (under licence) then switched to Romania with the erecting of

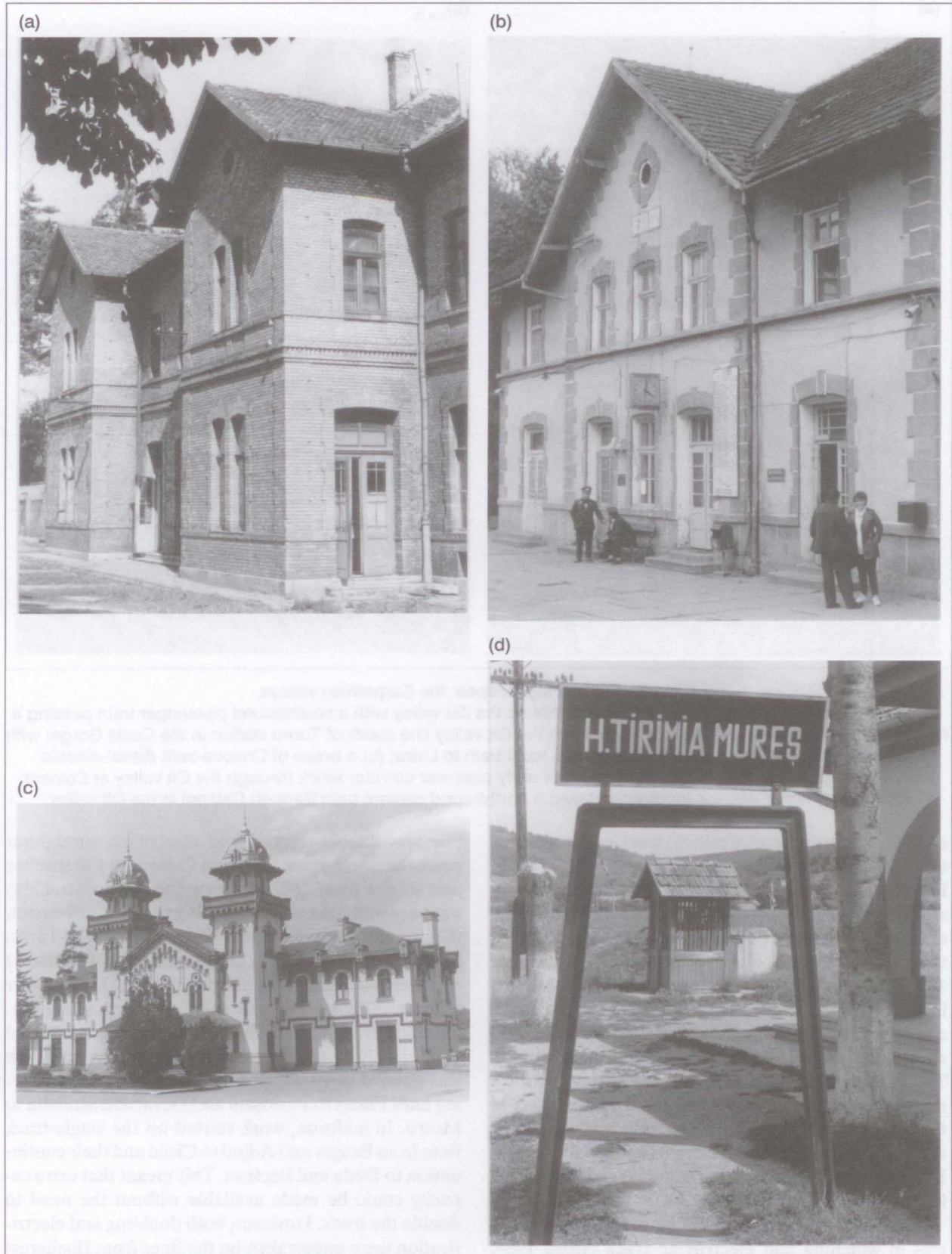


Plate 1 - Railway Stations

Showing relatively plain functional designs at (a) Anina and (b) Resita Sud; alongside (c) the superbly embellished terminus at Curtea de Arges; and (d) the rural tranquillity of Tirimia Mures halt on the former Targu Mures-Baile Sovata narrow gauge line.

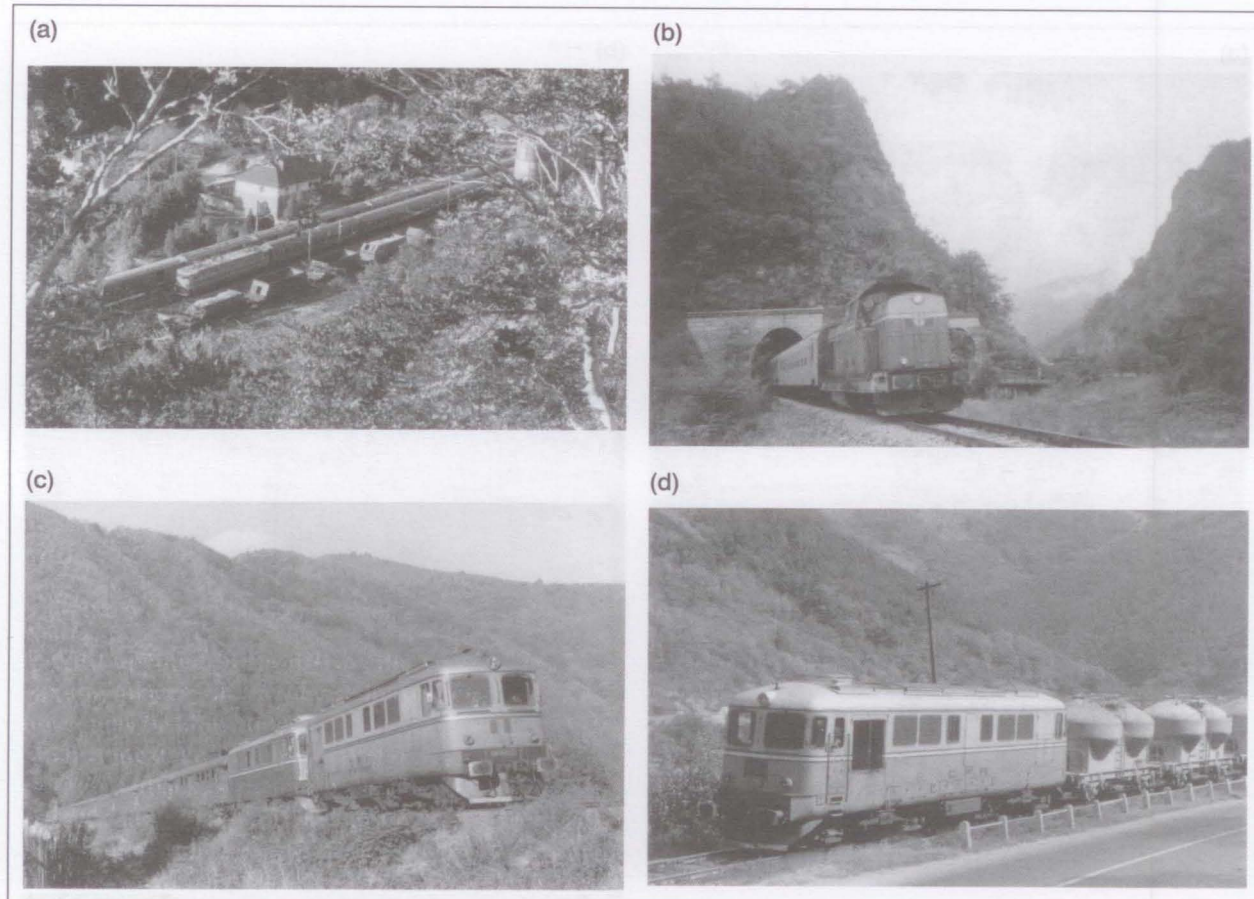


Plate 2 - Railway landscapes: the Carpathian valleys

(a) Meri station on the electrified single-track railway the Jiu valley with a southbound passenger train passing a northbound freight train; (b) The twin tunnels on the Olt valley line south of Turnu station in the Cozia Gorge: with a diesel hydraulic locomotive in charge of a local train to Lotru; (c) a brace of Craiova-built diesel-electric locomotives take a stopping train composed of early post-war corridor stock through the Olt valley at Caineni; (d) Another diesel-electric locomotive takes a northbound cement train through Caineni in the Olt valley.

shops at Electroputere (Craiova) working in conjunction with the component suppliers such as the Reșița Engineering Works (UCMR). And the Romanian specialists were responsible for further diesel locomotives including more powerful diesel electric locomotive of 4,000 hp and diesel-hydraulic locomotives of 700, 1,250 and 2,400hp (the latter built by '23 August' in Bucharest from the mid-1960s) (Plate 4). Steam locomotives handled only a tenth of the traffic in 1973 and their role was limited to shunting by the 1980s. The country also built its own rolling stock (with a margin for export): coaches at Arad and wagons at Caracal, Drobeta-Turnu Severin and Pașcani, using various component suppliers including factories at Bals (bogies), Brăila (braking systems) and Buzău (axles) (Table 2; Figure 1; Plates 3-4).

Particular reference should be made to the progress in widening and electrifying track (Buga 1984; Tufescu & Mocanu 1985 p.85). In 1970 only 10.0% of the network was double-tracked and only 2.0% was electrified, whereas in 1990 the proportions were 26.0 and 32.4% respectively. In 1970 the Bucharest-Brașov

line was double-tracked and electrified throughout while the single-track line from Craiova to Caransebeș and Reșița (double-track from Craiova to Strehaia) was very well-advanced, including the 24 km diversion (Coramnic-Valea Cladovei between Drobeta-Turnu Severin and Topleț, with ten tunnels and 21 viaducts) required on account of the Iron Gates hydropower scheme. This system was then extended along single-track from Caransebeș to Timișoara, Arad and Curtici (where the first electrified cross-border link was opened in 1974): also the single-track coal-carrying lines Filiași to Petroșani and Deva; and Strehaia to Motru. In addition, work started on the single-track lines from Brașov and Adjud to Ciceu and their continuation to Deda and Beclean. This meant that extra capacity could be made available without the need to double the track. However, both doubling and electrification were undertaken on the lines from Bucharest to Constanța and Craiova; Brașov to Mediaș, Cluj and Beclean (also Teiuș to Arad - single track beyond Deva - along with the Cugir and Hunedoara branches); and Ploiești to Suceava (including the lines from Buzău to

Table 2 - The Railway System 1938-2000 (kms)

Year	Total	Standard Gauge:				Narrow Gauge	Broad@ Gauge
		Total	Elec	Single	Double		
2000	11,073*	10,958	3,950	7,993	2,965	58*	57
1995	11,376	10,889	3,866	7,923	2,966	427	60
1990	11,348	10,876	3,680	7,927	2,949	427	45
1985	11,269	10,752	3,427	7,692	3,060	472	45
1980	11,110	10,506	2,367+	8,082	2,424	539	65
1975	11,039	10,403	1,209+	8,404	2,058	591	45
1970	11,012	10,341	224+	9,232	1,109	635	36
1965	10,979	10,302	74+	9,573	729	648	29
1960	10,981	10,239	58+	9,522	717	706	36
1955	10,987	10,191	58+	9,637	554	741	55
1950	10,853	10,024	58+	9,516	508	752	77
1938	9,990	9,274	58+	8,991	283	716	n. a.

+ Includes 58 km of narrow-gauge electrification relating to the Arad-Radna/Ghioroc service, closed in the early 1980s.

* The official figures suggest that there is no narrow-gauge railway left but the timetable still lists a service on the 58 km Sibiu-Agnita line. So this figure has been entered and the total adjusted accordingly.

@ The tables do not list broad-gauge track (essentially, the section Valea Vişului-Sighetul Marmatiei-Campulung pe Tisa) before 1995. The figures quoted have been obtained by calculating the deficit when the standard and narrow gauge figures are compared with the total.

Source: Anuarul Statistic (various years); Iordanescu & Georgescu 1986 301-14

Table 3 - Rail Passenger and Freight Traffic 1970-2000

Criterion	1970	1975	1980	1985	1989	1990	1995	2000
Passengers (mln)	328.3	366.9	347.9	460.3	481.0	407.9	210.7	117.5
Ditto: Share (per-cent)	47.5	30.9	25.1	35.4	35.2	34.2	33.5	36.2
Passenger-kms (bln)	17.8	22.4	23.2	31.1	35.5	30.6	18.9	11.6
Ditto: Share (per-cent)	66.5	51.2	46.3	55.2	56.8	52.7	54.5	53.7
Freight (mln.t)	171.3	228.3	274.6	283.4	306.3	218.8	105.1	71.5
Ditto: Share (per-cent)	16.6	n.a.	12.5	11.2	10.8	9.8	13.7	20.0
Freight t-kms (bln)	48.0	64.8	75.5	74.2	81.1	52.3	27.2	18.0
Ditto: Share (per-cent)	47.3	n.a.	39.5	34.9	29.9	28.0	21.5	42.7

Note: the shares relate to the total amount of traffic including all transport modes, including shipping (which has collapsed during transition) and pipelines but excluding urban passenger transport.

Source: Anuarul Statistic (Various years)

Feteşti and Galaţi; and from Paşcani to Iaşi). Double-track (so far without electrification) has been provided between Cluj and Oradea; Galaţi and Măreşeuşti; Leţcani-Iaşi-Bârlad (apart from the Buhăieşti-Crasna section) and Râmnicu Vâlcea-Drăgăşani.

Nevertheless, these achievements were only moderate compared with double-tracking to the extent of 45-70% - and 50-99% for electrification - prevailing in Western Europe, while the infrastructure as a whole, which includes automatic mechanical control ('bloc de

linie automat': BLA) and unified electro-dynamic control at 672 stations ('centralizare electrodinamică': CED) is mainly of 1970s vintage or older (Anon 1995a; Zimta 1996). The system still handles over 100,000 passengers daily and there is substantial freight traffic: coal; cars; cement; and mineral water from such sources as 'Dorna Apemin'. Nevertheless, traffic has fallen sharply due to the economic recession and the transfer to road transport (Table 3), while the lack of finance for modernisation has been all the

more keenly felt because tariffs - especially passenger fares - have not kept up with inflation and state subventions are inadequate. There is a heavy backlog on maintenance and deteriorating conditions have required speed restrictions (e.g. Bucharest-Urziceni and Simeria-Curtici) as low as 50 km/h (Moldovan 1993). Moreover, problems of theft, vandalism and fare-dodging have increased, creating the need for a stronger railway police force (Table 3).

2. REORGANISATION AND REHABILITATION

The lack of financial resources has meant a drastic reduction in spending to maintain infrastructure

and replace the rolling stock (outdated and insufficient in both quantitative and qualitative terms); thus significantly reducing the level of railway transport both from the quality and safety point of view. The Romanian railway infrastructure is consequently below EU standards (ANDR 2000, p. 49). These problems are not unique to Romania for a World Bank 'roundtable' in Vienna - discussing trends in the railway industry in East Central Europe (ECE) generally - noted falling traffic, even in relation to GDP (especially for cement, coal and steel), and a deteriorating financial situation (Anon 1997b). Operations in the context of the market economy with an enhanced role for the private sector also had major implications for the management. Yet, rail transport still offers advantages in terms of energy

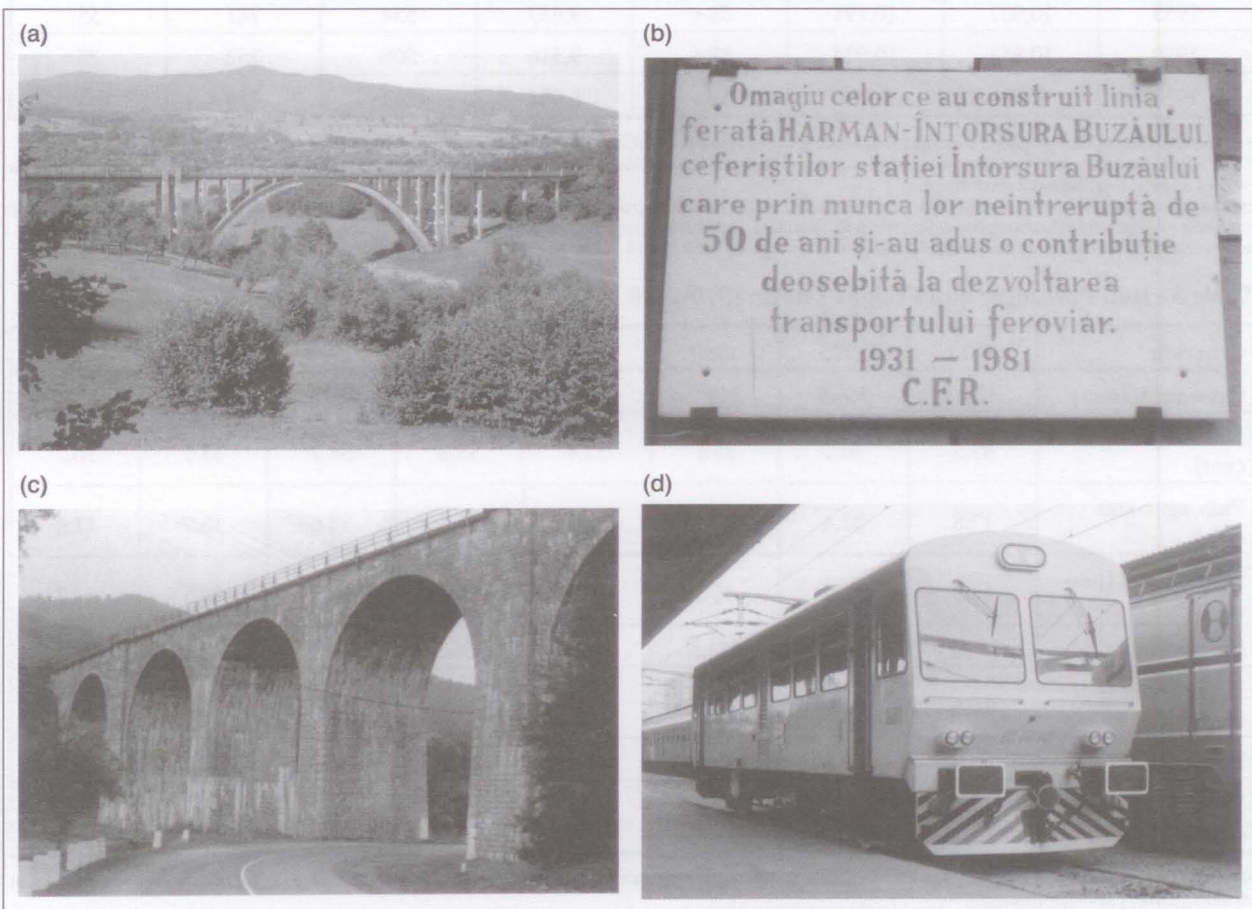


Plate 3 - Aspects of railway modernisation

(a) A number of difficult main line sections have been realigned. The original line from Brasov to Fagaras used to thread through a narrow gorge to cross the difficult Homorod-Sercaia watershed. Diversion through the Persani tunnel resulted in the abandonment of this elegant concrete viaduct at Sinca Noua, now used by light agricultural traffic; (b) Many new lines through the Carpathians were contemplated during the inter-war years. A link between Brasov and Galati via the Buzau Valley was opened as far as Intorsura Buzaului in 1931 after several years of works on the Teliu tunnel (the longest in Romania). The picture shows a plaque erected at Intorsura Buzaului after half a century of activity to commemorate the building of the line which carries the local service only because the rest of the line was never built, due to the high cost of engineering in unstable terrain; (c) One of the features on the new line was the viaduct at Teliu at the approach to the tunnel; (d) Railcars for lightly-used lines have not been a priority since the building programme in the late 1930s, but Marub of Brasov produced two designs in the 1990s, one of which is seen at Bucharest's Gara de Nord on a Snagov train.

efficiency, with substantial environmental benefits through relatively low pollution levels (a tenfold advantage over road transport) and massive advantages in terms of safety. And with a network similar to that of the United States, despite a vastly smaller territory, Romania's railways penetrate economically poorer regions and continue to contribute to their regional development. In this paper an attempt is made to summarise the problems faced by the Romanian Railways and the progress made in reorganisation and rehabilitation. Particular attention is given to the challenge posed by the European high-speed transport corridors and the implications for the future regional change. The study is based on the geographical literature along with railway coverage in the Romanian Business Journal, the railway timetables and specialised railway literature including 'Revista CFR' and 'Jurnal Feroviar' with the latter accessed via website <<http://www.cfr.ro>>.

Confronted by the challenge to align more closely with Europe, the CFR was faced by a growing financial and technical crisis. Initially, it formulated its perspectives for 1994-2000 which were adopted by 'Consiliul de Administrație' in April 1994, leading to the 'Strategia Generală de Restructurare a SNCFR' (later that year) to adjust to current traffic levels while improving technology and efficiency in concert with Europe. The basic rationale was initially supplied by a study in 1993 by Deutsche Eisenbahn Consulting: 'Restructurarea SNCFR: Rolul CFR in Economia de Piața' involving external action in the form of legislation appropriate to competitive transport services in the market economy (allowing for flexibility and disposal of assets other than infrastructure which is national property) and internal action to identify sectors of activity, adopt commercial principles and enhance adaptability and efficiency on a phased basis during 1994-6. This would require reductions in labour, locomotives

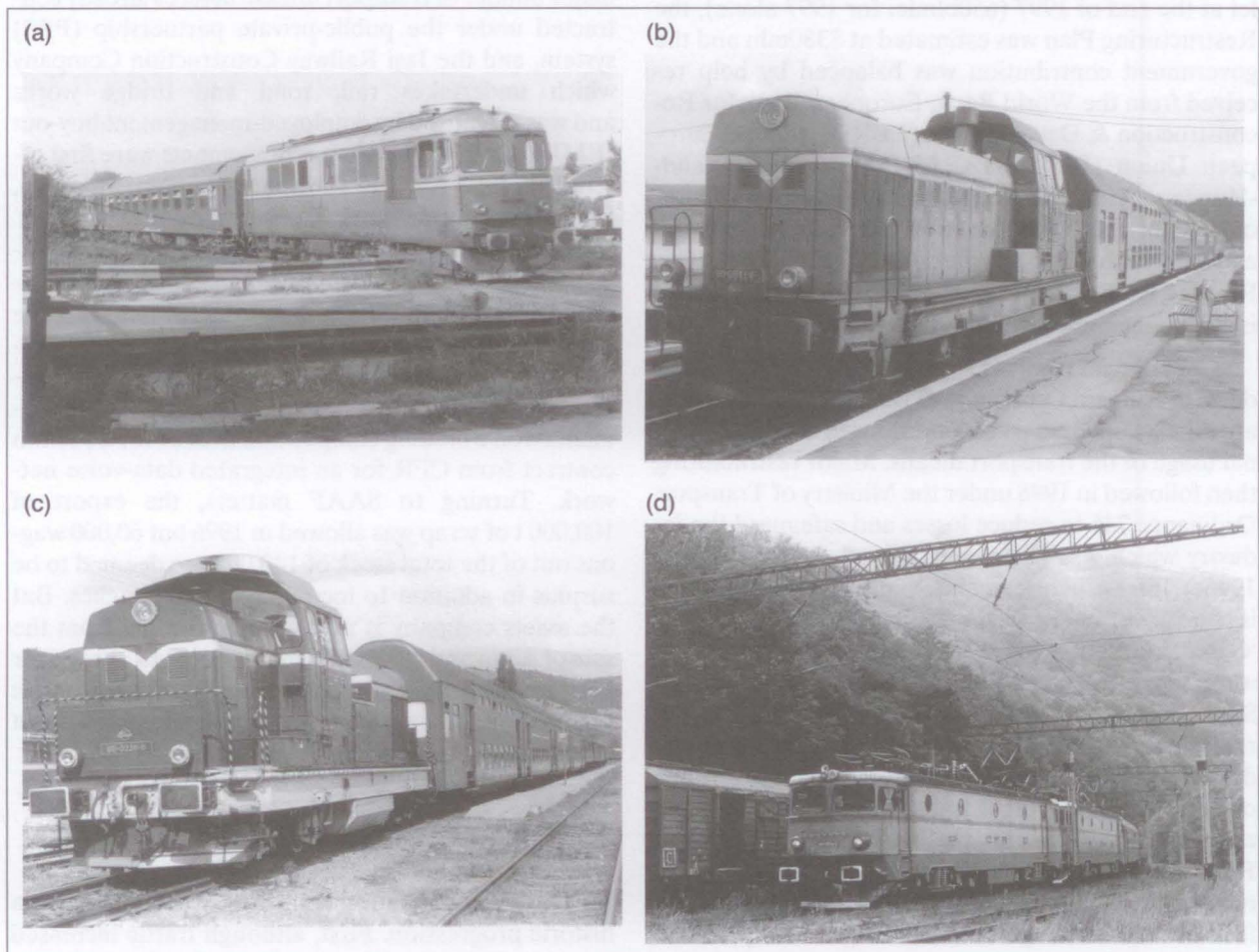


Plate 4: CFR Locomotives

(a) A 2,100 hp diesel-electric locomotive at the level crossing in Ramnicu Valcea with an 'accelerat' train consisting of coaches built in the later communist period; (b) A 2,400 hp diesel-hydraulic locomotive stands at Intorsura Buzaului with a train for Brasov; (c) Another portrait showing the rear end of a 2,400 hp diesel-hydraulic locomotive with its train of two-storey and single storey coaches at Patarlagele on a stopping train to Buzau; (d) two 5,100 Kw electric locomotives pass Lainici in the Jiu defile south of Petrosani with a Bucharest-bound 'accelerat'.

and rolling stock appropriate to current traffic levels (with fewer trains and closure of certain lines and stations). At the same time, qualitative improvements were needed to provide high speed InterCity trains integrating with the European network with reduced energy consumption. Other aspects of the programme included wholesale adoption of light railcars for trains covering short and medium distances; advanced installations of control ('centralizare') and signalling ('semnalizare'), especially at such key stations as Braşov, Ploieşti Sud and Timișoara Nord; appropriate resources for maintenance; a system of digital telephones, electronic information and computerised ticketing based on a network of fibre optic cables (started between Bucharest and Ploieşti in 1995 and extended to Braşov in 1996); modernised frontier stations; and facilities for combined transport including the Black Sea ferryboats (Craciun 1997).

With the CFR's overall debt soaring to 2,500bn. lei at the end of 1997 (650bn. lei for 1997 alone), the Restructuring Plan was estimated at \$380m and the government contribution was balanced by help received from the World Bank, European Bank for Reconstruction & Development (EBRD) and the European Union (EU) 'PHARE' Programme (Poland-Hungary: Assistance for Regeneration of their Economies) for the 'redefinition of the railway network' and halt to further deterioration during 1998. This Railway Restructuring & Rehabilitation Programme is still being implemented (ANDR 2000 p. 50).

Commercial reforms were belatedly provided under Government Ordinance 41 of 1997. Railway tariffs are now set under market conditions to facilitate rational usage of the transport means. Major restructuring then followed in 1998 under the Ministry of Transport Ordinance 746 to reduce losses and safeguard the industry which was in danger of total collapse (Anon 1996c). Infrastructure, maintenance and development is the government responsibility, looked after by 'Compania Națională a Căilor Ferate Române'. There were separate companies for Railway Management Services ('Societatea de Servicii de Management Feroviar') and Railway Assets Management ('Societatea de Administrare Active Feroviare'), while the running of passenger and freight trains was handled by separate companies ('Societatea Națională de Transport Feroviar de Călători/Marfă') which are not entitled to request financial support from the government. New facilities for management training were provided through the new 'Facultatea de Inginerie Managerială de Căi Ferate' at Bucharest Ecological University; complementing the technical capacity already available in higher education through 'Catedra de Material Rulant de Căile Ferate' at the Timișoara Politechnic University Engineering Faculty. The restructuring has eliminated cross-subsidy between freight and passen-

ger traffic and provided for competitive pricing of freight services.

The national railway authority has drawn up modernisation objectives for 2001-5 in harmony with the 'Vision' of the UIC ('Union Internationale des Chemins de Fer') which describes the main strategic ideas for European activity and collaboration to 2015. The key points are: rehabilitation of infrastructure in the interests of safety / efficiency; interoperability / European standards; improved efficiency in maintenance with increased mechanisation, higher labour productivity and lower costs; proper quality systems and new market trading procedures. Concern has been expressed over infrastructure in general and especially the precarious situation over the Făurei test track. And there is also to be encouragement of private railway operators with the subcontracting of maintenance of secondary lines to specialised companies like CCCF ('Centrala de Construcții Căi Ferate') of Bucharest, a major builder of transport infrastructures already contracted under the public-private partnership (PPP) system, and the Iași Railway Construction Company which undertakes rail, road and bridge works and was privatised by employee-management buy-out (EMBO) in 1995. Leasing arrangements were first offered in 1996 for the Timișoara-Stamora Moravița, Bucharest-Giurgiu and Constanța-Mangalia lines. Meanwhile, the World Bank and the US Trade & Development Agency are supporting railway restructuring and have financed a computer network to link the regional departments and provide an integrated railway information system (IRIS) to achieve rapid assessment of problems: Alcatel Network Systems Romania won a bidding competition in 2001 for a \$10m contract from CFR for an integrated data-voice network. Turning to SAAF matters, the export of 100,000 t of scrap was allowed in 1996 but 60,000 wagons out of the total stock of 140,000 are deemed to be surplus in addition to locomotives and coaches. But the assets company is now earning income from the sale of scrap and steam locomotives sought abroad for heritage purposes and it is reported that the Bucharest regional administration has collection-significant quantities at the lineside.

3. THE FREIGHT BUSINESS

The freight situation is difficult when viewed as a historic progression. First, although traffic increased through the 1980s the railway share declined due to the very fast growth of shipping. And second, during the transition the sharp decline in absolute figures is combined with a growth in the road transport share, while the rail share has advanced strongly since 1995 with the collapse of Romanian shipping (Table 4). When the situation is viewed in commodity terms, it is

Table 4 - Romanian Freight Traffic By Transport Modes 1980-2000

	1980			1985			1989		
	mln.t	bln.tkm	pc	mln.t	bln.tkm	pc	mln.t	bln.tkm	pc
Rail	274.60	75.53	39.5	283.40	74.21	34.9	306.30	81.13	29.9
Road	1877.22	27.73	14.5	2187.22	27.87	13.1	2416.06	30.03	11.1
Water	12.34	2.35	1.2	18.40	2.42	1.1	37.37	3.67	1.4
Sea	16.21	80.26	42.0	25.73	103.42	48.6	35.93	149.37	55.1
Air	0.03	0.07	*	0.03	0.07	*	0.05	0.08	*
Pipeline	22.48	5.19	2.7	21.31	4.77	2.2	30.60	6.65	2.5
Total	2202.88	191.13	100.0	2536.09	212.76	100.0	2826.31	270.93	100.0
	1990			1995			2000		
	mln.t	bln.tkm	pc	mln.t	bln.tkm	pc	mln.t	bln.tkm	pc
Rail	218.83	57.25	28.0	105.13	27.18	21.4	71.46	17.98	42.7
Road	1934.36	28.99	14.2	616.04	19.75	15.6	262.94	14.29	33.9
Water	12.04	2.09	1.0	14.39	3.11	2.5	13.10	2.63	6.2
Sea	27.60	110.77	54.2	13.05	73.64	58.1	1.36	5.82	13.8
Air	0.04	0.06	*	0.05	0.11	*	*	0.02	*
Pipeline	23.49	5.06	2.5	16.18	2.94	2.3	8.81	1.39	3.3
Total	2216.36	204.22	100.0	764.84	126.73	100.0	357.67	42.13	100.0

Source: Anuarul Statistic (Various years)

Table 5 - Romanian Railfreight 1980-2000 (mln.t)

	1980	1985	1989	1990	1995	2000
Cereals	9.0	7.3	7.3	8.0	2.9	1.3
Other food fodder and seed	14.8	15.0	16.3	10.6	4.0	2.0
Wood	14.4	15.8	13.9	10.1	4.2	3.3
Ores and waste	25.4	28.8	26.5	21.4	5.2	3.0
Crude minerals	67.5	60.2	71.0	48.0	14.5	8.5
Other raw materials	2.5	2.6	2.5	1.9	0.8	0.7
Solid fuel	32.8	47.2	63.9	43.3	36.9	24.7
Fertiliser	10.2	11.3	7.3	7.1	2.9	2.1
Cement and manufactured b.m.	24.7	21.4	23.7	16.4	5.9	3.1
Metal/metallic products and mach.	25.9	27.2	25.5	17.5	9.3	7.7
Oil and oil products	24.3	22.4	25.0	18.0	12.4	10.4
Chemicals and glass	10.8	11.9	11.1	8.3	5.2	3.8
Textiles and leather	1.4	1.5	2.0	1.3	0.2	0.1
Total	274.6	283.4	306.2	218.8	105.1	71.5

Source: Anuarul Statistic (Various years)

oil and solid fuel which have shown the least decline (41.6% and 38.7% respectively of the 1989 level in 2000) when the overall figure was 23.3. Chemicals and glass (34.2%), metals (30.2%), fertiliser (28.8%), other raw materials (28.0%) and timber (23.4%) have also done relatively well (Table 5). It is now important

that the freight company should make itself more competitive and here there are some positive signs (Tables 4-5).

The freight company has negotiated accords with Hungary over Hungarian cereals transported across Romania; the use of containers - involving combined

transport companies like Romania-Combi ('Rocombi') and Hungarocombi - and reciprocal tariffs and wagon use (plus similar arrangements with other neighbouring states as well as Austria and Germany). Despite outstanding debts with major customers concerned with energy (Termoelectrica) and metallurgy (Sidermet Călan, Siderurgica Hunedoara and Sidex Galați), the freight concern is the most profitable railway company, handling 71.4mln.t in 2000 and an estimated 71.7mln.t in 2001 and 71.4 in 2000, with revenue of 23.3% up on 2000, thanks to a stimulating tariff strategy, effective marketing for new business and improved quality. It plans to increase capacity to 2005 with updated trains (incorporating the American and West European experience) with investment earmarked to upgrade the wagon pool which currently has relatively few new vehicles. The change of gauge at the frontiers with the former Soviet Union (FSU) poses problems e.g. for Shell who have to transfer Russian/Ukrainian LPG - destined for its network of bottling stations and also for the Székésfehérvár gas station - from wide gauge to standard gauge wagons at Halmeu, north of Satu Mare. The freight company appears to be the first in line for privatisation which may soon be financed through a World Bank grant. It needs private capital and strategic alliances with foreign operators, but it is encouraging that EBRD are interested in buying shares.

This is an appropriate moment to mention combined transport which involves co-operation with Rocombi and shareholding with Inter-Container. Traffic is concentrated at 32 terminals (23 equipped to handle large containers and some are serviced by CFR own road vehicles - including the most modern tractors and handling devices at Bucharest, Constanța, Craiova and Oradea) and 12 border stations (Berindei & Dinescu 1995; Dinescu 1995). International container services operate between Regensburg-Pitești; Sopron-Bucharest; Udine-Bucharest, Kaspicean (Bulgaria)-Pitești - also Vienna-Halkali (Turkey) and Mainz-Alsancak (Turkey) in transit via Curtici-Giurgiu. All this in addition to the ferryboat operations to Istanbul, Samsun and Batumi. This is a picture of the development which provides Romanian competitiveness on both east-west and north-south axes, handling traffic between Europe, the Middle East and Far East although to date there have been no through workings to Greece, Poland and the states of the FSU and the question of competition with other Black Sea ferries and the Mediterranean services with Beirut, Haifa and Suez is beyond the scope of this paper. It is also worth mentioning that SAAF has set up the intermodal transport service 'ICA Romania' with Intercontainer Austria and Interfrigo Basel have set up the intermodal transporter ICA Romania. Trains operate from Western Europe to Curtici for central, north and

west Romania and Bucharest for the south and south-east. Finally, reference may be made to the operations of private companies such as Sefer which began transporting oil products from Brazi (Ploiești) to Baia Mare, Bucharest, Constanța, Galați. Iași and Timișoara in 2000. Sefer is a component of the 'Compania de Transport Feroviar' (CTF) arising from the privatisation of Petrobrazi, but it also includes four other companies concerned with the repair of locomotives and carriages; maintenance and construction of railway infrastructure. Unifertrans is another private rail transport operator working beside the state railway system; while Lafarge-Romcim operate their own cement trains from Medgidia with updated diesel locomotives. Finally there are various private railway operations concerned with private sidings for individual factories or industrial estates, like the Imperial company in Botoșani which purchased a locomotive and three kilometers of track for the Botoșani industrial zone in 1996.

4. THE PASSENGER BUSINESS

The passenger company was set up in October 1998 and almost immediately had to cancel 130 lightly-loaded trains when budget payments were not received. It introduced an automatic ticket reservation system in 1999 and tried to cut down on fare-dodging by installing access barriers to the platforms at Bucharest's Gara de Nord in 2000 and planned to extend control to other large stations. A new system of train numbering was introduced and responsibility for stopping trains was decentralised to eight autonomous regional companies in 2000 - and that year the Romanian timetable (available on disk from 1996) initially listed express trains only. But the experiment was not conducive to overall profitability and the regions (reduced to four for greater efficiency) are now once again subordinated to the national company. Looking to the future, the company's target is an annual 3.4% growth in passengers which should generate a 27% increase for 2010 over 2000, while subsidies should decrease from 59.2% in 2000 to 30% in 2010. This comes after a massive decline in passengers from 305.8 th/day in 1990 to 201.2 in 1995 and 115.5 in 2000 (62.2%, with an even greater decline in average distance travelled: 71.1%). It also aims at providing substantially better services to passengers through fuller integration with road and air transport and improved support services: hotel reservation (with American technology throughout the ticketing system); luggage handling; urban transport; and tourist services/currency exchange. Further commitment was to increase small shops (kiosks) and catering facilities, particularly in the capital at Gara de Nord where a major parking project is being implemented during 2001-3 with a surface area

and two underground levels to provide 750 spaces for annual subscribers and 970 for payment by the hour. The passenger company also intends to reduce prices for stopping trains while increasing them for 'accelerat' and other express categories so that subsidies will be reduced - and eliminated altogether on Inter-City trains which are aimed at high-income travellers. It will also provide greater incentives for the purchase of yearly season tickets. Computers have been in use in Bucharest since the early 1990s but in 1999 the capi-

tal's Gara de Nord was still the only station with computerised ticketing. Meanwhile, the company is doing more of its own publishing and the 2000-1 passenger timetable was made entirely 'in house' by CFR at Filaret.

With passenger timetables most readily available, it is possible to examine trends in services in some detail. Line closures have been quite moderate apart from narrow gauge lines which created problems over freight transfer (despite the mechanised arrange-

Table 6 - Closures of Lines to Passenger Services Since 1989

Timetable Number and Section	A	B	C	D	E
204 Cornatel-Vurpar	13*	n.g.	1m	1	1992(a)
209 Deva-Brad	36	s.g.	2c	7	1994(b)
211 Hateg-Sarmi	17	s.g.	2m	3	1994(c)
211 Subcetate-Hateg	4	s.g.	4p	4	1998(d)
214 Lupeni-Berbateni	4	s.g.	7c	-	1990(e)
217 Periam-Lovrin	16	s.g.	3c3cm	2	1997(f)
219 Valcele-Bujoreni	41	s.g.	1a1c1p	4	1991(g)
303 I.L.Caragiale-Filipestii de Padure	12	s.g.	4c	6	1999
303 I.L.Caragiale-Moreni	16	s.g.	2m	3	1997
303 Moreni-Filipestii de Padure	11	s.g.	3c	2	1999
309 Turda-Abrud	93	n.g.	3m	26	1997
311 Huedin-Calatele	14	s.g.	1m	2	1991
312 Oradea-Cheresig	23	s.g.	6m	5	1996
314 Oradea-Holod	43	s.g.	1a3p	12	1997(h)
407 Targu Mures-Baile Sovata	74	n.g.	3c1p	16	1996(i)
408 Targu Mures-Mihesu de Campie	55	n.g.	1c	11	1996
408 Band-Lechinta	69	n.g.	1c	13	1996
410 Viseu de Jos-Borsa	23	s.g.	5m	3	1996
411 Sighetul Marmatiei-Campulung pe Tisa	12	b.g.	5m	2	1996
414 Ulmeni Salaj-Cehu Silvaniei	20	s.g.	3m	2	1996
415 Ghilvaci-Ardud	18	n.g. 3m	2	1993	
508 Comanesti-Moinesti	8	s.g.	2c1m	1	1996
608 Dangenii-Saveni	16	s.g.	4c	1	1999(j)

A Route length (kms); B Gauge (b.g. broad gauge; n.g. narrow gauge; s.g. standard gauge); C Train service at time of closure (a Express Train ('accelerat'); c Stopping Train ('tren cursa*'); m Mixed Train; p Stopping Train ('tren personal')); D Number of stations; E Year of closure

a The train originated in Sibiu and continued to run to Cornatel only until 1997.

b There were also 4c Deva-Paulis Lunca (10 km) and 3c Brad-Dealul Fetii (7 km). Also the final timetable entry shows a railcar accelerat service from Arad to Simeria.

c Part of the Subcetate-Caransebes which lost its central (rack) section in 1978. The Caransebes-Boutari section is still open.

d This short section was probably retained in connection with the work on the Raul Mare-Retezat hydropower project: there were 10 trains listed in 1995 (8c2m), falling to 5p1m in 1996 and 5p in 1997 and 4p in 1998.

e Remains open Petrosani-Lupeni.

f The Timisoara-Nerau service was revised so that Periam-Nerau trains operated as connections from the Timisoara-Cenad service. The old service operates to Periam only.

g The service was first listed in 1990 when the three trains were all running on an optional/occasional ('facultativ') basis - including an Arad-Mangalia holiday train. In 1991 the same trains were shown as regular workings and there was an additional accelerat shown (Arad-Bucharest). Presumably some occasional trains were running on the line (at least over part of it) and the 1991 listing was anticipating completion.

h Closed due to landslides.

i Two trains went to Miercurea Nirajului only.

j The service was first listed in 1991. It consisted of 2c in 1992 and 1993, improved to 3c in 1994 and declined to 1c in 1995-9.

Source: CFR Timetables

ments installed at Turda Transbord for the Abrud line) and were easily marginalised by bus competition for passengers (Table 6) (Plate 5). Most standard gauge lines are quite short and often involve suburban areas or rural areas with main roads running parallel. Special circumstances such as landslide damage and mine closures may also have been significant. Meanwhile, the number of stations listed in the timetable has been reduced from some 2,020 in 1999 to 1,900 in 2001. However, when allowance is made for the 135 stations which have been eliminated through passenger service withdrawals, this amounts to a slight increase! A partial examination reveals that a small number of stations have closed like Bistrița Fabrica and some have been renamed: Borcea is now Ramificația Borcea while Băcești has become Mareșal Constantin Prezan. Several new stations have appeared like Bichigiu on the Salva-Vișeu line and Borzia near

Deda. Between Carei and Șarmășag, Unimat has gone while Giorocuța has appeared; between Piatra Olt and Podul Olt Bogdănești and Răstoaca have closed while Bucșani Vâlcea has opened (Table 6) (Plate 5).

A survey of changes in service provision was made by counting trains on each branch line and on each section of the main line (Table 7). This meant of course that many long-distance trains were counted several times but it produced a realistic picture of the choice available to passengers around the country. Services have been reduced significantly but stopping trains much more than expresses (which have actually increased in many areas) so that the survey produced 1.4 stopping train observations for each express in 2001 compared with 1.9 in 1989. The general pattern reflects the decline of commuting to factory work with many of withdrawals affecting early morning and evening trains; also the growth of inter-city business travel

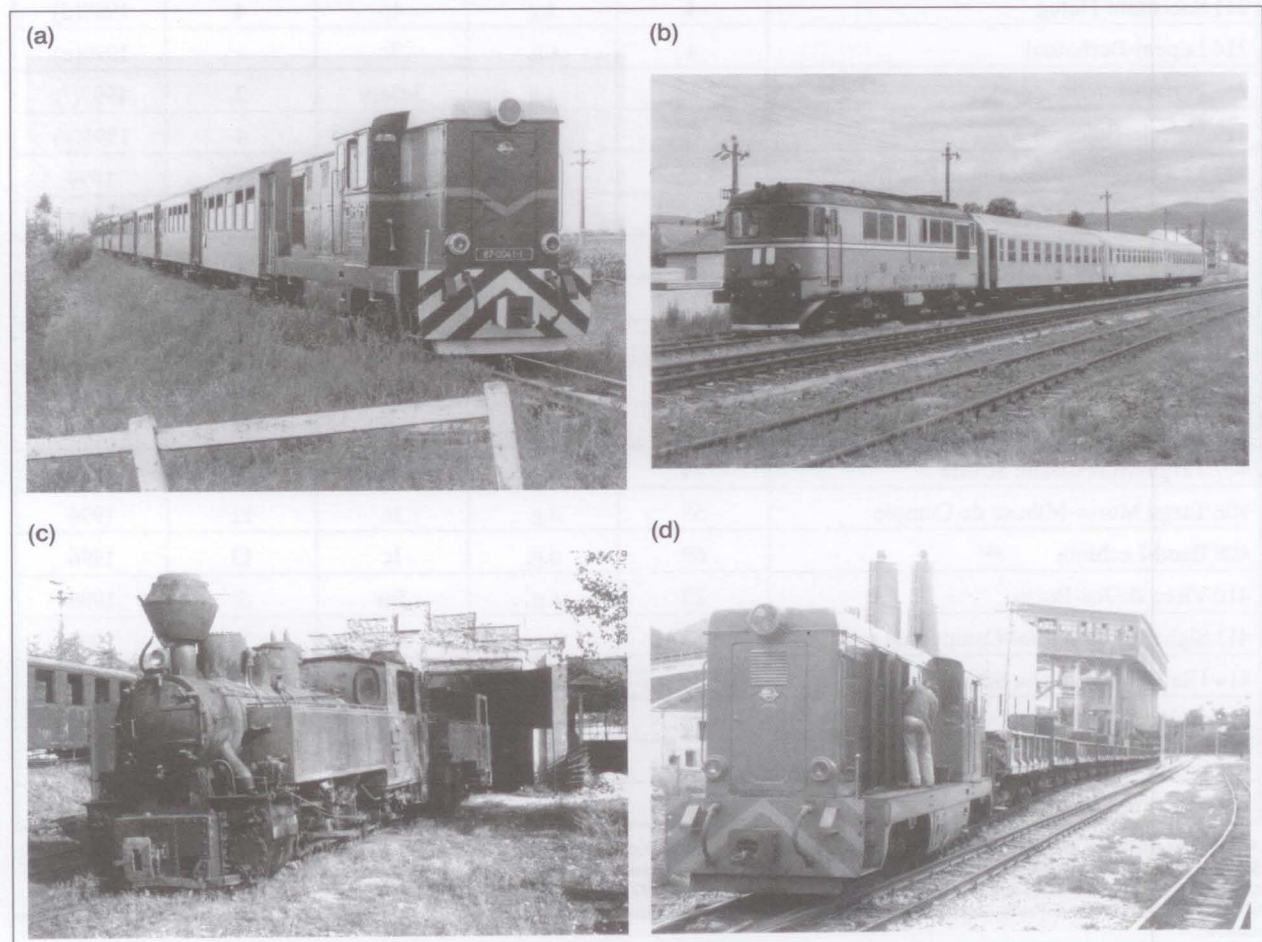


Plate 5: Narrow gauge operations

(a) The CFR narrow gauge system has been drastically pruned since 1989. A Faur (formerly 23 August) diesel-hydraulic in charge of an afternoon passenger train from Targu Mures to Miercurea Nirajului in 1996, by which time service to Baile Sovata had been reduced to one train per day; (b) some narrow-gauge lines have been converted to standard-gauge: one example is Satu Mare-Bixad with a local train approaching the terminus in 2002; (c) The once extensive forest railway system is now limited to the Covasna, Moldovita and Viseu systems. Here a pair of Resita-built 0-8-0 tank locomotives lie derelict at Stalpeni, north of Pitesti; (d) Some industrial narrow-gauge lines remain: here limestone is taken from the Arnota quarry to the soda works at Govora near Ramnicu Valcea.

Table 7 - Passenger Service Reductions 1989-2001

Service Number and Main Route Axis	A	B	C	D	E
200 Brasov-Sibiu-Arad-Curtici	-17.6	+37.2	-4.3	3.12	1.88
300 Bucharest-Brasov-Cluj Napoca-Oradea	-15.9	-3.0	-9.9	1.15	1.00
400 Brasov-Baia Mare-Satu Mare	-11.7	+27.7	-1.3	2.77	1.92
500 Ploiesti-Buzau-Bacau-Suceava-Vicsani	-23.6	-26.3	-24.9	1.10	1.14
600 Faurei-Vaslui-Iasi-Ungheni	-17.6	+23.3	-4.5	2.12	1.42
700 Bucharest-Faurei-Braila-Galati	-30.3	+3.1	-20.5	2.42	1.64
800 Bucharest-Medgidia-Constanta-Mangalia	-28.6	-19.8	-5.1	1.06	0.63
900 Bucharest-Craiova-Caransebes-Timisoara	-26.1	+16.5	-15.8	3.13	1.99
Total	-20.4	+3.9	-12.2	1.86	1.42

A Percentage reduction in stopping trains
 B Ditto express trains
 C Ditto all trains
 D Stopping trains per 1.00 express train in 1989
 E Ditto 2001
 Source: CFR Timetables

and international tourism/family movements. Local variations arise from the extent of bus competition but it is interesting that express trains have also declined in some areas: marginally on Axis 300, arising from the switch of international trains away from the Episcopia Bihor crossing point near Oradea (not yet electrified) to Curtici near Arad; but quite massively on Axis 500. This latter situation arises in part from international traffic given the sharp reduction in trains running from Bulgaria and Romania to the FSU via Vicșani and the reduction of formerly generous service provision on the route to Suceava now that Moldavia has become the most depressed region in the country. The change on some individual sections has been quite remarkable e.g. between Apahida and Dej with increased express services on this route from Cluj-Napoca to both Satu Mare and Sighetul Marmatiei; also, between Urziceni and Faurei now that this route is being used more for expresses from Bucharest to Galați and Iași which used to travel via Buzău (incidentally another reason for the change noticed on Axis 500) (Table 7).

5. INTERNATIONAL TRAINS

In 1999 the pattern was dominated by a group of trains operating regularly to the FSU: 'Bulgaria' (Sofia-Leningrad), 'Danubius' (Istanbul-Moscow), 'România' (Bucharest-Moscow) and 'Sofia' (Sofia-Moscow). Meanwhile, another four trains served the ECE communist states: 'Balt Orient' (Bucharest-Berlin), 'București' (Bucharest-Belgrade), 'Carpați' (Sofia-Warsaw) and 'Pannonia' (Sofia-Berlin). Apart from the Belgrade service which passed directly into Yugoslavia from Romania at Stamora Moravița, these all travelled through Hungary and Czechoslovakia to reach East Germany via Budapest and Prague and Po-

land via Szolnok or Püspökladány (depending on whether the Curtici or Episcopia Bihor frontier crossing was used) and Košice - after the option of the Ukrainian route via Lviv was renounced in 1988, presumably to avoid problems of gauge when crossing the Soviet territory. There was just one train proceeding through Hungary to the West: the 'Orient Express' with through coaches to Paris. The profile was completed with a range of seasonal holiday trains: 'Marea Neagră' (Varna-Moscow), 'Mamaia' (Mangalia-Prague), 'Nesebar' (Burgas-Budapest), 'Nord-Sud' (Burgas-Warsaw), 'Tracia' (Varna-Leipzig), 'Transdanubium' (Burgas-Prague), 'Varna' (Varna-Warsaw) and 'Vitosha' (Sofia-Berlin); also by some short-distance cross-frontier trains serving Hungary for the most part (Carei, Curtici, Salonta and Valea lui Mihai) but also routes in Bulgaria and Yugoslavia at Negru Vodă and Jimbolia respectively.

The picture is now very different because only the 'București' and 'Carpați' expresses still operate regularly (the 'Balt Orient', renamed 'Alutus' in 1996 was withdrawn after 1997) and 'Bulgaria' is the only train that now operates into Russia serving Moscow as well as Kiev and Minsk (also St. Petersburg until 1999; and Riga and Vilnius until 1995). The 'Romania' service was withdrawn after 1997. The summer services have been drastically curtailed. 'Marea Neagră', 'Nesebar', 'Nord-Sud', 'Plovdiv', 'Transdanubium', 'Varna' and 'Vitosha' were all still running in 1991 but 'Nesebar' was the sole survivor in 1992 after which it too was withdrawn. Now the summer trains are: 'Basarabia' which runs between Chișinău and Constanța while the 'Transbalkan' operates between Budapest and Thessaloniki via Bucharest and Sofia and 'Trakia' was introduced between Bucharest and Istanbul during 2000 only. The big positive change was a substantial increase in services to Hungary which originate not only in Bu-

charest (currently the EuroCity expresses 'Ister' overnight and 'Trianus' by day, introduced in 1996 and 1997 respectively) but from various provincial centres: Arad (unnamed, for Szeged only - starting in 1999), Braşov ('Corona' 1992), Constanţa ('Ovidius' 1993), Oradea ('Partium' 1992 - and during 1993-7 'Varadinium' also), Târgu Mureş ('Ady Endre' 1992) and Timişoara ('Bega' 1997). These are in addition to the services passing through Hungary to Prague ('Pannonia' - with a through coach for Munich until 2000: the remnant of a separate Bucharest-Munich train which ran until the 1993 timetable expired), Venice ('Muntenia' - with a through coach for Paris until the 2000 timetable), Vienna ('Dacia') and Warsaw ('Carpaţi' or 'Karpaty', already referred to). The picture is completed by 'Bosfor' (Bucharest-Istanbul), 'Griviţa' (Bucharest-Sofia) and 'Prietenia' (Chişinău-Istanbul); also the short cross-border services which now operate into Moldova at Fălciu and Ukraine at both Câmpulung pe Tisa and Valea Vişeuului - while the Negru Vodă and Valea lui Mihai routes are no longer advertised. Although services to Western Europe are modest, the Venice service (proceeding from Budapest via Croatia and Slovenia) provides connections with France, Italy and Spain, with further opportunities for transfers in Budapest, Prague and Vienna (just as the Chişinău service provides connections to Russia and Ukraine and Croatia can also be reached via Belgrade).

Although bureaucratic controls have been eased with simplified passport and visa formalities, border administration is still a delaying factor while the demand is limited by low incomes and is also affected by competition from air and bus services (Anon 1995a). There has been some acceleration of services particularly between Bucharest and Budapest for whereas the fastest time between was 15h.20m in 1989, it came down to 13h.2m in 1997 when the EuroCity service was introduced, while new customs regulations brought into force in Romania in 1998 mean that the present scheduled time is 12h.57m (a reduction of 15.5%) - although recent progress has been minimal because although the Arad-Budapest leg of the journey has been accelerated by 24m the Bucharest-Arad section takes 19m longer. In other directions the acceleration is much more modest. The present Warsaw time is 26h.54m compared with 29h.14m in 1989 (a saving of 8.0%) while Bucharest to Sofia by the 'Bulgaria' has been accelerated only marginally to 11h.0m, compared with 11h.29m in 1989 (4.2%), despite the agreement over the faster handling of trains across the frontier. 'Prietenia' takes 14h.6m to get from Bucharest to Chişinău (45.2km/h) compared with 13h.0m by the 'România' in 1989, a deterioration which evidently arises mainly from the state of the railway in Moldova where the 108 km from Ungheni to Chişinău now takes 2hr.36m compared with 1hr.44m in 1989. Thus, there is much scope

for improvement in terms of speed, with more use of light railcar sets, while comfort could increase with more connections with the Euro-City network.

Under the circumstances the development of services has been difficult. An attempt to launch an overnight Braşov-Chişinău service (three times a week in each direction) in December 1996 was not a success (Anon 1996a) and rail traffic to Moldova in general is constrained by the fact that the bus route via Albiţa is much shorter than the main railway line through Iaşi. Again, the route to Poland via Ukraine (Oradea-Halmeu-Chop-Kosice) pioneered by a Constanţa-Kraków service in 1996 did not survive beyond the 1997 timetable, although it reappeared briefly as a Satu Mare-Cierna nad Tisou service in 1999. The Hungarian services have seen several innovations which have not survived: through coaches going beyond Budapest to Szombathely and Zalaegerzeg and in the other direction an Iaşi portion attached to the 'Corona' service; a train from Arad to Nyíregyháza ran in 1999, taking the name 'Varadinium' (vacant since the name was last used for a second daily Oradea-Budapest service which ran for four years 1993-7) and unnamed trains to Budapest via Valea lui Mihai serving Baia Mare and Satu Mare, introduced in 1994 and also Jibou and Zalău which started the following year and ran until 1999, while another unnamed service ran from Arad to Pécs (via Budapest) in 1999 timetable. Finally, the 'Banat' InterCity service ran from Bucharest to Belgrade for three years 1996-8 after operating from Timişoara to Belgrade during 1995.

The swapping of names is a confusing and intriguing aspect of the juggling over international services during the 1990s. 'Pannonia' was used for a Sofia-Berlin service in 1990 and 1991, but switched to Bucharest-Prague only in 1992 (when the former service was cut back leaving a single daily service from Bucharest to Berlin by the Balt-Orient Express) and then in 1993 'took over' the Bucharest-Munich service which had been known as 'Kalman' over the previous two years (dating back to 1991 when the Orient Express was replaced), leaving Prague as well as Berlin with a single through service by the Balt-Orient Express. But in 1994 the main 'Pannonia' train reverted to Bucharest-Prague, including through coaches for Munich which survived until 2000, as already noted. This continues to be the case, although it is now the sole Bucharest-Prague through working since the Balt-Orient Express was withdrawn at the end of the 1997 timetable. And while 'Vitosha' emerged as a summer season train from Sofia to Berlin (Dresden only in 1990), in 1991 it was used for a summer train from Sofia to Leningrad, Minsk and Vilnius but the train was withdrawn and the name did not appear in 1992. However, 'Vitosha' was then used for the Sofia-St.Petersburg regular working in 1993 (after which the name was

dropped in favour of 'Bulgaria' which was used for a Sofia-Kiev service withdrawn when the 1993 timetable expired). The trains operating between Romania and Hungary involve some interesting name changes in addition to the case of 'Varadinium' already mentioned. 'Claudiopolis' was the name of the Cluj Napoca-Budapest service inaugurated in 1992, which was modified first in Târgu Mureş the following year. However a Cluj Napoca-Budapest InterCity started in 1997 with the name 'Ady Endre' which was then transferred to the Târgu Mureş train when the InterCity service was withdrawn in 2001. Finally, 'Alutus' made two fleeting appearances: first, in 1992 when it was used for the overnight Bucharest-Budapest express which had been introduced (unnamed) the previous year, but only to give way in 1993 to 'Ovidius' when the service was scheduled to begin in Constanţa; and second in 1996 when the 'Balt-Orient' was renamed but only for this train to be withdrawn when the 1997 timetable expired.

6. INFRASTRUCTURE

The rehabilitation plan highlighted the problem of 2,500 km of railway which had not been repaired for many years; the same as the 400 bridges and 25 tunnels with an expired lifespan (necessitating speed restrictions) in addition to control and signalling problems costing a total of some \$400 mln. Efforts were made from the mid-1990s to deal with bridge repairs (the celebrated Arad case is mentioned below) and also to cope with the 16 tunnels causing the greatest concern (Bereşti; Bumbăşti-Livezeni; Poarta-Orşova; Teiuş-Cluj; Predeal-Braşov; Ilva Mică-Vatra Dornei). In 1998 E27.4 mln of PHARE funding was reported in connection with Corridor Four requirements for rails, points and welding materials (also referred to below) but also for track renewal using recovered rails and the removal of dangerous pointwork (Anon 1998). It is fortunate that Siderca of Călăraşi is now in a position to produce heavy rail of 60 kg/m (in spite of some concerns over the type of steel involved) and an annual delivery of 100,000 t over 25 years has been mooted. The Bucharest-based CCCF is building a 5 bln.lei reinforced concrete sleeper factory for CFR at Blejoi (Prahova) where production started in 2001 - 100,000 sleepers annually - enough for 60 km of railway, suitable for speeds up to 250 km/hr. Previously, the concrete sleepers were produced only in Braşov (Anon 1998).

7. NEW PROJECTS

Given the parlous financial situation there was little scope for development and the works that went on

in the 1980s to extend double-tracking and electrification - and also to extend branch lines in Moldavia and the Oltenian lignite field - were drastically curtailed. The works on the new lines did not halt immediately because at the time of the revolution, the works were underway between Dângeni, Săveni and Darabani, Hârlău and Botoşani, Băbeni and Alunu and - most significantly - Vâlcele and Râmnicu Vâlcea. A history of railway tunnelling (Bellu 1996 p.16) implies that all development works ceased in 1994 after the 900 m Hârlău-Flămânzi Tunnel was opened in 1990, while on the Vâlcele-Râmnicu Vâlcea line two tunnels totalling 4,200 m are dated 1990. The completion of the Vâlcele project was obviously anticipated in 1990 and 1991 when the works were included in the timetable and Floricel (1992) hailed the scheme as a valuable one that would provide a significantly shorter route between Bucharest, Sibiu and the Hungarian frontier (having been conceived in the 1980s as a means of overcoming the bottleneck between Bucharest and Braşov). There was also reference made to seven tunnels with a combined length of 5,528 m on the Băbeni-Alunu section, dated from 1987 to 1991, although the line was listed in the timetable as being open from Băbeni to Popeşti from 1985 and on to Alunu in 1987. This suggests that the tunnelling may have been carried out in connection with the continuation of the line from Berbeşti towards Albeni and Târgu Cărbuneşti which could have produced a new through route from Bucharest to Târgu Jiu (via Piteşti and Râmnicu Vâlcea) but with a total distance of some 345 km compared with 316 km for the existing route via Craiova and Filiaşi.

The plans for the early 1990s are shown in Figure 2 against the background of the 1989 network. National physical planning maps were drawn up for different aspects of infrastructure and the railway map highlighted the principal routes that would need development in order to handle international traffic (Turnock 1994). Other lines were thought to require increases in capacity requiring the doubling of tracks (Adjud-Ciceu-Dej-Satu Mare; Filiaşi-Târgu Jiu-Petroşani; and Piteşti-Sibiu-Vinţul de Jos). A commuter line from Bucharest to Bolintin was envisaged and at the same time virtually all towns presently lacking a railway connection were destined to receive one by the early years of the new century; though some of the proposals emerge from work by Talaba (1991) and are not grounded in the official plan. Nevertheless, the programme was remarkable in showing clear continuity with the programmes of the former Ceauşescu regime (whose 1982 proposals are included in the map) when rail transport was clearly favoured over road improvements and higher levels of car ownership. These proposals have all fallen by the wayside, although the new main line proposals for Ploieşti-Sibiu (requiring com-

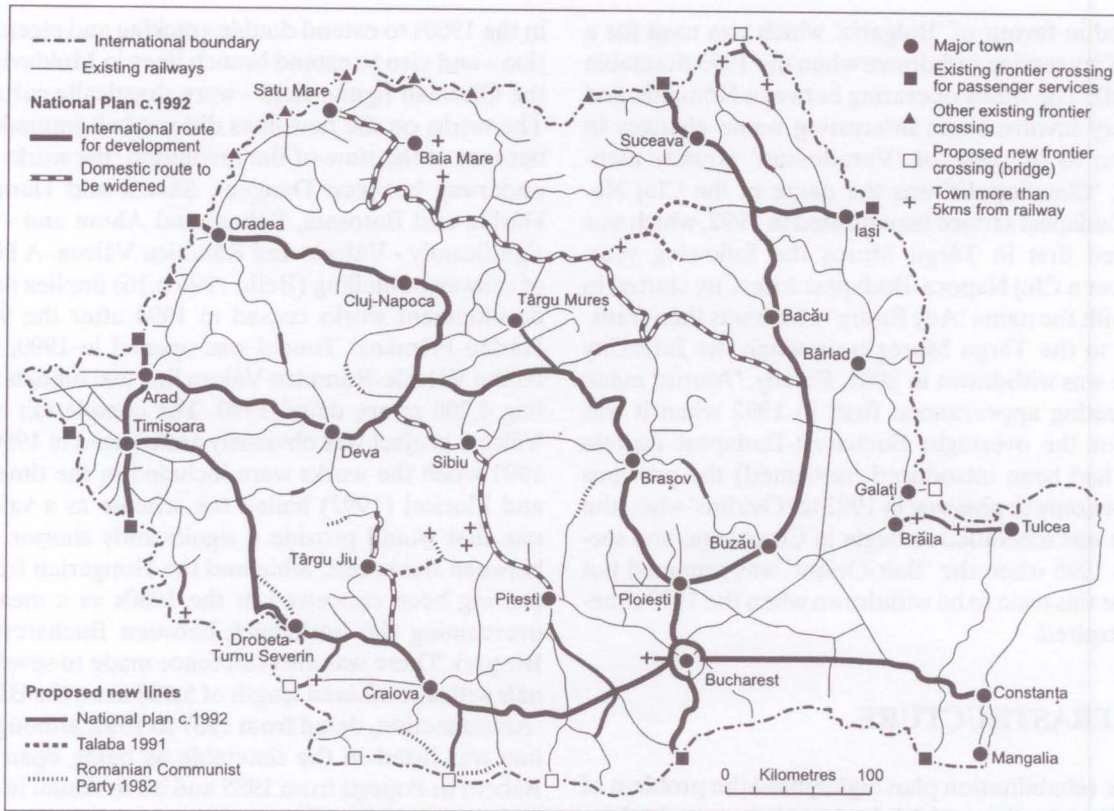


Figure 2 - Developments planned for the early transition years

Sources: National development plans (Urbanproiect); Talaba 1991; and Turnock 1994.

pletion of the Vâlcele-Râmnicu Vâlcea project) and Bucharest-Belgrade (with a new line from Craiova to the Danube at the Iron Gates II dam) persisted for some years (Figure 2).

However, the official CFR journal ('Revista CFR') was still referring to outstanding projects in 1995, including the Darabani branch where no tunnelling was involved, and the 1996 programme for new lines covered Vâlcele-Râmnicu Vâlcea, Albeni-Seciuri-Berbești, Hârlău-Flămânzi, and Dângeni-Săveni-Darabani; and there was an invitation for bids from private companies to secure their completion. Thus, there is an implication that it was the election of a Centre-Right government in 1996 that brought about the abandonment of these projects and ushered in a belated rationalisation already referred to. However, the railway press reminded the public in February 2002 that the Hârlău and Vâlcele projects were still outstanding (the other two were overlooked) and restated the advantages offered by the latter which might be difficult to realise at a future date if the installations (73% complete) were allowed to deteriorate. Further reference will be made to the Danube and Vâlcele projects when discussing the Euro-corridors below. Meanwhile, the doubling of track also ceased, although there were priorities in the Oltenian lignite field (Gura Motrului-Turceni-Târgu Jiu) but electrification continued at a modest pace (Stanescu

1995) with the Suceava-Ilva Mică-Salva, Tecuci-Doaga and Turceni-Dragotești sections reported complete in 1996. But the annual growth during the 1990s was only 27 km compared with 131 km during the 1980s and 214 km during the 1970s.

8. LOCOMOTIVES AND ROLLING STOCK

The locomotive fleet has been dominated by diesel electric 2100 hp and electric 5,100 kW locomotives for the past 35 years - thus the freight company's locomotives are now on the average around 30 years old - but the situation will have to change given the pressures for higher speed, greater comfort and safety and reductions in both energy consumption and environmental damage. Of course, many of the locomotives can be dispensed with in view of the decrease in traffic: by the start of 1995 34% of electric locomotives (including 15 locomotives overhauled and sold to Serbia) and 52% of the diesel locomotive fleet had been taken out of service under the restructuring plan, along with 14% of coaches and 43% of wagons. For the rest, 160 km/h was deemed to be achievable with some modifications to the transmission of 5,100 Kw electric locomotives - enough to see out the 1990s (Dinu 1996) and indeed the first years of the present millennium. Thus,

the 2001-2010 development programme incorporates CFR aim (stated in 1998) to update around 100 diesel and electric locomotives to meet the European standards and prepare for the competition along the European corridors (with liberalisation in 2000).

The passenger company will proceed with 24 electric locomotive upgrades in Craiova by Siemens/Electroputere with an EBRD credit of \$22 mln. There is also a reference to the first four 5,100 Kw electric locomotives being tested to identify the final solution for modernisation, while Electroputere are upgrading 2,400 Kw locomotives recently acquired from Croatia: these are economical and contribute to the solution of the traction problems in the period until 2010-15. Meanwhile, after references to various numbers of 2,100 hp diesel-electric locomotive upgrades, it now appears that 70 are involved. Following the upgrading of seven locomotives with funding by an EBRD loan in 2001, the Transport Ministry invited bids in 2002 for the upgrading of another 63 locomotives in partnership with Electroputere (the only Romanian company with the technical resources) and co-operation will involve the Canadian Subsidiary of General Motors (GM) in London (Ontario) backed by a \$100 mln financial package (state guaranteed) from Foreign Trade Bank of Japan. Two prototypes of the new class EGM621 were completed in 2000 with the assistance of GM and showed excellent reliability after two months of testing to the point where interest has also been shown by Bulgaria and Poland. There is still a close resemblance to the old type but the chassis is bulkier and the Sulzer diesel engine is replaced by a GM product. These locomotives will be much needed by the freight company which intends to acquire ten new locomotive per year from 2005. Finally, four diesel hydraulic locomotives have been modernised with the help of Alstom for use between Oradea and Cluj-Napoca where they are badly needed for traction and heating on a route that hasn't been electrified yet. Two further locomotives have been modernised for use with cement trains from Medgidia by Lafarge-Romcim.

9. RAILCARS

A particularly curious aspect of CFR traction policy concerns the distinctly ambivalent attitude to light railcars which are found extensively on branch lines across ECE. However, after a flurry of activity in the 1930s to build railcars for branch lines and some express inter-city services (Holban 1991), there has been no consistent programme of development; so the old trains - now more than 60 years old - remain in service and can still be seen at work on branches around Timișoara (Turnock 1991; 1995). Possibly the heavy volume of commuting traffic during the communist

period made the railcars inappropriate as an alternative to the flexibility provided by rakes of coaches hauled by standard diesel or electric locomotives; so that the occasional railcar innovations were never consolidated. But with lighter branch line traffic and priority for reducing costs - combined with the increasing difficulty of maintaining the inherited stock - the case for railcars would appear unanswerable. However, finance has proved to be a stumbling block. In 1995 a prototype by Marub of Brașov with a 282 hp engine (MAN licence) was used with a Meva (Drobeta-Turn Severin) trailer an Bucharest-Câmpulung/Bucharest-Târgoviște accelerates in 1996 - and then transferred to the Snagov branch. The second prototype (hydraulic variant) was built by Marub in 1997 and tested on lines in the Brașov area, but the engine overheated on steep gradients and the train was damaged in a collision with a motor vehicle on the Zărnești line. Meanwhile, the CFR 1995 programme extended to the purchase of two diesel hydraulic 'Düewag' trains from Germany acquired and tested in various parts of Romania on lengthy secondary routes (Dinu 1996). However, no finance could be insured for an extended programme. Then, in 1999 there was an announcement of the intention to open a bid book for railcars and the result emerged in 2002 with finances (through a government-guaranteed loan) for the supply of Siemens 'Desiro SR20D' railcars which have been very successful in Germany in insuring lower running costs through light weight (use of aluminium). Romania will make subassemblies. Each pair of cars will have 12 first-class seats and 111 second-class (13 folding) with standing room for 90 persons and facilities including toilets for the disabled. With a maximum speed of 120 km/h, they will be used for short/medium haul trains (up to 250 km) on non-electrified lines such as Bucharest-Craiova via Pitești, Bucharest-Iași via Urziceni and Tecuci, Cluj Napoca-Oradea and Satu Mare-Baia Mare. 120 sets will be delivered over four years for a total cost of \$250 mln - the first during 2002 - and 63 will be built in Romania. 80-100 sets will also be bought second-hand from Germany for \$200,000 each. Thus, after decades of stability the face of the CFR is destined to change radically during the next few years.

10. ROLLING STOCK

By the beginning of 1995 only 3,400 out of 6,400 coaches were still functional, with an average age approaching 30 years. It seems that 1,200 coaches that are 15-25 years old can be rebuilt, with improved comfort and heating, including 750 that will be fitted with bogies of superior performance (Kleinschmidt 1996). Many will be rebuilt in CFR workshops in Grivița (Bucharest) using the passenger company's own funds but

there is also work for Astra Vagoane at Arad and Remar at Paşcani. The intention is to provide 30-40 trainsets of upgraded coaches starting in 1999 and 22 sets were available for use in the 'Litoral 2000' programme described below: subsequently used on Rapid services (19), InterCity trains (2) and an Accelerat. Meanwhile the freight company needs to upgrade its wagon pool where there are few new vehicles and one eighth of the stock is 30-40 years old. A programme of wagon repairs is proceeding with the help of several companies: Reva of Simeria are concentrating on coal wagons - 'Fals'; also 'Tals' for dry goods, 'Uagaps' for cereals, 'Z' type tank wagons and 'Gags' which are four-axle covered wagons; while Marutin of Timişoara specialise in refrigerated and special wagons of 10-20 axles, as well as 'Gags'; and Rova of Roşiorii de Vede deal with four-axle open wagons and wagons for crushed stone - 'Ucs', as well 'Fals' and 'Uagaps'. Other firms are Umerva Ploieşti (2-4 axle tank wagons, cement wagons - 'Ucs', as well as 'Fals' and 'Uagaps'); Vagmar (four axle platform wagons - 'Eacs' and tractor wagons - 'Laads', as well as 'Fals' and 'Ucs'); Romvag Caracal (four-axle covered wagons - 'Eacs', as well as 'Fals'); and Meva of Drobeta-Turnu Severin ('Eacs'); and Remar, Paşcani ('Eacs'). Discussion of locomotives and rolling stock is continued in the next section with particular reference to high-speed lines.

11. TOURISM

Reference should also be made to the railway role in developing tourism through ownership of hotels (including the Astoria in Sibiu, Bucovina in Vatra Dornei and Decebal in Eforie Nord), villas and campsites (not to mention the additional real estate that remains the subject of restitution proceedings). A Steam Locomotive Museum was opened in Sibiu in 1994 and business has been gained from the operation of heritage trains (including the Royal Train) on scenic routes such as main lines like Arad-Băile Herculane and Braşov-Sibiu and branches including Câmpulung Moldovenesc-Moldaviţa, Oraviţa-Anina and Paşcani-Târgu Neamţ. Narrow gauge is always source of particular fascination and although Sibiu-Agnita is the only line still operating regularly, Turda-Abrud is still retained and the local authorities are keen on implementing a SAAF rehabilitation project to invest \$70,000 (which may be obtained through PHARE for the National Agency for Regional Development Programme): all ticketing would be done on the train to minimise costs and 20 CFR properties would be put at the disposal of the local authorities for handicraft shops or mini-hotels. Furthermore, the once ubiquitous forest railway survives at Covasna, Moldoviţa and Vişeu de Sus (Beier & Hufnagel 1993, Turnock 1990):

in the latter case the 35 km Vaser Valley line ('Wasertalbahn') has enhanced its tourist profile in the hands of privatised logging companies - R.G.Holz and Vişeu Forest - backed by the accommodation provided in the town by the Vişeu development organisation and by Romsilva chalets up the valley. Finally, CFR have contributed to the relaunch of the Black Sea tourism, initially in 1995 by carrying cars - at a cost equivalent to the petrol cost incurred in driving the distance - on summer trains to Eforie from Iaşi, Oradea and Timişoara (an Autorail service which still operates from Oradea). Then the passenger company provided 22 pairs of upgraded train sets (normally used for InterCity, rapid and accelerate services) for summer specials under the 'Litoral 2000' programme, including electric and diesel locomotives upgraded by Electroputere and GM respectively, with seats bookable up to 30 days in advance. Another incentive offered in 2000 was limited travel in the first class accommodation at the second class prices.

12. EMPLOYMENT

Employment is a critical indicator given the falling traffic and the quest for higher productivity. With 180,000 workers at time of the revolution the CFR claimed a productivity level more than 50% above the European average - taking the second place after Sweden - with 660 th.t/km of freight per worker in 1989: a reflection of prodigious quantities of minerals (especially coal) transported at the time (Anon 1995a). However, the figure fell catastrophically to 320 in 1991 and 248 in 1993 and in the process the proportion of total costs referring to staff moved up rapidly to 46.6% in 1991 and 56.0% in 1993. It is also worth noting that CFR scored highly for tonne-kilometres of freight handled in relation to the numbers of locomotives and wagons while subventions which averaged only 12.5% of total income during 1991-4 were low in relation to Europe where most countries fell into the 20-40% band. Action was taken in 1994 to start reducing employment by 22,500 (with great sensitivity to avoid difficulties with unions) and a productivity gain was registered in that year after falls each year from 1989. But 45,000 jobs were lost by 1996 and at the end of 2001 employment had fallen to 115,000, while the optimum number was quoted at 78,000: a level that would be attainable in 2004 with annual reductions of 7%. In many places employment has fallen far more rapidly than the national average. The collapse of much of the heavy industry in Reşiţa reduced employment at Caransebeş locomotive depot from 1,880 to 750 by 2000 and there is a prospect of further losses if a rationalisation plan for the region concentrates freight and passenger locomotives at Simeria and Timişoara respectively.

13. THE PROGRAMME OF HIGH-SPEED RAIL CORRIDORS

The paper must also discuss what is clearly the overriding consideration in railway development in Romania: implementing the European programme for high-speed trains passing along major transport corridors which were already being considered in 1989 in the context of 'Trans-European Railways' (TERs) for passenger and freight movements from Northern and Central Europe to Africa and the Middle East (Popa 1993; Radulescu 1995). The issue came to the fore immediately after the revolution as the need for closer integration with Western Europe became apparent, not to mention intermodal competition within Romania which soon produced the general objective of intention of providing maximum eight hour schedules for inter-city trains from Bucharest to reach Iași, Oradea, Suceava and Timișoara (Anon 1993a; 1993b). In 1991 CFR established its 'Comisia pentru viteze mari', while a 'consiliu' was set up in the Ministry of Transport and 'Institutul de Studii și Proiectari Căi Ferate' (ISPCF) elaborated 'Condițiile tehnice pentru căile ferate existente și cele noi privind circulația trenurilor de viteze mari' to examine the implications for trains and infrastructure (Floriceș & Petrean 1993). CFR decided to go for 200 km/h with 160 km/h as an intermediate stage (Huțanu 1997 p.7), given the huge technological and financial implications identified with the help of Deutsche Eisenbahn Consult. The infrastructure would have to be radically upgraded, with realignment and improved trackwork requiring appropriate Plasser & Theurer tamping machines ('mașini de burat') and new pointwork from Aparcom of Buzău who were collaborating with BWG (Germany); also, changes to signalling and even the catenary on electrified lines which was suitable only for speeds of up to 160 km/h (Spack 1997 p.37); not to mention locomotives and rolling stock. But with the Lehliu-Fetești section available as a testbed for high-speed running (with speeds of 140 km/h already possible), the Bucharest-Constanța seemed the most appropriate first project for completion.

Identifying the key routes was nothing new in a situation where half of the total rail traffic was carried on a fifth of the network and where the key links between the capital and the leading provincial cities would inevitably set the agenda. However, priorities were also determined by the network of agreed international corridors since Romania is participating in the UIC 'Direcția de Mare Viteză' and in two initiatives over two complementary Trans-European railway systems: AGC ('Accord Européen sur les Grandes Lignes Internationales de Chemin de Fer') and AGTC ('Accord Européen sur les Grandes Lignes de Transport Combiné et les Installations Connexes') (Dinicescu 1996; Hutanu

1997). Planning the high-speed corridors is also taking place within six groups of countries set up at UIC's Madrid meeting in 1993. Romania operates within a south-eastern group (also including Albania, Austria, Bosnia & Herzegovina, Bulgaria, Croatia, Greece, Hungary, Italy, Macedonia, Slovenia, Turkey and Yugoslavia) which first met in Bucharest in 1995.

Nine corridors were agreed on Crete 1994 and confirmed at Helsinki 1997, with the addition of Corridor 10 - Salzburg-Thessaloniki - and integration with the maritime basins of the Adriatic Sea; the Barents-Arctic; the Black Sea; and the Mediterranean. This is a useful extension which covers much of the former Yugoslavia - excluded from the early planning by the wars of the early 1990s - and also encourages planning to link the corridors with maritime activities: in Romanian case the Black Sea traffic to the Caucasus, Central Asia and the Middle East handled by the ferry services to Batumi, Izmir, Mersin and Samsun and Poti (Anon 1997a). As regards the corridors themselves, the Romanian is involved with Corridor Four: Berlin/Nürnberg-Prague-Budapest-Constanța-Thessaloniki-Istanbul; Corridor Seven: River Danube; and Corridor Nine: Helsinki-Sankt Petersburg-Moscow-Kyiv-Liubashevskia-Chișinău-Bucharest-Dimitrovgrad-Alexandroupolis. While the Danube corridor is river-only, the others involve railways and motorways, with associated sea and river ports - all carrying priority for upgrading by 2010. In addition, the EU concern for transport integration in candidate countries led to the setting up of a 'Transport Infrastructure Needs Assessment Group' (TINA) in 1996 and this has been operating in Vienna since 1997 with concern for the Baltic, Central Europe and South Central Europe. A selected railway network of 20,290 km has been identified (along with 18,030 km road, 38 airports, 13 maritime and 49 river ports) requiring an estimated E90 bln. needed until 2015 (1.5% of GDP) including help from PHARE.

14. THE GEOGRAPHY OF THE CORRIDORS

The corridor concept has to be translated into specific routes (Figure 3). In Romania Corridor Four begins on the Hungarian frontier at Curtici and runs east via Arad, Deva, Teiuș, Sibiu, Brașov and Bucharest to Constanța. But there is also an alternative route to Teiuș from the frontier at Episcopia Bihor via Oradea and Cluj Napoca. And there is also a southern variant between Arad and Bucharest routed through Timișoara, Caransebeș, Drobeta Turnu Severin and Craiova - and this also includes a link from Belgrade via Stamora Moravița to Timișoara. Corridor Nine extends from the Ukrainian frontier at Vicșani through

Suceava, Paşcani, Bacău, Buzău and Ploieşti to Bucharest and Giurgiu on the Bulgarian frontier. But there are also routes from Kyiv through Chişinău in Moldova to Iaşi and Paşcani and from Odessa via Ismail to Galaţi and Buzău, while there is alternative route from Bucharest to Giurgiu via Videle. Protocols have now been signed with the railway companies in the adjacent countries and priorities have been worked out: these were presented by Hutanu (1997 p. 5) as the lines from Bucharest to Constanţa, Strehaia and Teiuş (Corridor Four) and Ploieşti to Paşcani (Corridor Nine) (Figure 3).

However, there are several problems that arise. In the case of Corridor Four there is the option of completing the Vâlcele-Râmnicu Vâlcea project (already referred to) which was started in the communist period and was 75% complete in 1989. This more direct route from Bucharest to Transylvania, afforded by crossing from the Argeş valley at Vâlcele on the Goleşti-Câmpulung branch to the Topolog which gives access to the Olt valley route (Piatra Olt-Podul Olt) at Bujoreni near Râmnicu Vâlcea, is shown on the Romanian maps of the early 1990s and also some EU documentation, although all the recent statements (since 1996) refer only to the northern and southern routes already described. Dinu (1997) refers to the official abandonment of the project in 1996 after ten years of construction (1979-1989) involving 34 km of

track with two tunnels, ten viaducts and extensive stream diversion in an area prone to landslides. The issue poses a dilemma. To go ahead with it would require more funding that cannot be easily justified bearing in mind the huge resourcing that the current plan will require and the capacity on the chosen routes today (far greater than current traffic levels given the recession since 1989) and for the foreseeable future given the scale of modernisation envisaged - and notwithstanding the problems of 'straightening out' the Predeal-Braşov route. While the Vâlcele project could simplify Corridor Four, this might not be welcome on regional development grounds since the combined variants offer direct access to so many major towns. A second issue concerns the best way of connecting Corridor Four with Belgrade. The current plan is to modernise the existing route from Timişoara which runs south to the Yugoslav border at Stamora Moraviţa which the Yugoslavs wish to electrify (perhaps in conjunction with hydropower development on the Caraş), but this means effectively going round 'three sides of a square' on the way from Bucharest. A more direct route would use the Craiova to the Danube at Iron Gates II which is shown, like the Vâlcele-Râmnicu Vâlcea route, on maps of the early transition phase when 'dreams' were still being nourished (Floricele 1992). Once again, the indications are that the option of building new railways outstanding

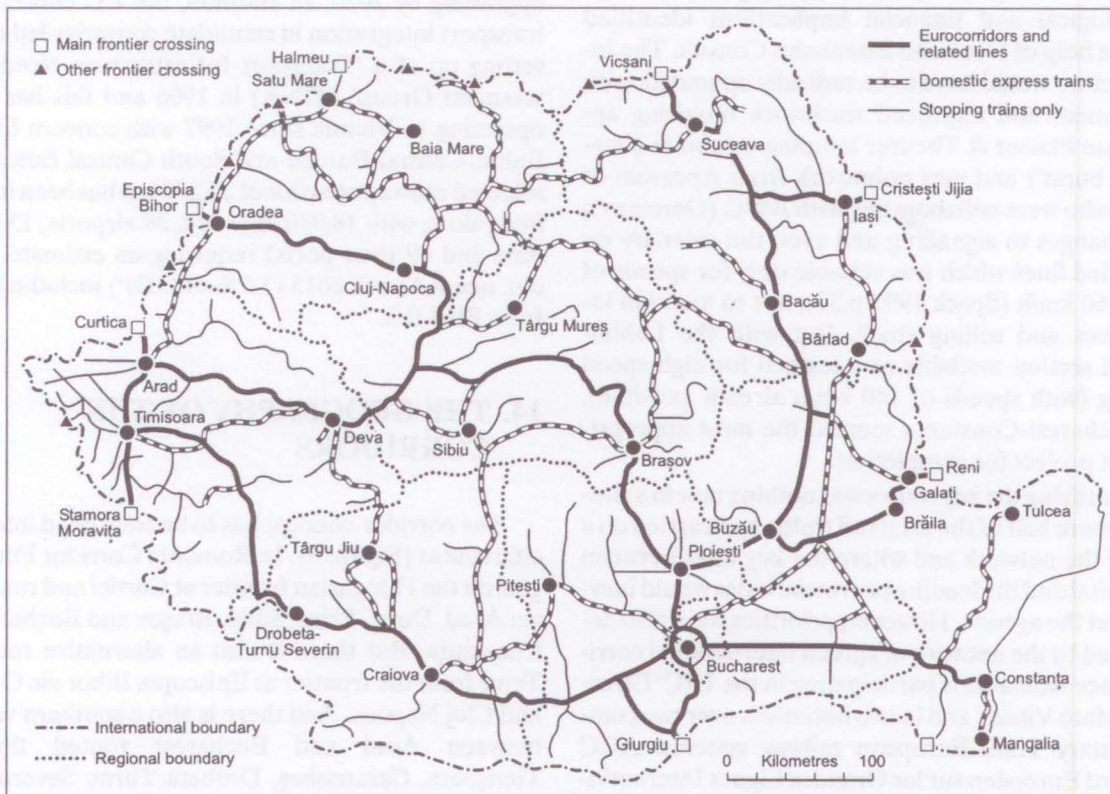


Figure 3 - The present passenger network

Source: CFR Timetables.

from the communist period - attractive though it might have been as an ideal - was finally rebuffed by the Centre-Right government in 1996. But this did not prevent a reminder of the issue appearing in 'Jurnal Feroviar' pointing out the investment that will be lost if the installations are simply allowed to deteriorate beyond rescue. It should not be forgotten that the Calafat-Vidin bridge project will offer the possibility of international traffic from Craiova to Sofia, Thessaloniki and Athens, while collaboration between Hungary, Romania and Yugoslavia through the Danube-Criş-Mureş-Tisa Euroregion has revealed the highly inconvenient transport links between the main towns (Novi Sad, Szeged and Timișoara, which happen to be the second cities in their respective countries) and pointed to a simple solution through rehabilitation of the direct Szeged-Timișoara railway which was broken up by the new borders imposed on Banat after the First World War.

Corridor Nine is not without its problems. Dincescu (1996) confirms the gap between Reni (on the Moldovan frontier near Galați) and Ismail on the route to Odessa which has not yet been addressed. There is also the question of the high-speed line from Pașcani to Kyiv via Chișinău which will involve an extremely exaggerated 'zig-zag' if the present alignment is adopted. Some discussion has arisen in connection with the projected standard gauge line from the Romanian-Moldovan frontier at Ungheni near Iași to Chișinău which could either follow the existing line, with the possibility of doubling in the future, or take a new alignment following the most direct route. Finally, it remains to be seen how the two-kilometer Calafat-Vidin rail-road bridge (which is due to start operating in 2002 or 2003) will modify the geography of corridors and affect the possible approach routes through Romania, a question which has raised the possibility of rehabilitating the Carpathian route Simeria-Petroșani-Târgu Jiu; a strategy that would be beneficial for the depressed Petroșani mining area.

Most of the corridors are already electrified: the main gap is Cluj Napoca to Episcopia Bihor scheduled for 2002-6, along with the Giurgiu lines and Iași-Ungheni (Anon 1997a): these are also single-track sections. Generally, 100-120 km/h is possible (140 km/h in some cases like Ploiești-Bucharest-Videle and much of the Constanța line) while there are some much slower sections e.g. 50-95 km/h between Pașcani and Ungheni. The corridors feature in proposals for further electrification published in 2000 and also in the routes for 3,600 km of fibre-optic cable in connection with digital telephony (and extended to 4,065 km when cost savings allowed for some further development) (Mironescu & Mitroi 1998). This work is being done in five stages, the first was to be carried out by Siemens under contracts awarded in 1998 and 1999 for

completion by the end of 1999/2000. Planning will also have to take careful account of Constanța shipping and the Black Sea ferries in particular. These date back to an accord between Romania and Turkey in 1982 but ratified by the Romanian Parliament only in 1993 with a Romanian-Turkish Commission set up to implement the project in the following year. The service started in 1995 (Anon 1995b) and was followed by the Mersin service in 1997. The Poti/Batumi ferry started in 1998-9 but problems arose over the gauge (which the competing Bulgarian and Ukrainian ferries do not have to cope with) since broad gauge was in use in Georgia and EU spent E2.2 mln to lay standard gauge so that a Romanian-Georgian joint venture company 'Euroasia' can load standard gauge wagons on to broad gauge flats. The Batumi ferry has been operating steadily since 2001 handling oil, gas, coal, ores, cereals and cotton. The ferryboats 'Eforie' and 'Mangalia' take 85-100 wagons or 80TIR trucks or combinations on a six-day cycle, and there is scope for triangular voyages taking in Constanța, Batumi and Sam-sun (Floricele 1994).

The present idea is that traffic can feed into ferries from Europe (e.g. from routes originating on the Baltic/North Sea coast at (say) Riga, Szczecin or Rotterdam for destinations in the Middle East or in the Pacific theatre via Lianyungang, with the Batumi ferry thus providing a link in a 12,600 km corridor between the Atlantic and the Pacific. This has increased German interest in co-operating in the Romanian railway development: in addition to the contact with Electroputere, Krupp have discussed logistical support for the Bucharest-Constanța modernisation. France has also looked into ways of improving transit to the Middle East via Romania, while the national railway corporation of Poland, Romania, Slovakia and Ukraine agreed to co-operate on upgrading the 2,163 km Gdansk-Constanța route via Tarnów, Košice, Beregovo and Oradea - already pioneered by Kraków-Constanța passenger trains introduced for a short period in the mid-1990s. Standard gauge and electrification throughout will bring the Bucharest-Warsaw journey time down from 26 to 20 hours. Funding will be available for this route and will come from the EU's 'Instrument for Structural Policies for Pre-Accession' (ISPA) because major development is needed in the central section (Tarnów-Teiuș), though part of this is already scheduled in connection with the Eurocorridors (like the Cluj Napoca-Episcopia Bihor electrification already referred to).

15. IMPLEMENTATION

The corridors comprise an ambitious programme of technical and legislative harmonisation. It has always been understood that Corridor Four (especially

the northern section) would have priority with works planned to start in 1998. The 1996 'Proiect de Reabilitare a Căilor Ferate' included a provision for infrastructure and rolling stock with funds from the World Bank and EBRD. The 'Compania de Infrastructură CFR' needed 39,600 t of heavy rails from the British Steel Track Products; also 235 switches from Apcarom Buzău; and elastic welding material ('sudura aluminotermică') from the French company Railtech - all destined for Corridor Four at a total cost of E25 mln. There was also to be a start with the modernisation of control at Arad, Braşov and Timișoara (costing E58 mln.) while similar work at Bucharest was planned under the PHARE programme, as the equipment of an important training facility: 'Centrul de Perfectionare și Documentare al CFR'. A contract with Comreco of UK for an IT system needed for the railway timetable was also mentioned as was a contract with the Belgian firm Transurb Consult for the management of the railway overhaul as a whole during 1997-2000. In 1997 a feasibility study by Italferr, with design by the Institute of Railway Research & Planning (ISPCF), came up with an estimate of \$1.5 bln. for modernisation of Corridor Four for 160 km/h running (but up to 220 km/h in places) for passenger trains and 120 km/h for freight between Curtici, Braşov, Bucharest and Constanța.

The large scale of the work could be appreciated from the fact that - at the time - half the 880 km route length was beyond its repair term; there were some 70 dangerous points, 310 bridges with weight limits and two tunnels below European standards. The works would be carried out in three phases (1998-9, 1999-2000 and 2001-2003) and would secure a 22% improvement in the running time. The following year the Romanian government reached agreement about co-financing with the European Investment Bank (EIB) through a E200 mln. loan for a period of 15 years - specifically for the Bucharest-Braşov Railway Rehabilitation Programme. The Belgian company Tansurb Consult emerged as the successful consulting firm for the first section (Bucharest-Braşov) which was due for completion in 2003. And in 1999 a \$9.2 mln. contract was negotiated with a Belgian consortium for the refurbishment of the first section (Bucharest-Ploiești with the Ploiești-Câmpina, Câmpina-Predeal and Predeal-Braşov sections to follow). A detailed examination of this programme is not possible, but it is clear that the works fell seriously behind schedule through a severe financial blockage arising from the deep economic recession of the late 1990s which prevented a successful reform of the economy and made foreign investors nervous despite the encouragement offered to them (Ion Tudor 1996). However, there is now (since 2000) a resumption of economic growth and more avenues for financing can be followed. Trans-

port projects may be implemented through partnership between the Romanian state and foreign investors during 2002-8 e.g. the Cluj-Oradea electrification (valued at \$0.59 bln.); the Iași-Tecuci electrification (\$0.21 bln.); and the Giurgiu container terminal (\$75 mln.) (Anon 2002). Meanwhile, the regional railway administrations are making their own arrangements for finances, as in the case of Timișoara which has received 2,000 bln.lei from PHARE and EBRD for various projects including installation of CED control equipment Timișoara. Station modernisation at Bucharest's Gara de Nord is using money obtained both through local and foreign credits as well as through co-financing.

It is during the year 2002 that significant progress should begin since the railways have come up with a 'shopping list' valued at \$760 mln for this one year alone. The programme concerns specific sections of Eurocorridors and broader programmes which are inevitably tied to the corridors in general (and specifically Corridor Four - while Corridor Nine remains under preparation): upgrading stations to European standards with embankment consolidation, bridge rehabilitation and replacement (11 bridges and 21 small tubular bridges on the Bucharest-Braşov section alone) and tunnel repairs with replacement of the trackbed to a depth of one meter; modern control at the main stations (Ploiești Sud/Vest; Predeal and Sinaia have already been dealt with, while Constanța, Curtici, Deva, Simeria and others will follow) with the increased height of platforms also a consideration (Valea-Baba 1997). There will also be improvements to signalling with electronic installations; new electrified lines; enlargement of the optical fibre-based communications network; machinery for upkeep of railway infrastructure (Plasser & Theurer track maintenance machines of 09-32 CSM type - eventually one for each region); elastic fastening of rails; and standardisation of pointing systems.

As already mentioned, financing is coming through credits from the EBRD and the EIB and the CFR's own funds. Further negotiations proceeded with a recalculation in 2000 estimating the Corridor Four upgrading cost at \$1.8-2.0 bln., needed from investment banks, the EU and Romanian government. Contracts were signed in 2001 for the first section which was redefined as Bucharest-Câmpina, the winning bids coming from: a Swietelski (Austria), WIEBE (Germany) CCCF (Romania) consortium for infrastructure and superstructure; CCCF (Romania) for civil engineering works at railway stations; a Spie Ene-trans (France) and ISAF (Romania) consortium for contact line and protection of installations; and IMSAT (Romania) for signalling and telecommunications. The plan is to finish work on the northern line of Corridor Four in 2010 (advanced from 2006 which was

the initial target in the 2000 recalculation) and complete all the Eurocorridors by 2015. Completion dates for Cămpina and Braşov are not known but the 2003 date mooted for Braşov in 2001 is clearly unrealistic, especially in view of the realignment required in the Timiş Valley between Predeal and Braşov.

The Bucharest-Constanţa section of Corridor Four has also received high priority although the history seems less complicated. Negotiations over the Bucharest-Constanţa Rehabilitation Programme have been taking place since 1988 for a Japanese loan for a project which will be the doubling of the track between Bucharest Nord and Băneasa. But EU funding is also obtained under ISPA which will also cover the road schemes from Bucharest to Cernavodă and Giurgiu roads: a total of three projects presented at the first ISPA Management Committee Union in 2000. The hope is that the Japanese Bank for International Cooperation will help the government finance the Bucharest-Băneasa and Feteşti-Constanţa sections while ISPA funds will cover Băneasa-Feteşti. As well as track improvement and station rehabilitation to the European norms, there will be improved drainage and sewerage; and also a woodland screen where the road runs parallel with the railway. This will provide optical separation (useful at night) and may also help in winter on a line regularly plagued by drifting snow (especially in the Ciulniţa-Medgidia and Fundulea-Sărulăşti sections). The works are scheduled for 2002-5 and will allow speeds increase to 180 km/h and a decrease in journey time to 1 hr 40 m. Meanwhile, little has been said about the other corridor works, although Corridor Nine (Ungheni-Giurgiu) was estimated at \$636 mln. in 1997; along with electrification/modernisation for the Timişoara-Stamora Moraviţa section of Corridor Four (\$54 mln.). However, it is clear that the southern arm of Corridor Four will require protection in the Iron Gates to cope with erosion and unstable slopes (Buzuloiu 1990), while the bridge over the Mureş in Arad is likely to resurface as a controversial issue.

This 350 m long bridge built in 1912 was damaged by bombing during the Second World War and although repaired in 1947 cracks were noticed 40 years later and flood damage in 1998 forced its closure under the orders of the Ministry of Transport. However, during the urban growth of the communist years the bridge was entombed within the Micalaca suburb of Arad and the urban plan now includes a provision for a new double track bridge two kilometres upstream to be accessed by a realigned railway. But although there was a proposal in 1987 for a new double-track Arad-Timişoara railway, CFR were never consulted regarding the urban plan. When the local authority refused permission for the bridge repairs in 1992 and CFR lacked the 450 bln.lei needed for the new bridge,

a deadlock ensued which continued for more than a year after a closure order on the bridge became unavoidable. The local authority eventually agreed to the repairs on the existing bridge which were carried out during 1999-2000 but it seems that planning for Corridor Four will almost certainly bring the issue back to the agenda. Meanwhile, higher speeds raise safety issues. Level crossings with lights - but without barriers - are a major concern because drivers of road vehicles are often too impatient to wait or are blatantly inattentive to movements on the railway. But more capacity is needed to cope with accidents and fires in tunnels and - though for long officially discouraged - the time-honoured tradition of roof-riding on the CFR gave rise to a spectacular accident in 1996 when a passenger climbed on top of a locomotive and was electrocuted to the extent of 27,000 volts through contact with the pantograph: the train was stopped because of flames and the passenger made a miraculous recovery in hospital.

As regards new trains, the issue is again complex and bedevilled by financial problems. The Austrian, Hungarian and Romanian railways agree that the Vienna-Budapest-Bucharest route (Corridor Four) will be served by high-speed trains but only between Vienna, Budapest and Arad initially. Romania will need new trains, particularly tilting ('pendulare') trains, given the context of terrain and railway alignments. This requirement was anticipated many years ago and after discussions beginning in 1995, Fiat Ferroviaria demonstrated the Pendolino/Cisalpine train ETR470 (380 seats) in 1996 between Curtici and Constanţa (running at 160-165 km/h between Bucharest and Constanţa) - also between Arad and Cluj Napoca - and indicated that with small modifications it could work up to 180 km/h (while speeds of 180-200 km/h would require track and signalling upgrades) (Anon 1996b; Firma Fiat Ferroviaria 1996). However, the future for tilting trains is problematic. While passengers do not necessarily feel discomfort caused by increased centrifugal force, the force is still there and 'erodes' wheels and rails at the point of contact, creating a lot of noise. Even more important is the need for expensive additional maintenance (which is not a good prospect for the Romanian economy). Furthermore, the standard quality of track is particularly demanding.

With regard to the rolling stock, CFR already operates InterCity trainsets with German Bautzen-Görlitz stock imported during the 1980s and capable of 160 km/h maximum with some modification to the bogies (Dinu 1996). These coaches are used for the Bucharest-Budapest EuroNight service, while MAV (Hungarian) coaches acquired from Spain are used on the daytime EuroCity and can exceed 200 km/h. To meet this higher speed requirement, Astra Vagoane Călători (Arad) have co-operated with De Dietrich

Ferrovie (France) and used a state-guaranteed credit to buy a manufacturing licence (1992 origin) plus equipment and components in respect of the Corail-AVA200 coach for 200 km/h running. A contract was signed in 1993 for 100 coaches (30 first class, 60 second class and 10 bar-restaurant cars - with sleeping and couchette wagons to come later) for completion in 2002 at a cost \$1.3 mln/4 bln.lei per coach (quoted in 1996) financed through part of the railway rehabilitation finance received from EBRD through a state-guaranteed \$250 mln. loan. Work at Arad and also by Santierele CFR at Grivița, using components from Europe and Romania, permitted rapid assimilation which meant that the prototype was ready in 1996 for exhibition at Băneasa. Five coaches were ready later in the year and were reportedly destined for through services from Bucharest to Frankfurt, Hamburg, Paris and Milan (although these facilities have never appeared in the timetable). But production was virtually stopped during 1998-2001 and it is not clear how many coaches are now in service (numbers between 12 and 30 have been mentioned) although the financial arrangements evidently applied to the first 50. But it is clear that there has been a change of plan with the existing stock updated to save half the cost of building a new one. It was announced in 1999 that Astra would work with Alstom to update 100 coaches during 2000-1 and that some of the work would be done in Grivița and also in the workshops of 'Aerofina Bucharest' and 'Avioane Craiova' (both aircraft factories seriously short of engineering work). These coaches will incorporate AVA elements and will be suitable for international use in preparation for competition along the European corridors (with the impending liberalisation of rail transport in 2000) and with EBRD funding switched from the original plan.

As regards wagons the freight company signed a \$30 mln. agreement in 1998 with the Technirail (Belgium) and Romvag Caracal for the modernisation of 750-1,000 open and closed wagons ('vagoane acoperite/descoperite') in preparation for competition along the transport corridors. There are four types of wagons involved: a covered four-axle wagon with metallic doors ('Gas'); an uncovered four-axle wagon with wooden floor and skin tarpaulin ('Rils'); a removable reinforced plastic cover to expedite mechanical loading and unloading; a two-axle covered wagon with aluminium sliding doors ('Hbin'); and an uncovered four-axle wagon with metallic walls and floor ('Shimm'). Astra has also produced a prototype four-axle wagon ZDL for TIR after Banat-Crisana Public Ownership Fund had won an award at the International Eurofinance Luxembourg 1996 Conference for its 'Romania-Combi' Ro-La combined transport project. 40 units are needed for traffic between Hungary and Bulgaria.

16. RAILWAYS AND REGIONAL DEVELOPMENT

It has already been asserted that the railways have played an important role in the development of Romania, and this continued to be the case under communism. "The railway network has a harmonious territorial distribution, having a circle distribution and two almost concentric rings covered by eight radial main lines which start at Bucharest" (ANDR 2000 p.49). This generalisation obscures many missing links, but during the first two post-war decades of communist rule Romania effectively abandoned ambitious programmes of railway network development inherited from the inter-war years. Industrial growth was quite heavily concentrated and except for a few cases where major new demands arose (lignite quarrying for example) major extension of the railway network was not required. But central planning worked on the basis of a unified and integrated transport system (Turbut 1981) and while road transport was preferred over short distances, the railways were expected to handle land transport on medium and long distances (ICCE 1983 p.90). They were to play the key role in achieving the goal of a 'multilaterally developed socialist society' which was paraded at the Tenth Congress of the Romanian Communist Party in 1969 as the focus for the succession of Five Year Plans to the end of the century. Although road transport handled larger number of passengers and tonnes of freight, the railway maintained its superiority in passenger-kilometre and freight tonne-kilometre terms. Moreover, during the 1980s the trend which was running in favour of road transport was suddenly reversed and an attempt was made to switch traffic from the roads to the railways. The relative importance of the railways increased and there was heavy investment in modernisation, including extensions to the network. A number of branches were opened serving small towns (Siret in 1986 and Târgu Neamț in 1987) while progress was made on a branch from Dângeni to Săveni and Darabani; and a link from Hârlău to Botoșani (Figure 4). It may be that what was considered was the rail access for all towns. Certainly, an economic survey of Oltenia referred not only to small towns like Vanju Mare but rural centres like Balcesti, Bechet, Cetate, Cujmir, Melinești and Plenița as possible candidates for rail connection (Barbacioru 1983, p.136). And a study of the forestry potential of the Lăpuș basin in Maramureș recommended a rail link from Târgu Lăpuș to the main Baia Mare-Cluj line at Gilgău (Iacob 1987). One factor in the slowing down of the controversial rural resettlement programme may have been the reluctance to create more towns away from the rail network. Of the towns eventually promoted in 1989 - just before the revolution - only two (Insuratei and

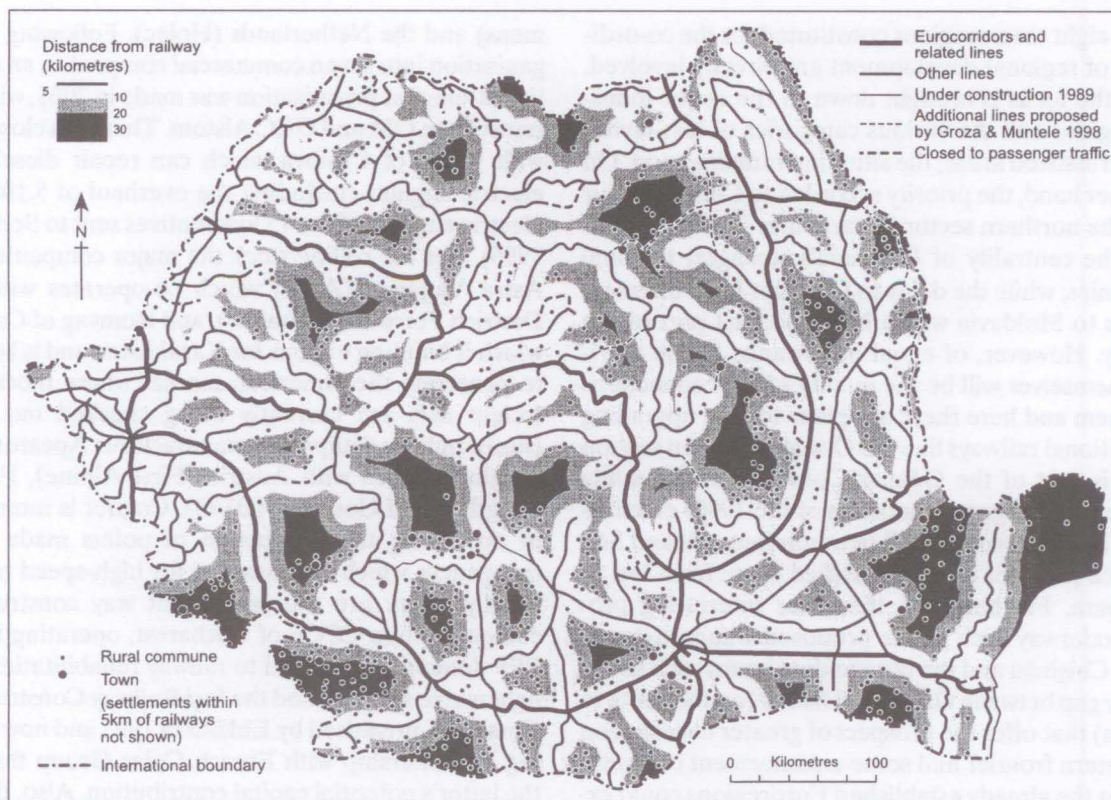


Figure 4 - Accessibility and regional systems

Source: Topographical Maps

Scornicesti) were more than ten kilometres from the network while only two more (Bolintin Vale and Mi-hăilești) were more than five (Figure 4).

Today railways are of great importance for the second 'axis' of the national plan which aims at improving and developing the infrastructure. The plan explains how the attractiveness of the country's potentials rests on an adequate infrastructure that "is able to support the demands imposed on it" (ANDR 2000 p.314). Transport services need developing in the context of the Eurocorridors but also with regard to local and regional links connecting the main corridors with peripheral areas (and their enterprises) to relieve isolation (Ibid pp. 314-7). This will require better roads and also a "national railway system consistent with the European standards" (Ibid p.318). In this context the layout is rational in the sense that the transport systems reinforce regional urban hierarchies (Talanga 1994), while the metropolitan region - with its relatively dense network and heavy traffic flows - seems vindicated by historical analysis which shows the demographic centre of gravity shifting progressively south-eastwards during the twentieth century (Groza 2001). However, it is also shown by Groza & Muntele (1998), that the north-south movement is much easier than the east-west movement - attributed to historical legacies and the post-1918 priority of integrating the inherited systems. Strategic considerations prevented

the construction of a railway along the Prut (with easy access to Odessa), while a direct line from Piatra Neamț to Târgu Neamț, Fălticeni and Suceava (for Cernăuți) also failed to emerge. The Roman-Buhăiești link across Moldavia is less satisfactory than a direct connection from Bacău to the towns of Bârlad and Vaslui; while it is highly anomalous that Brașov lacks railways on the northeast-southwest axis (Bacău to Câmpulung). And in general, the network in the west is better than the one in the east. A number of new lines would make a considerable difference to the connectivity of the network as a whole: Vascău-Gurahont; Nehoiașu-Întorsura Buzăului; Hârlău-Botoșani; Bixad-Sarasău, Piatra Neamț-Târgu Neamț-Fălticeni-Suceava; Târgu Neamț-Toplița; Bacău-Bârlad, Iași-Huși-Galați-Tulcea; Odorhei-Miercurea-Ciuc, Brețcu-Onești; Săveni-Darabani. However, there is virtually no chance of any of these lines being built, given the priority to modernise what already exists. The authors also refer to the lack of continuity of double-track railways and electrified lines; while long inter-city journeys are frequently well in excess of the straight-line distance e.g. Iași-Brașov-Craiova via Ciceu; Iași-Timișoara via Cluj; Satu Mare-Constanța via Ploiești - a point that has also been made elsewhere (Turnock 1979; 1987).

However, the Eurocorridors as demarcated in terms of rail transport are remarkably well distributed

and all eight macroregions constituted for the co-ordination of regional development are directly involved. When the focus is brought down to the major industrial regions and the various categories of less-favoured and assisted areas, the situation remains good. On the other hand, the priority accorded to Corridor Four - and the northern sector in particular - tends to reinforce the centrality of Romania's strongest regional economies; while the delay to Corridor Nine offers no favours to Moldavia which is the poorest part of the country. However, of equal importance to the corridors themselves will be the quality of the connections with them and here there are plans for the upgrading of additional railways like the Oradea-Halmeu section which is part of the Gdańsk-Constanța route, while despite the stringent economies of the 1990s electrification has been completed between Suceava and Salva which provides an all-electrified route from Iași to Timișoara. Furthermore, there are interesting projects underway such as the proposed standard-gauge line to Chișinău and the outstanding issues such as the railway gap between Galați and Ismail (on the route to Odessa) that offer the prospect of greater cohesion on the eastern frontier and some enhancement of potential that the already established Euroregions could exploit. The Black Sea has been marginalised geopolitically over the recent decades but if the links between ECE and the Caucasus and Central Asia are strengthened, a bridge between the Atlantic and the Pacific to rival the Trans-Siberian could bring benefits to the depressed east of Romania (Anon 1999).

Finally, it is necessary to reiterate the significance of the high-speed Eurocorridor programme for railway engineering companies. A seminar in 1996 on 'The Introduction of High Speeds on the Romanian Railways' was attended by Romanian builders including Astra, Electroputere and Faur; also by research and design institutes as well as foreign firms. The companies are quite widely spread across the country's larger towns. The GEC Alstom/Faur Transport partnership for locomotives (a successor to the 23 August complex in Bucharest) aims to meet Romanian and third country requirements. Although work is done for other countries, the major repair programmes for CFR (which attracted investments by GEC Alstom in connection with bidding for upgrading works) are a major factor in its survival. The company is now scheduled for privatisation under the Private Sector Adjustment Loan (PSAL). Electroputere is the only company with the technical resources for upgrading electric and diesel-electric locomotives - work that has generated valuable income during an extremely lean period for new locomotive building since the revolution. Foreign companies need to bid in partnership with Electroputere which has relations with companies in the USA (GM), Germany (Adtranz and Sie-

mens) and the Netherlands (Holec). Following reorganisation into seven commercial companies, an abortive attempt at privatisation was made in 2001, with interest from GM and GEC Alstom. There is a close link with Reloc of Craiova which can repair diesel and electric engines (including the overhaul of 5,100 kW electric engines of the 15 locomotives sent to Serbia in 1996). For the rolling stock the major companies are Astra Vagoane (Arad) which co-operates with De Dietrich Ferroviare (France), and Romvag of Caracal which is building wagons for Kazakhstan and is hoping to penetrate the American market where models of freight cars are currently being checked out. The Buzău railway equipment manufacturer Apcarom has developed links with Austria (First Alpine), France (Cogifer) and Germany (BVG). Cogifer is interested in expediting the production of points made from manganese which are essential for high-speed traffic. Finally, there are the permanent way construction companies like CCCF of Bucharest, operating in the PPP domain with regard to railway rehabilitation and light metro systems, and the Iași Railway Construction Company, privatised by EMBO in 1995 and now seeking a partnership with French Colas Group through the latter's potential capital contribution. Also, the relaunched Siderca (Călărași) which is the main domestic source of heavy steel rails (with export to Brazil, Egypt, Pakistan and Turkey): while Siderca was closed pending restructuring, Romania had to import her rail requirements. Finally, it has to be emphasised that important though the railway companies are in doing business with engineering companies the problems of funding are such that government guarantees for loans can sometimes be crucial - as the GEC Alstom/Faur partnership found when a tender was won in 1991 but only for delays to ensue with unfortunate repercussions when the work provides opportunities for other countries.

17. CONCLUSION

Railways were playing a key role in 1989 but it could not be assumed that they would continue to enjoy such primary function. However, the road system cannot take more traffic without major improvement while the EU Eurocorridor concept relies heavily on high-speed railway services on selected routes. Despite the catastrophic decline in traffic which may now have bottomed out, the Romanian railway network remains substantially complete. Even the dense network of local lines around Timișoara has resisted the closure axe and the only economy in passenger working is the short section between Lovrin and Periam: an obvious economy which actually reduces the distance to Nerău (at the end of the branch) from 92 km to 74! Despite huge losses, governments have resisted the

urge to close down the network wholesale since the road system is not in the position in terms of both the condition of the highways themselves and the vehicles available. Not even the stations have been compromised on the grounds that public transport is an essential service and private car ownership is much too low in rural areas for the risk of isolating the villages to be politically acceptable. On the other hand, the railways have been starved of finance and the infrastructure is in great need of improvement. The national plan observes that Romania has an extensive and diversified transport system but it requires substantial improvement and development commensurate with the country's strategic location in Europe which provides great opportunities in the Danube/Black Sea context (ANDR 2000 p.47). The task of development in the light of the European concept of high-speed transport corridors poses further major challenge. Access to the European corridors is currently poor, despite the effort at legislative and institutional transformation to align with the European standards. Although the reorganisation of the industry has been accomplished and the European privatisation agenda has been assimilated with regard to privatised railway companies and capital investment by public-private partnerships, consistent progress has not been possible and although the infrastructure was given some priority after the corridors were confirmed in 1997 financial problems meant that the signing of contracts for the first major works on Corridor Four was possible only in 2001-2.

Some decisions are individually difficult to account for and while the high-speed corridors raise complex problems over both trackwork and trains, a relatively early start was made with the introduction of a new passenger coach suitable for 200 km/h running, but only for a somewhat extravagant order for 100 coaches to be drastically revised with production curtailed from 1998 to 2001, with resumption on the basis of reconditioned stock. By contrast, the production of new locomotives never proceeded beyond the demonstration of the Italian Pendolino/Cisalpino tilting train in 1996 and current plans rest heavily on upgrading the existing locomotives. The signs are that consensus surrounding the European project will make progress smoother in the future, given the priorities on the Romanian side and the need to expedite finance through European institutions. Maybe a reduction of three hours in the journey time from Bucharest to Episcopia Bihor is no longer an impossible dream. At least the paper has shown how the railway business, like others, has been prone to all the uncertainties, delays and vacillations that have so characterised Romania's transition as a whole. However, while the general upgrading of railways is highly desirable, it is worth asking if Romanian needs should not be considered in the context

of the new rail technology involving the Maglev (Transrapid) technique with its advantages in terms of speed (economy), energy (ecology) and adaptability to the topography (Drgona et al. 1998). Freight operations increasingly involve relatively light containerised traffic, while travel times and distances will become more significant given the future prospect of a united Europe. Romanians will become increasingly bound up with international travel over long distances to reach the centre of Europe - and even more so in the case of Spain which is becoming so popular as a destination for Romanian 'Gastarbeiter' and increasingly for permanent settlement.

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