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TO CONNECT ECONOMIES: INTERNATIONAL EXPERIENCE OF TRANSPORT AND TRANSPORT POLICIES

Introduction

Dealing with the aspects of infrastructure, that is the network characteristics of the transport system, in many respect have to focus on geography, history, politics; hierarchy, centralisation, and also on accessibility, spatial extension or graph descriptions. The whole approach should cover a kind of "networkology" rather it is a traditional transport supply-side approach. In this respect very important to compare "soft" data relating the historical background, the problems faced or formulated by the society concerned and the decisions for the future.

Another kind of data relates to *transport* in narrower terms. In the first part of the paper in order to present the actual situation comparing Eastern and Western countries we applied this kind of *volume* data and tried to make them as comparable as we could, using tables and figures to visualise the tendencies. As for explanations of methodology we should refer to the Annex at the end of the paper.

1. Transport specialities of central and eastern europe

1.1. General data

We compared 29 countries of which 10 were Eastern including the Ukraine and Belarus. Thoughout the comparison the "two big states" that is the USSR and US needed special consideration because of their size. The majority of the other Eastern countries created a closed neighbourhood in the centre of the categories, but there was a good possibility to compare

them with the slightly less or slightly more populated other countries of Europe. In the same way as the two big states, Luxemburg too creates quite a different category because of its population size.

Considering population together with the area of the countries, we could state, that the population densitier of the "mainstream" Eastern countries are quite similar, while among the Western group the differences are larger. We could distinguish the typical *"Scandinavian"* group (less population in a big area) and the *"Benelux"* phenomenon (big population in a small area). As the transport demand depends on both the *population* and *area* size, in some cases we had to make reference to this natural background.

In the case of the GNP per capita data the distinction is more distinct: only Portugal, Greece, Ireland and Spain can be compared with the data of the Eastern group, even if the GNP of the latter are very closely calculated as explained in the Annex. Naturally throughout the analysis we used all the categories from Turkey to Switzerland, and so we can visualise the tendencies by this kind of development index.

1.2. Networks

Comparing the *inland waterway, railway, and road networks* of the different countries, we have to underline both historical and a natural points of view.

Considering the above-mentioned modes of transport, it is primarily the **waterway network** of a country that is determined by geographical endowments: much more than by the wishes of the developers. Still there was a period of extensive construction of waterways primarily in the first part of the last century. In that period waterways were the only method of organised inland transport and the main target was to overcome the time- and space constraints of this type of transport by regulating the rivers and by constructing canals respectively.

Relating to the *navigable length of the inland waterways*, today there is no significant difference between the Eastern and most of the other countries. Relative to the population level, Finland, The Netherlands (!) and the USSR and Belarus show high values; while relative to area. The Netherland and Belgium: As for the present GNP level these differences do not show any kind of tendency.

Figure No 1

Rail network density [km/1000km]

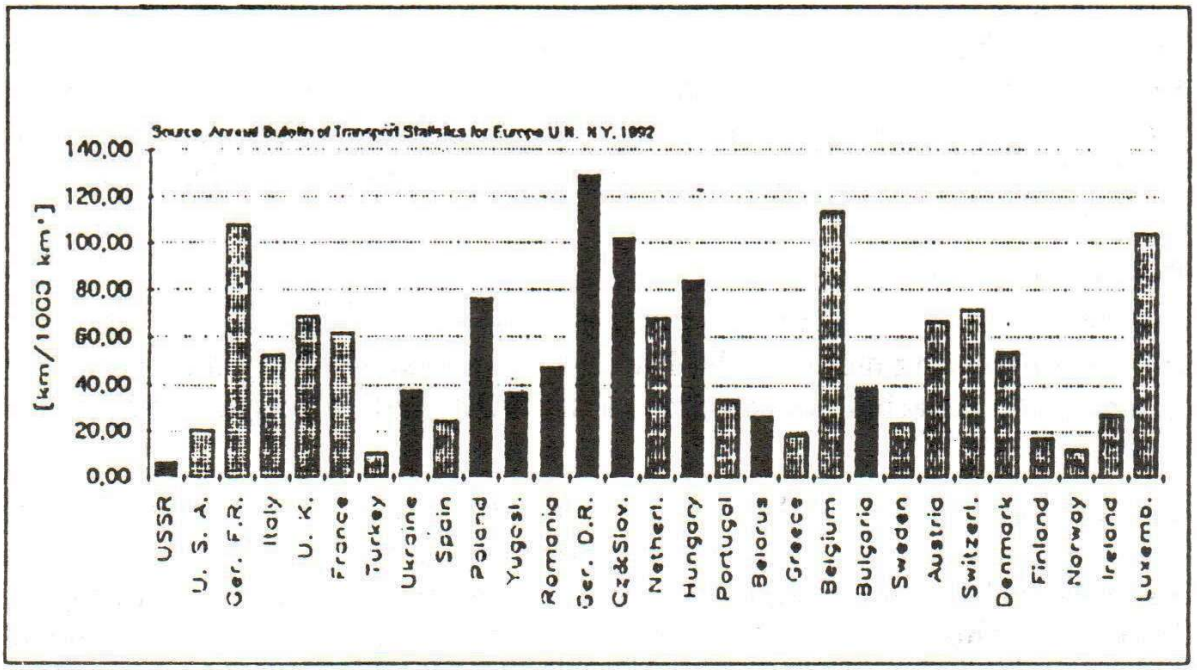
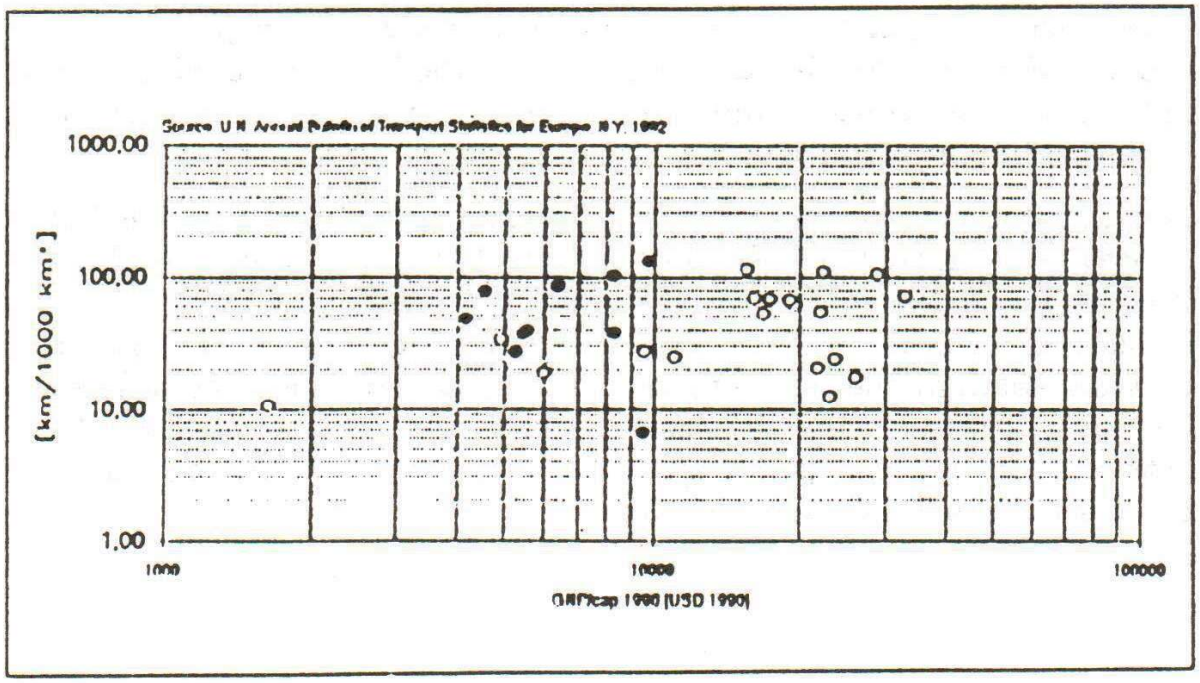


Figure No 2

Rail network density [km/1000km] versus GNP per capita [USD1990]



The second half of the last century was the period of **railway** *construction.* The construction of the European network had practically been finished by the first World War. So a comparison of the networks rather shows the development of the countries during a given historical period, than in the last decades. Analysing *Figure No 1* we can state, that between London and Transylvania there is a continuous dense network throughout the Benelux countries, Germany and the late Habsburg Empire. This divison was so sharp, that even today we can see the differences in the density of the Polish railway system relating to the historical boundaries of the last century.

Due to the historical facts mentioned, the rail network density of the countries compared with the present level of per capita GNP shows a rather contrasting picture. The Eastern countries give very high values in general, and especially in the case of the GDR, CSR, Hungary and Poland *[Figure No 2]*.

Looking at the **non-urban road network** the role of this kind of transport seems to have an even greater importance in the case of the big, and relatively scarcely populated countries than the role of the railways. Aside from this fact, the Eastern countries conform to European trends. Moreover both the km/km^2 and the km/inhabitant indices are higher than that of some other moderately developed countries. In the case of the USSR the values, primarily in the case of density are very low. The separate data for Ukraine and Belarus show, that even if the lack of the network in the European part is not *so* remarkable, the road network is still poor.

The construction of the road network is already to a major extent the product of our century, initially in the case of the USSR covered the period of the command economy. But this historical coincidence is even more true in the case of the motorways.

Looking at the **motorway network,** we can see, that their construction is related very largely to the development level. It is not a question, that the Eastern countries lag significantly, but compared with the moderately developed other countries their situation is similar. In network density and in km/inhabitant indices Romania or Poland are at a similar level to Greece and Ireland, while the other Eastern countries presented are placed between Portugal and Spain *[Figure No 3]*. As for the USSR, unfortunately there is no data available in this area.

Figure No 3

Motorway supply [km/1000 inhabitant]

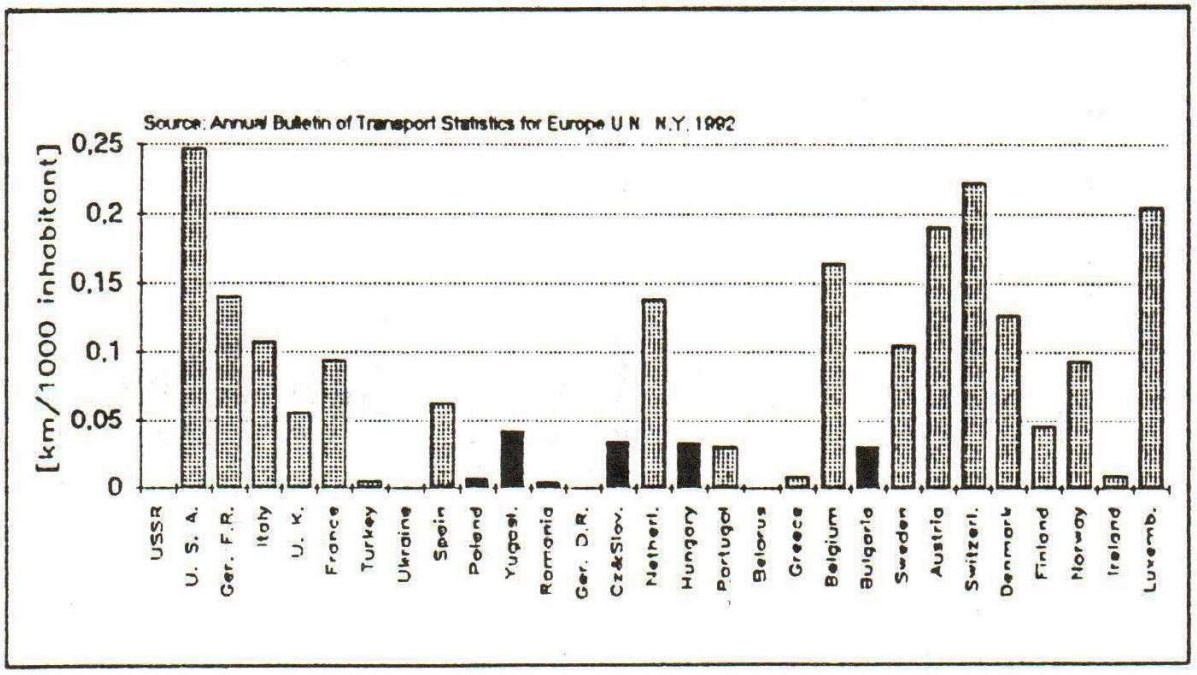


Figure No 4

Relation between motorways proportion from non-urban network [km/km%] and non-urban road network supply [km/1000 inhabitant]

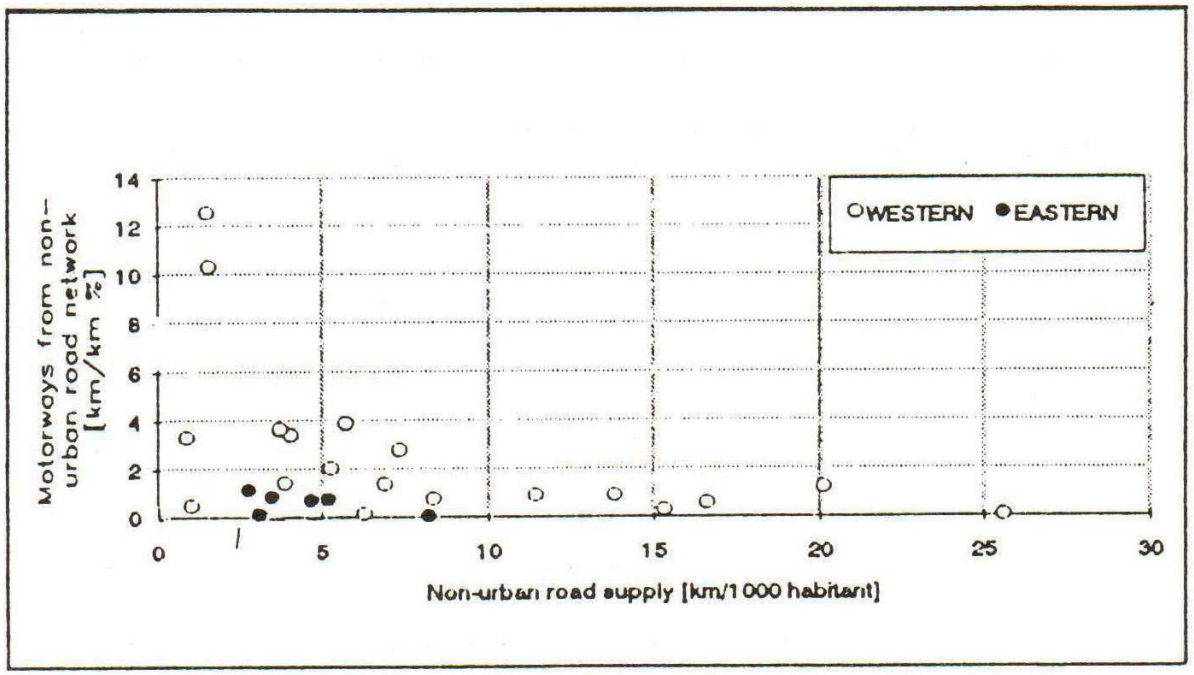


Figure No 5

Railway passenger seat supply [pass.seat/1000 inhabitant]

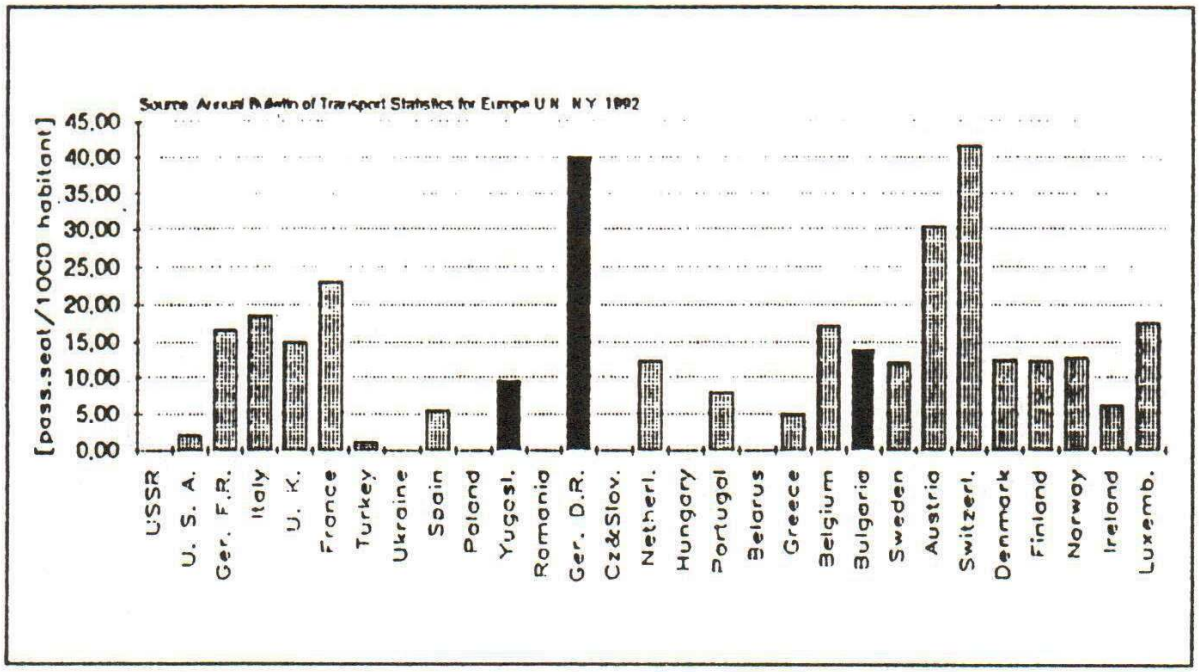
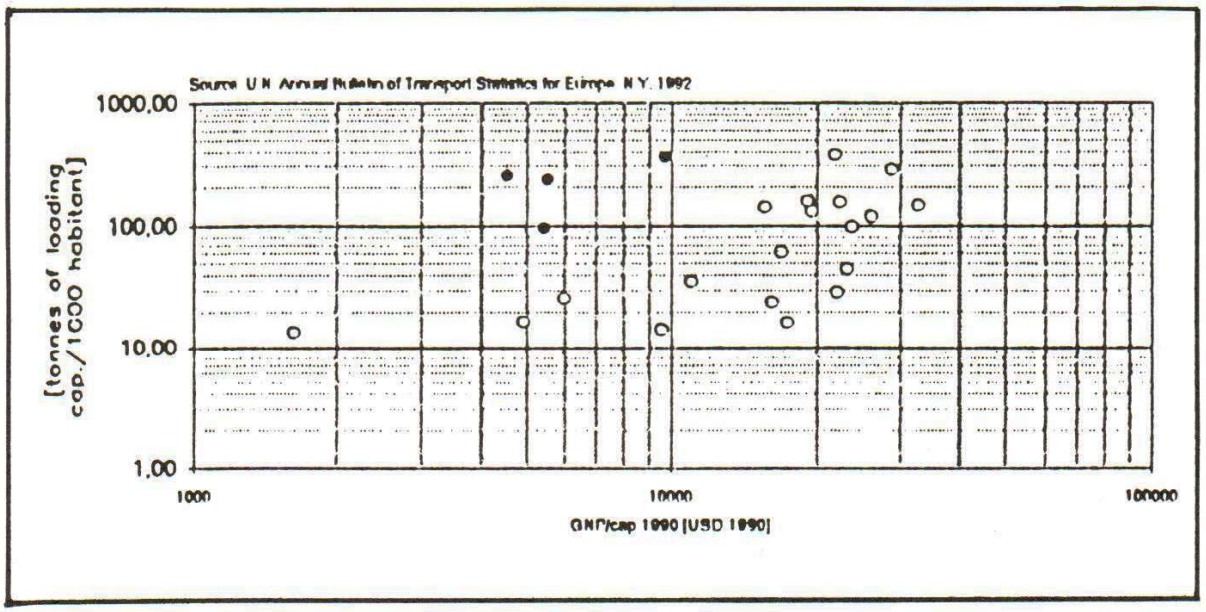


Figure No 6

Railway freight transport capacity supply
[tonnes of loading capacity/1000 inhabitant] versus GNP per capita]

[USD 1990]



We compared the motorway network as well with the totality of the non-urban road network. We studied, the thesis that the construction of the motorways could be a kind of *compensation* for the not so dense original network, or that the general tendency was that the need for motorways would be higher where the original network was already developed. *Figure No 4* where we can compare the ratio of the motorways within the total road network [km/km%] to the total road supply [km/inhabitant] of the different countries presents the interesting result that even the western model can offer different patterns depending more or less on the richness of the country. By this hypothetical model in the situation of the most developed countries there was a substituting relation between the existing network and the newly developed motorway network. Austria and Belgium are the most relevant examples of this successful follow-up model. We may state, that for the majority of the western countries there is an inverse ratio between these two series of indices: *either* they could have developed the traditional roads earlier *or* they increased development later. But the Eastern countries together with other moderately developed ones were not able to overtake.

1.3. Equipment

In the following section we compare some volumes relating to the vehicles, vehicle parks, and to the carrying capacity or number of seats. All this data was presented as volumes, and was projected also to general data, that is to the *population* and the *per capita GNP* level.

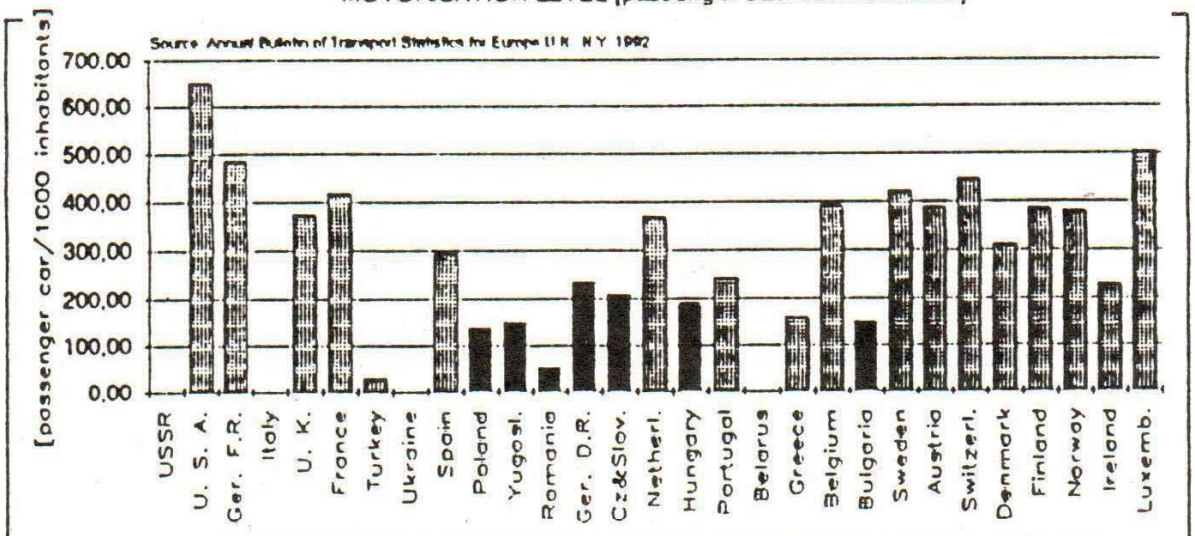
These data were also specified by the relating network data. In this chapter the [park/network.km] index will be interpreted as park *density* index. We have to emphasise, that naturally this is not the same as the density understood for *area* as it was used in the previous chapter.

At the end of the chapter there are other kinds of specific data from the volume/volume type: as the ratio of the *passenger-* to the *freight transport capacity.*

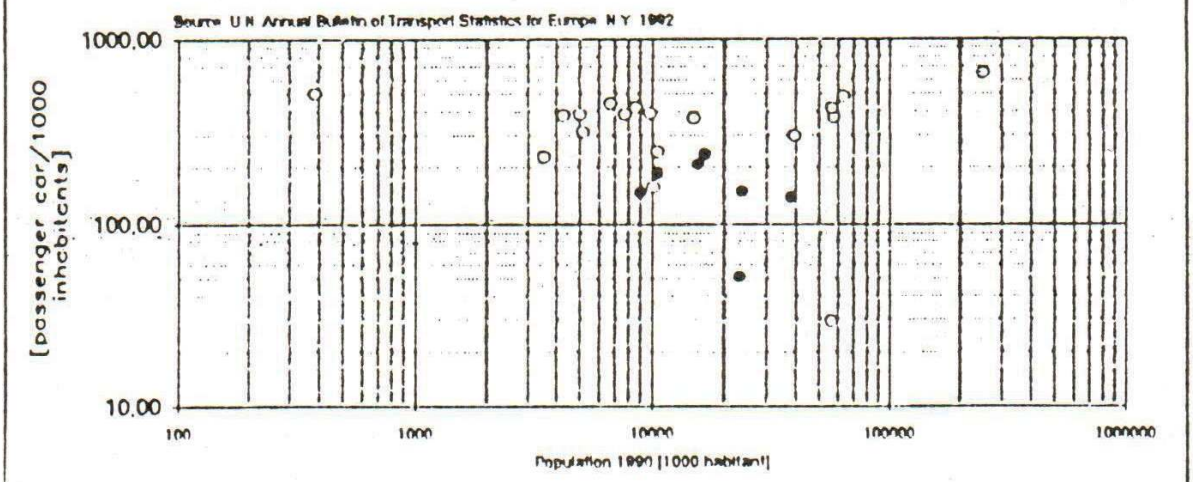
The **craft in service** (in number), or the craft's carrying capacity (in tonnes) of navigable inland waterways shows a very similar profile to each other. Relative to the population it is more characteristic, that the USA, The Netherlands and Belgium are ahead, than that the Eastern countries lag behind. If we compare the *intensity* index (craft/*GNP per capita*) it is

Figures No 7, 8, and 9.

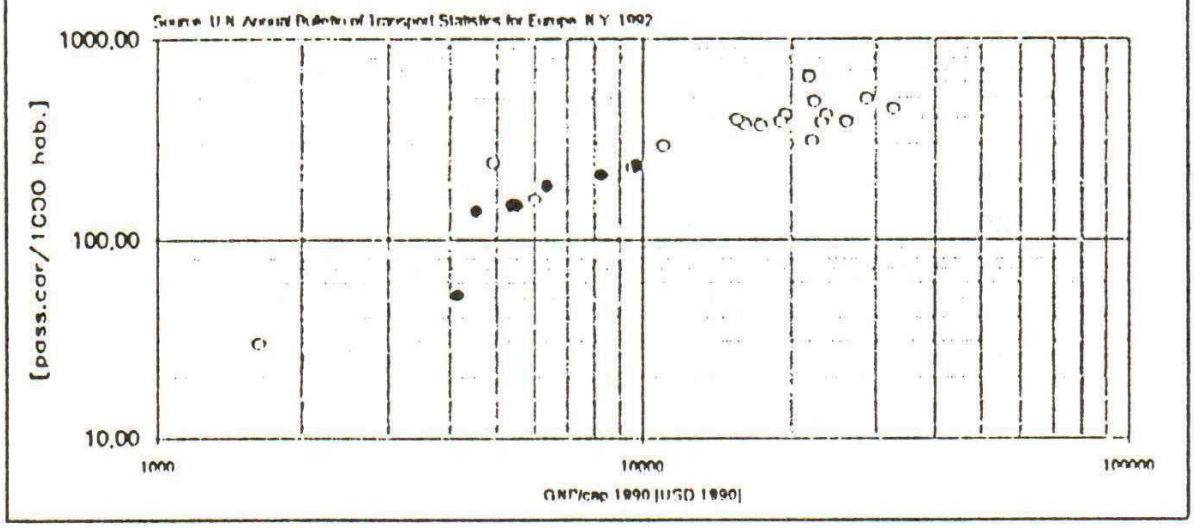
MOTORISATION LEVEL [passenger car/1000 inhabitants]



MOTORISATION LEVEL [passenger car/1000 inhabitants] VS. POPULATION [1000 inhabitants]



MOTORISATION LEVEL [pass.car/1000 habitant] VS. GNP PER CAPITA [USD 1990]



clear, that the craft capacity of the Eastern countries is very high, coming just next to the leading two Atlantic Benelux countries. (We could see that these two countries compose the biggest network density.)

Concerning the railways' passenger transporting capacity, – following a kind of geographical tradition, – three countries, Switzerland, GDR and Austria show more than a two times higher per capita supply relative to the average western standard (cca.15 seat/1000 habitant, *[Figure No 5]*. As for the other Eastern countries – unfortunately we have only two additional sets of data – the level of *supply* not too high, but projected to the *per capita GNP* definitely higher than that of the comparable other moderately developed countries.

In the case of the **railways' freight transport capacity,** the general picture is similar, but the high capacity development of the Eastern countries more visible. In the per capita capacity supply two other western countries, the U.S.A. and Luxemburg are among the leaders, sharing this position with the Eastern ones. Extremely high is the value of the Eastern railways' freight transporting capacity relative to their GNP *[Figure No 6].*

While the Eastern countries freight transport park capacity in navigation and the railways is high and very high respectively the situation differs on the roads.

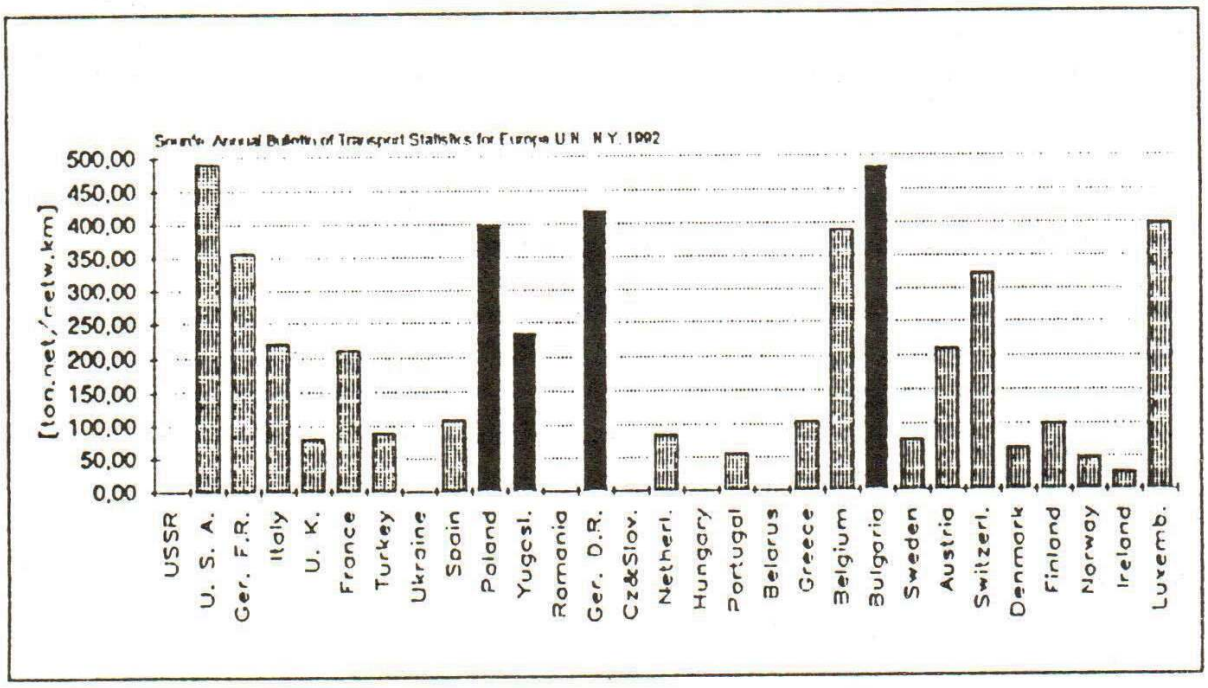
In the case of **passenger cars** the picture is very clear and well known. We present in *Figures No 7, 8 and 9* the motorisation level of the countries analysed. While the level of per capita car ownership in the developed European countries reached a kind of saturation level that practically equalized *[Figure No 8]*, the Eastern countries are still dynamically increasing their supply. If we project the motorisation level to the *per capita GNP* it becomes clear, that this trend in the Eastern countries is definitely not special, they are exactly in the same phase as the other moderately developed ones *[Figure No 9]*. In these countries, – perhaps owing to a kind of forced following pattern – the car parks are actually *higher* projected to the GNP than in the developed countries!

Equipment/networks

Up to this point we analysed the networks and the parks *separately*. In the following we try to link these two topics.

Figure No 10

Railway freight wagon capacity density
[ton.net/netw.km]



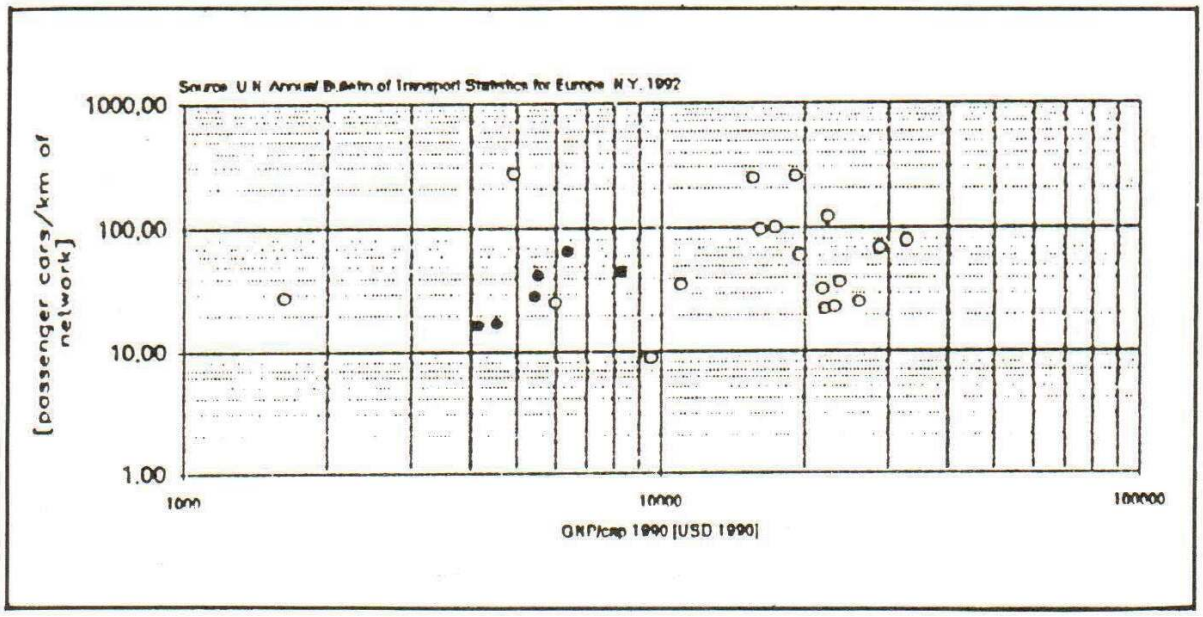
In **inland navigation** there are extreme differences, but not in the case of the Eastern countries. The craft's density on the network as a whole is slightly smaller than in the case of the average Western craft, but this difference can express a difference in development.

On **railways** the *seat capacity relative to the network* is very different, due to the different use of railways as regaerds passenger service. The Eastern position is in the middle, in line with Greece or Portugal. As for the *freight wagon capacity relative to the network* it is clearly high in the case of the Eastern countries *[Figure No 10]*, but there are similar example from the part of the others (Switzerland, U.S.A., Luxembourg, Belgium).

The Eastern cars on the road networks show an underdevelopment in the passenger car category relative to the number of cars in the *most developed countries*, but the same time this Eastern total is slightly more developed than in the case of the *moderately rich* other countries *[Figure No 11]*, excluding Portugal. Portugal, together with Austria and Belgium have a 6–8 times bigger park relative to its network than the other

Figure 11.

Passenger car density on the road network [pass cars/kms of network] versus GNP per capita [USD1990]



countries, both in passenger car and in freight transport capacity. What seems to be interesting, is that all these countries are car importers rather then car producers!

As a last point concerning the parks we go back to an inner interconnection between passenger and freight capacities. We find that *in the Western countries a much smaller proportion of the capacity of the railways was conceived and constructed for freight transport* compared to the Eastern countries.

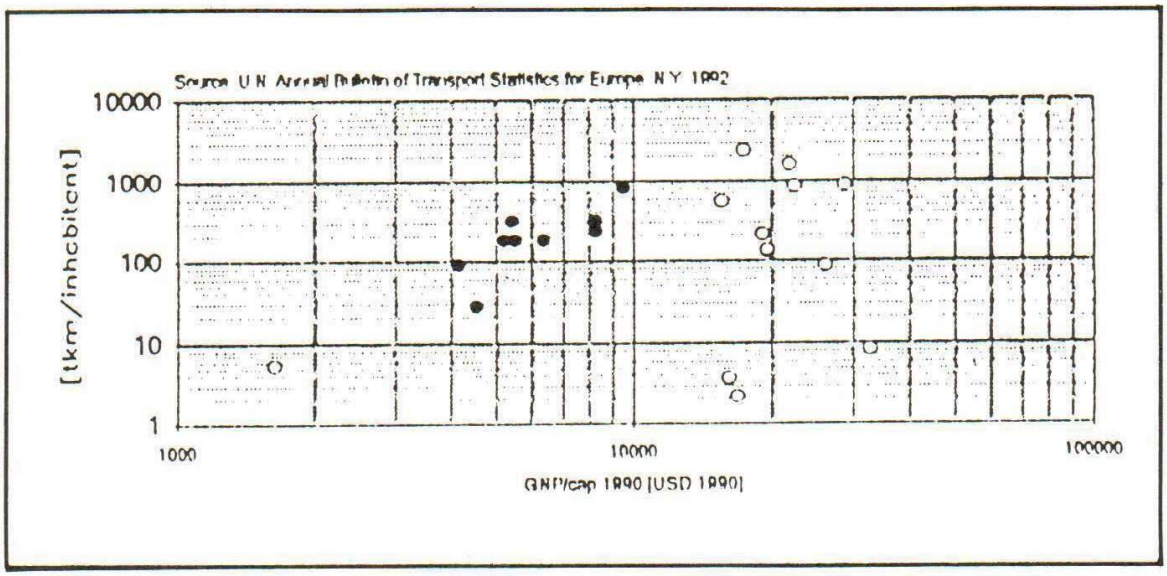
1.4. Traffic output

This chapter covers the passenger and freight traffic data, and all these projected to inhabitants or to units of GNP in areas of navigation, railways and road traffic. It was possible to add or to compare the different transport modes also with each other in the *last section.*

Between the two sections the traffic data are compared to equipment, and to networks.

Figure No 12

Per capita freight transport on inland waterways [tkm/inhabitant] versus GNP per capita [USD 1990]



In **inland navigation** the relative traffic of the Eastern countries creates a much narrower group than that of the others. This traffic is significantly less than the navigation of the Benelux countries, the U.S.A. Germany (F.R.), and Austria; equal with others, while Italy, the U.K. or Switzerland transport ten-fifteen times less on water per habitant *[Figure No 12].*

Both in freight and passenger traffic the Eastern railways transport significantly more than the Western ones, not only relative to GNP, but relative to population as well *[Figures 13. and 14.]* And comparing the per capita output data to the *moderately developed* Western countries, we find, that the Eastern railways transport 4–5 times more passengers and 20–30 times more goods!

Concerning road traffic in the Western countries there are three clear and definite correlation curves between freight transport (in [tkm]) and population *[Figure No 15*]; passenger traffic (in passenger kms) and population *[Figure No 16*]; or road traffic (in vehicle km) and population *[Figure No 17].* The position of the Eastern countries emphasises different correlation curves to that of mentioned: the difference is not too large in the case of freight transport, the gap is more, nearly *twofold* for road passenger traffic, and the more significant, on average *fivefold* in the case of the vehicle kms.

Figure No 13

Rail goods transport
[1000tkm/inhabitant] versus GNP per capita

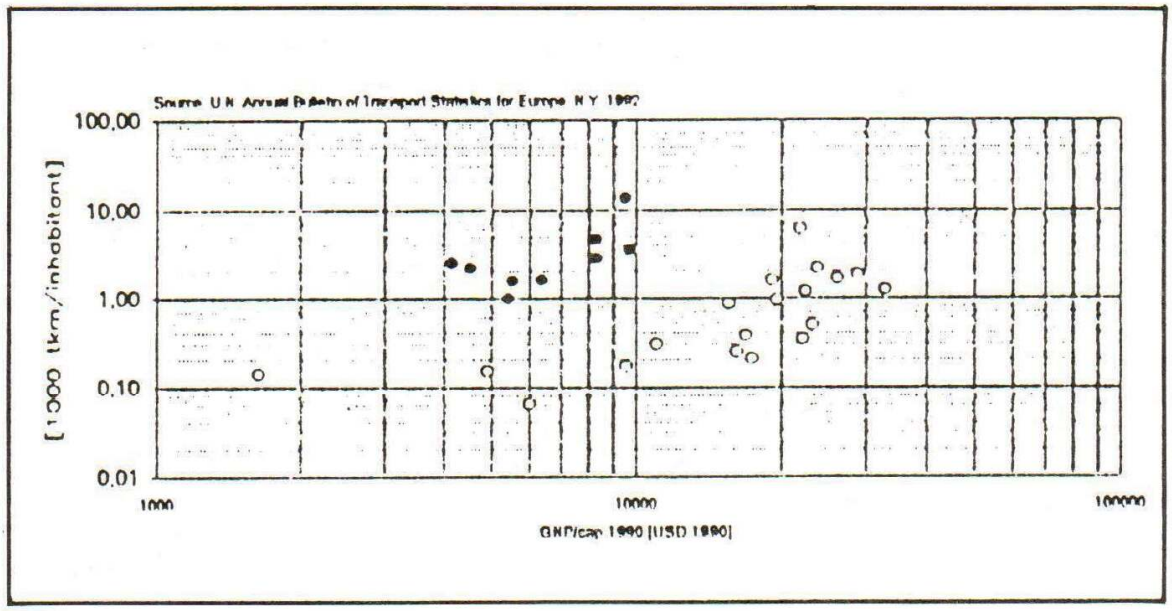
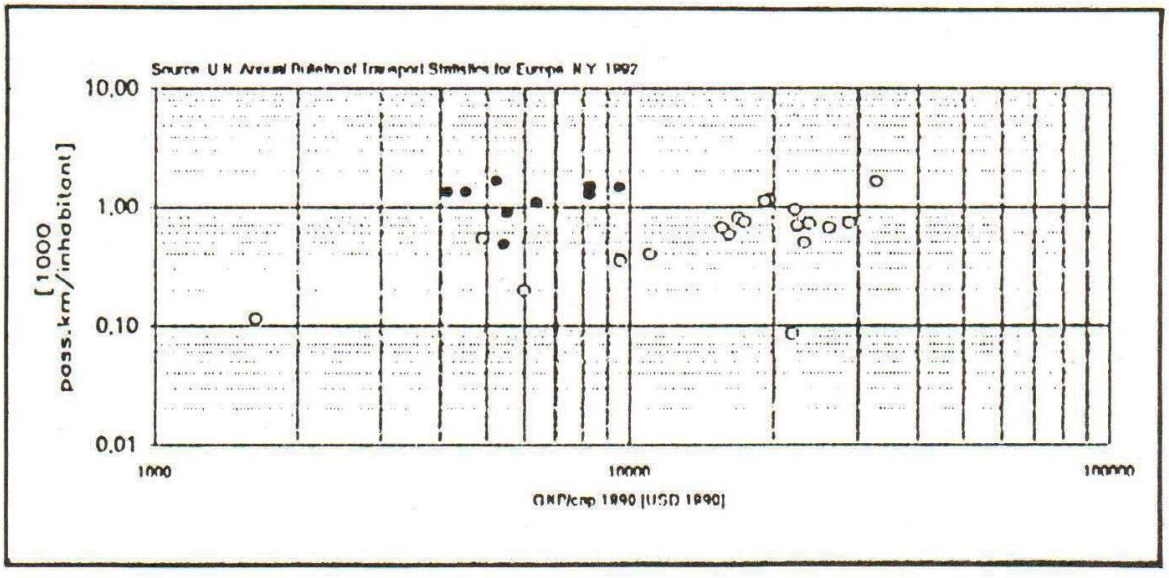


Figure No 14

Railway passengers' mobility
[1000 pass.km/inhabitant] versus GNP per capita [USD 1990]



Even if in road traffic mobility or supply we observe a definite underdevelopment in the case of the Eastern countries, we have to add, that it does not mean an extreme situation compared with the *moderately developed* Western countries.

Traffic/network, traffic/equipment

Analysing the exploitation level of the **inland navigable waterways** we see, that only the CSR among the Eastern countries can utilise at a high level the domestic waterways available. A possible obstacle for some others can be *the limit of their available craft capacity [Figure No 18]*

As for *passenger traffic* there is no special difference between the Eastern and Western **exploitation of the railway network** although there are big differences *within* both groups. In the case of *freight traffic* the two patterns are characteristically different *[Figure No 19]*: The Eastern exploitation level is much higher.

For *passenger trains* there is a definite (minimal?) exploitation level: more than half of the Western countries utilise seat capacity at a *40000 passenger km/seat* level. At the same time it is a lower limit. In the other

Figure No 15

Road freight transport [millions of tkm]
versus population [1000 inhabitants]

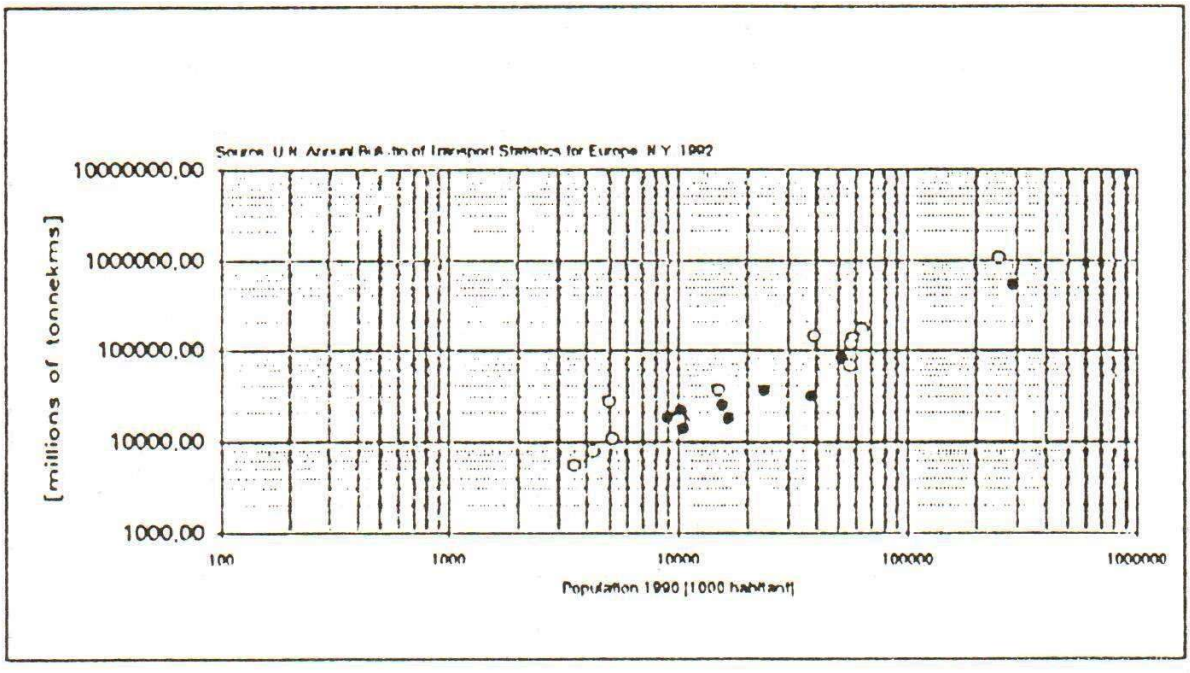


Figure No 16

Road passenger transport [millions of pass.km] versus population [1000 inhabitants]

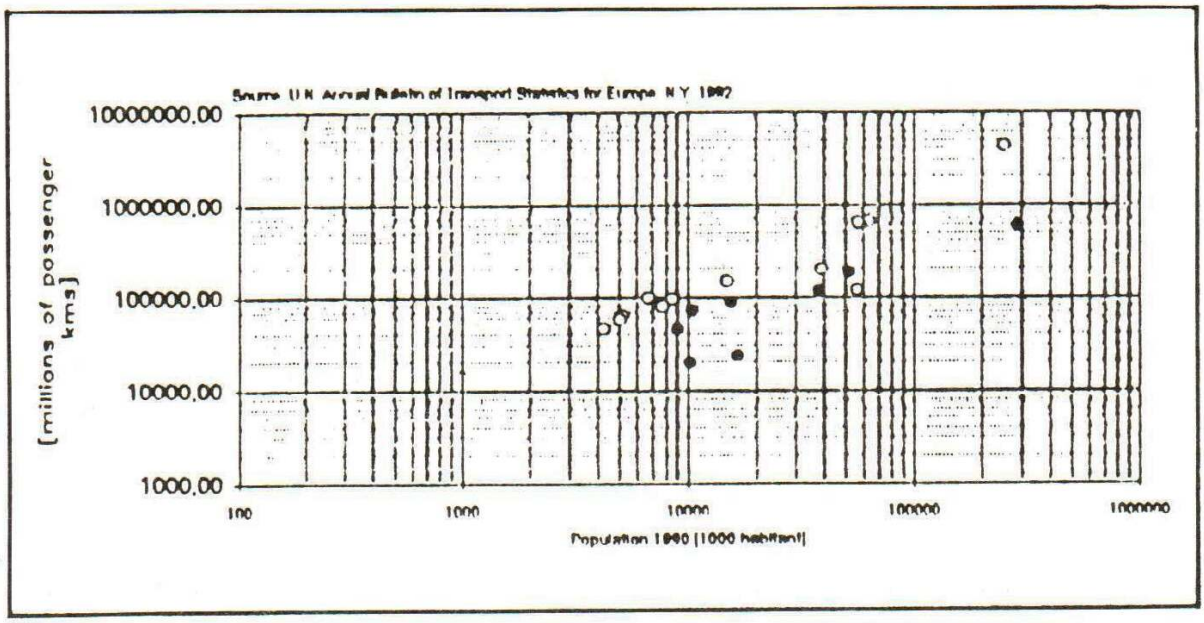


Figure No 17

Total road traffic [millions of vehicle kms] versus population [1000 inhabitants]

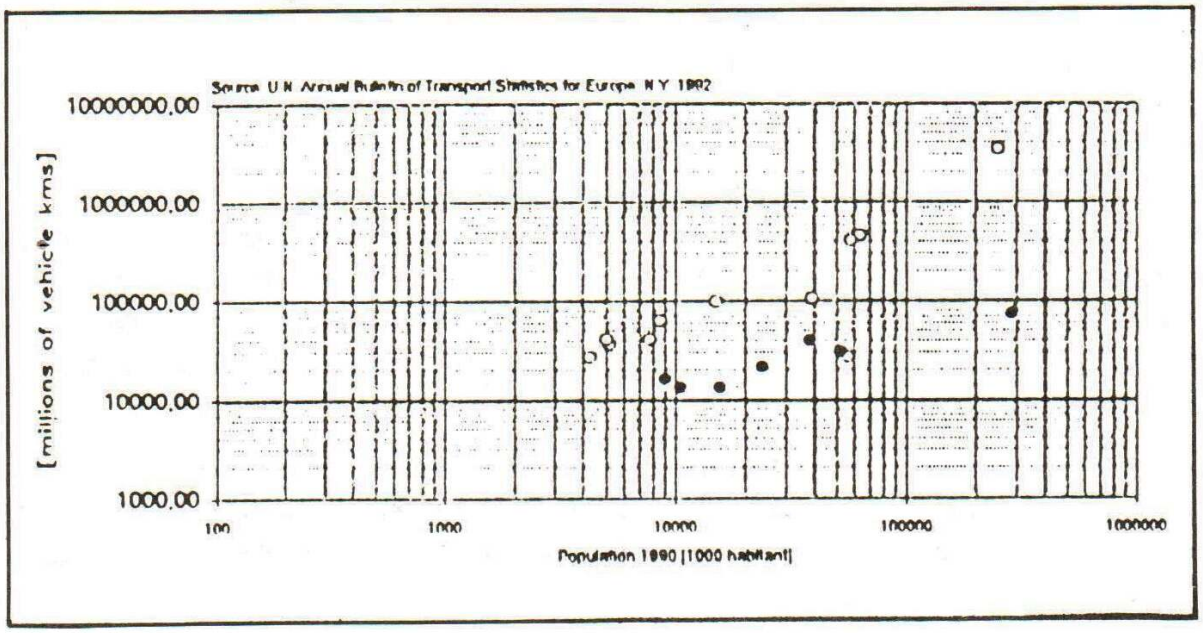
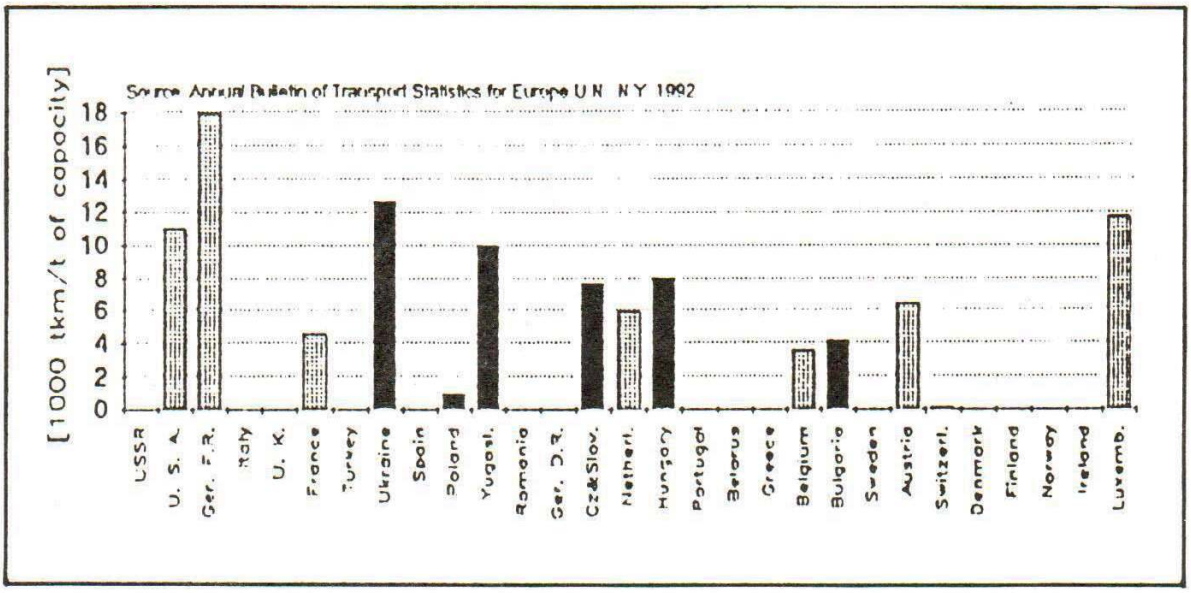


Figure No 18

Freight transport in inland navigation relative to the craft's carrying capacity [1000 tkm/tonnes of capacity]



countries – including the two Eastern ones for whom data is available – the rail seats transport *50–75000 passenger/year* (more than *90000* in Turkey). The exploitation of the *freight train's* transport capacity at a medium position in the Eastern countries.

On the **road network** – as could be expected owing to the low level of the car park – the traffic density [in vehicle km/network km] was much smaller in the Eastern countries. (*200000–500000 vkm/km* versus *400000–3,5 million vkm/km* in the other countries) Theoretically, looking only at the quantities, there should somewhere be big reserve capacities on the Eastern networks. We have to emphasise that the index of network length does not take into consideration the proportion of multilane motorways (of which there are few in Eastern- and many more in Western countries), the age, surface, real conditions and capacity of the roads, or structural problems such as the overcentralisation of the networks.

The *road freight transport density* on the network [in tkm/km] does not distinguish between the East and the Western part of Europe, the rate of exploitation of the network in the Eastern countries remains at an average level.

Figure No 19

Railway freight traffic density [millions of tkm/network km]

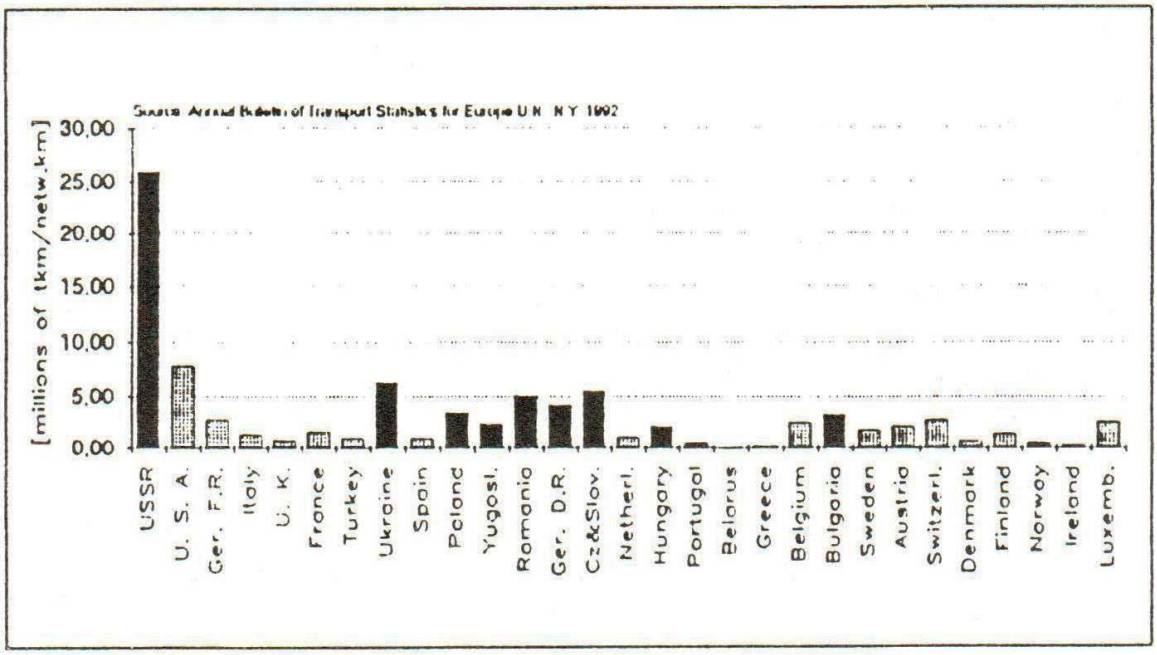
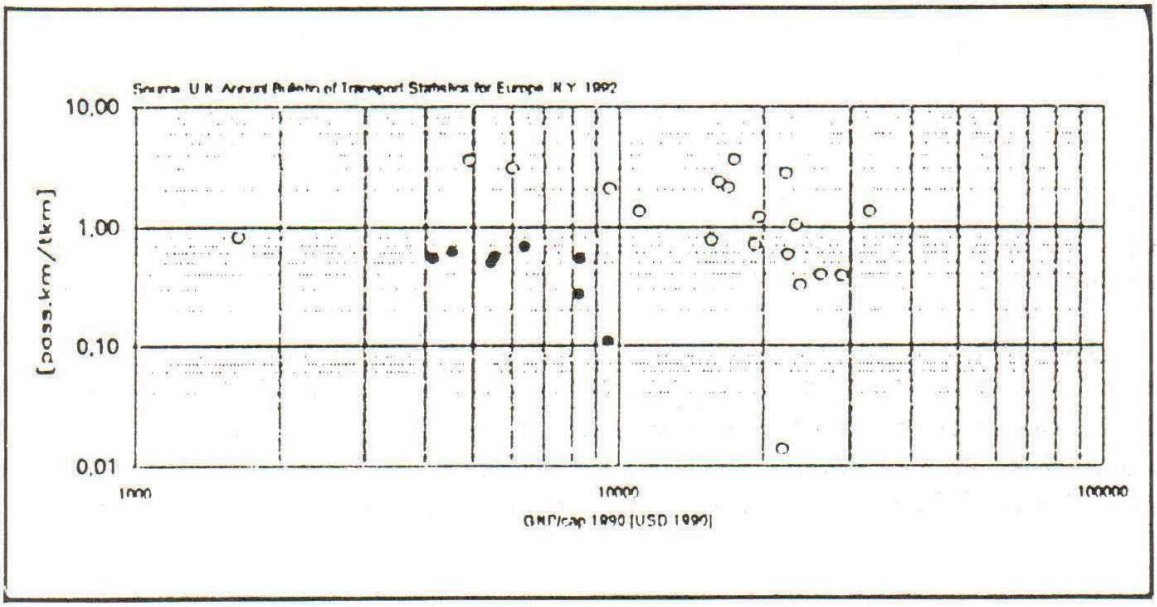


Figure No 20

Relation between passenger- and freight transport output of railways [pass.km/tkm] versus GNP per capita [USD1990]



There are some special traffic/traffic extremities we should mention too. In the case of inland freight transport navigation, the proportion of the *transit* is more than 90% in Luxembourg and Ukraine, and 65% in Yugoslavia.

The *passenger traffic/freight traffic* ratio for railways was very similar to the capacity ratios mentioned: that is, for the Eastern countries the importance of the *rail* freight transport is relatively much bigger *[Figure No 20].*

The similar comparison in *road traffic* shows that here there is less difference between the Eastern and Western model, in the same way as there is less range of values at all. Here too, the importance of freight transport is bigger for the Eastern countries than for the Western ones, that is the tendencies for rail and road are similar! We will see, that the real cause of this is a kind of *exaggerated total transport* demand.

Total freight transport

A last section of the figures deals with the **total freight transport** output of the different countries, and analyses the relative importance of the separate means of transport in that context.

After studying the detailed and specific deviations in different modes of transport it may seem surprising if the global behaviour of the **total freight transport output** of the Eastern European countries does not indicate any deviation, rather fitting the curve of correlation between the volume of freight transport and the size of the population *[Figure No 21]*

We analysed two more series of figures: an interconnection of the transport output with the *area of the countries* and another interconnection *with GNP*. Measured by spatial density the total freight transport of the Eastern countries is very similar to the level of the other countries; while by GNP *[Figure No 22]* the transport output of the Eastern countries is three times higher than that of the other comparable countries. (Unfortunately Greece and Portugal are missing from this series of data).

To analyse the composition of the transport we analysed the relative importance of *inland navigation, railways, road transport* and *pipelines* in total freight transport respectively. As for the special nature of the Eastern countries, in the cases of navigation and the pipelines there was no significant difference between the behaviour of the Eastern and Western

Figure No 21

**Total freight transport [millions of tkms]
versus population [1000 inhabitants]**

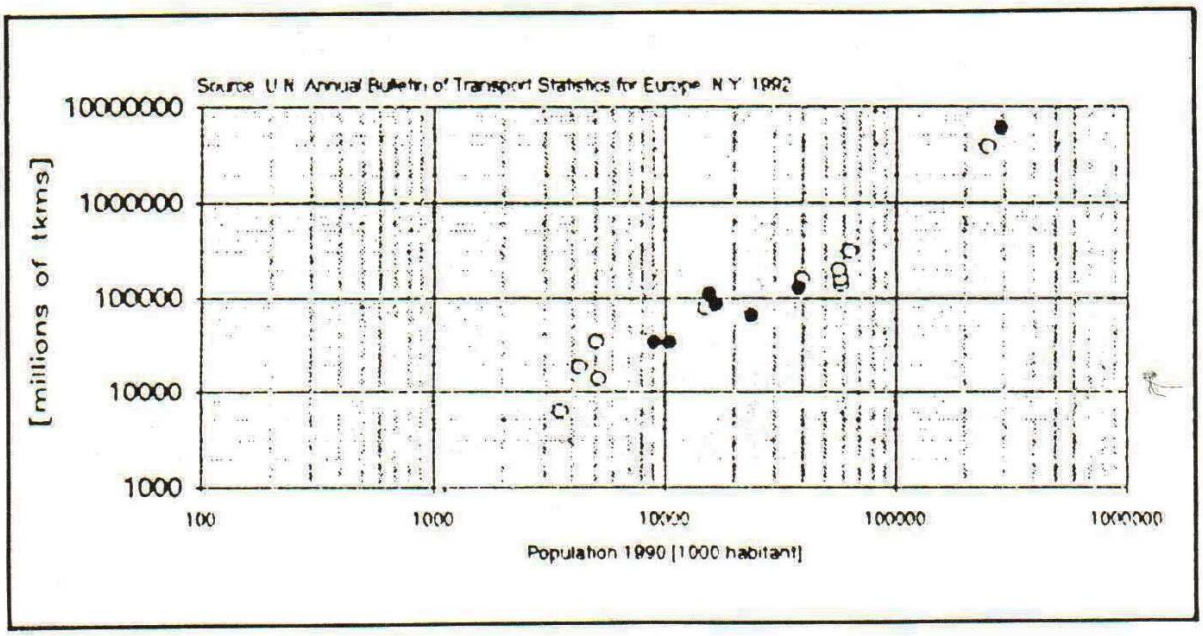


Figure No 22

**Total freight transport intensity [tkm/USDof GNP]
versus population [1000 inhabitants)**

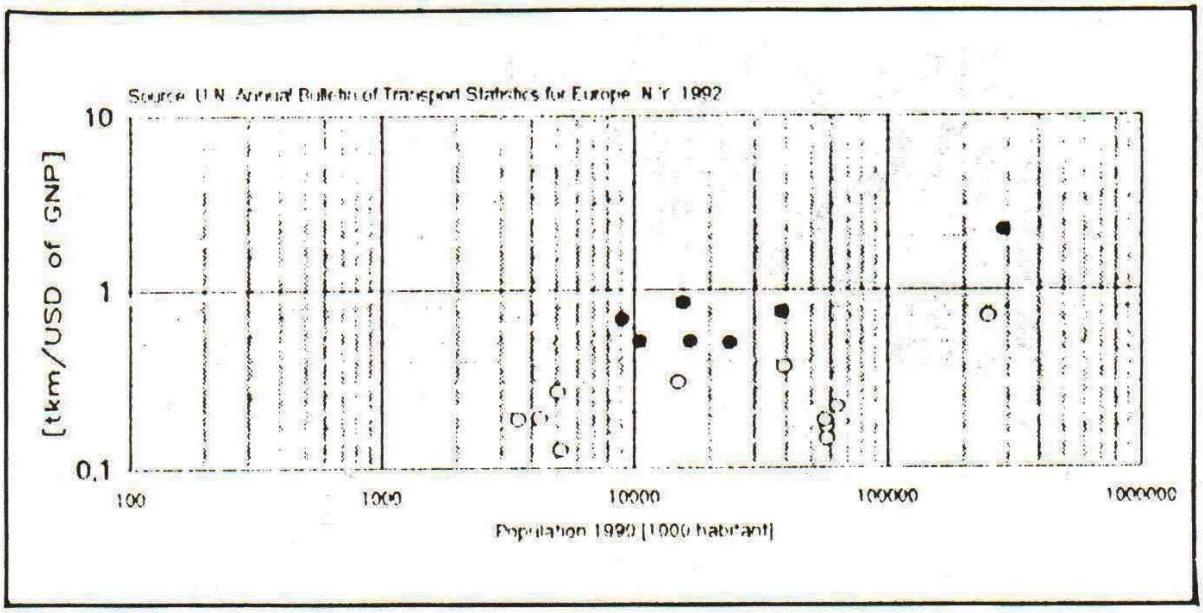


Figure No 23

Ratio of transport modes: decreasing order of proportion for rail

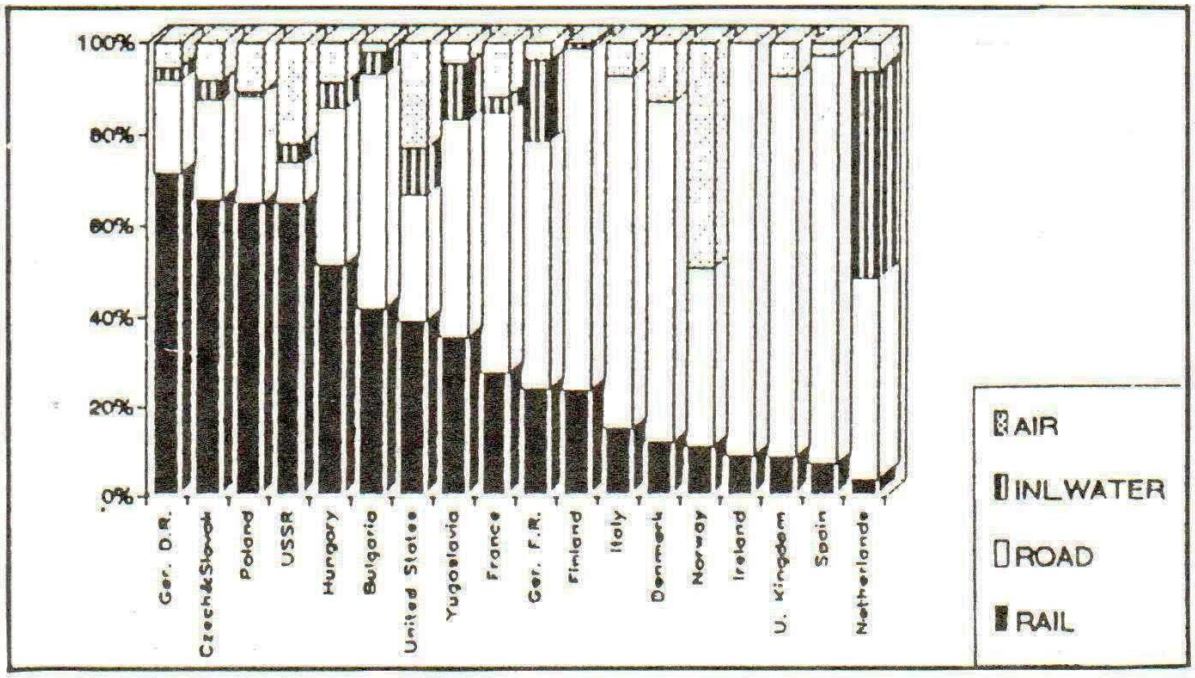
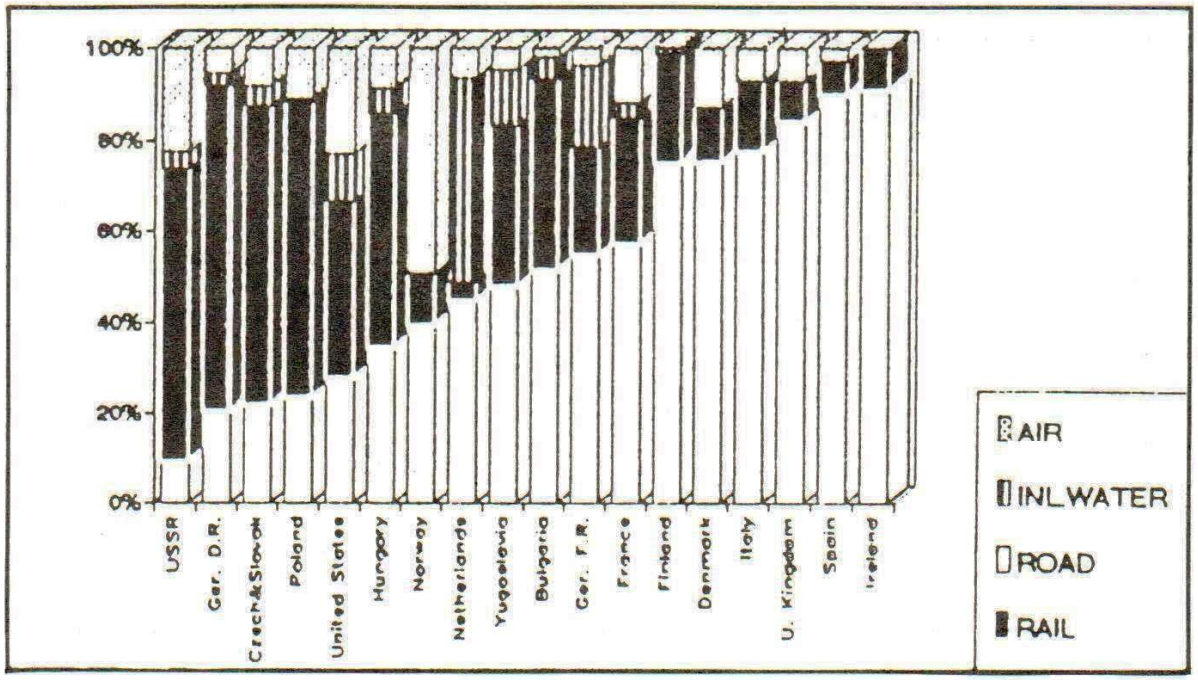


Figure No 24

Ratio of transport modes: increasing order of proportion for road



countries. But while the share for rail was 5–40% in the case of Western countries, that for Eastern ones was 35–70%. Naturally the case of road transport was the inverse that is 30–90 % and 10–50 % respectively.

Finally we present two figures summarising the relative importance of the different modes of inland freight transport. To visualise the most characteristic differences between the Eastern and Western modal composition, in *Figure No 23* we separated countries by the *decreasing order of the proportion for rail.* The first six countries are Eastern ones, only the 7th, the U.S.A. preceded the last Eastern one, Yugoslavia. In *Figure No 24* the countries are divided by the increasing order of the proportion for road. Here the division is not so sharp, Norway with 45% share of pipeline came for 7th place and The Netherlands with 50% share of navigation came 8th.

2. Tendencies in transport development

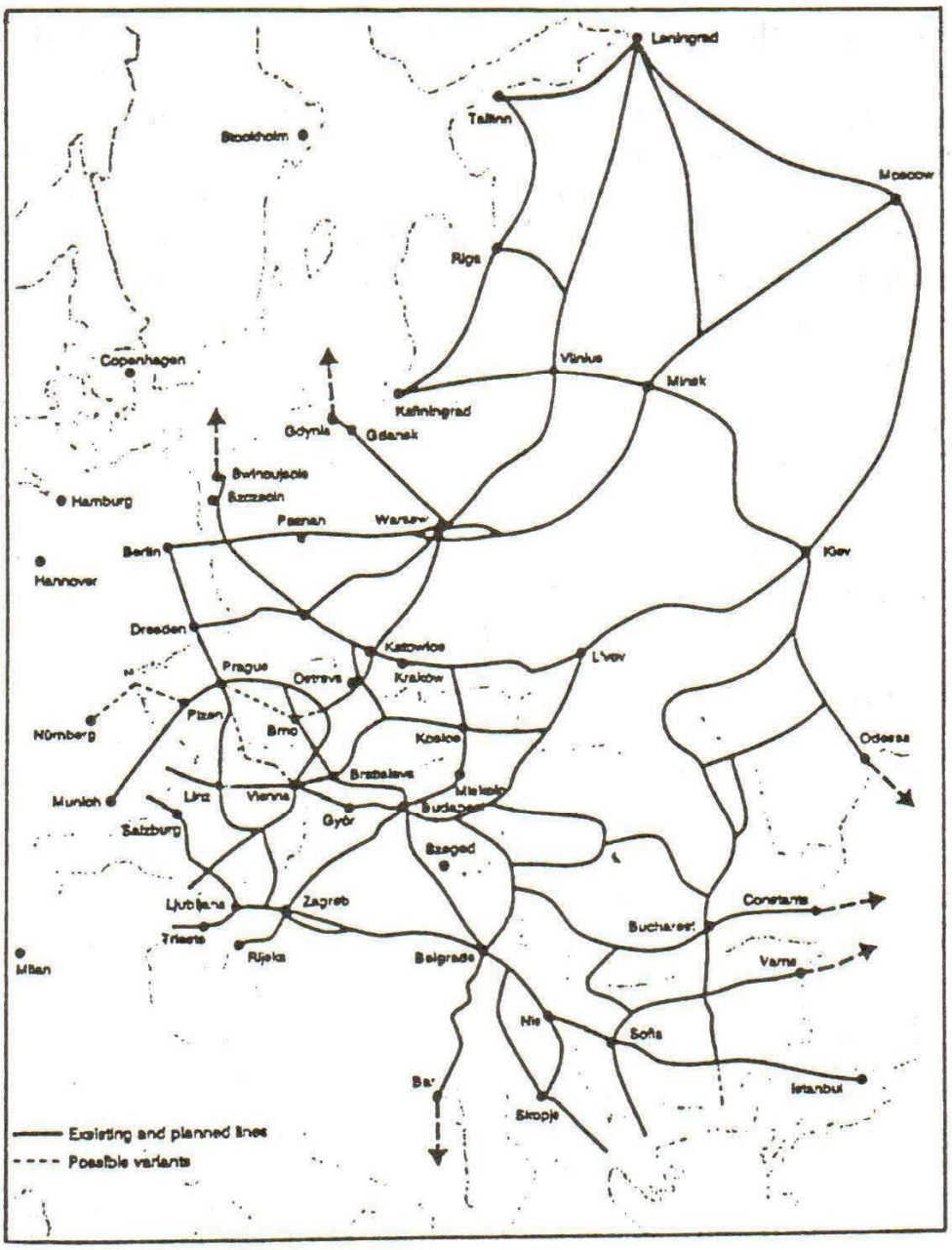
As a dilemma common for the development of all branches of traffic it is worthwhile to point out the question of *the ordering of magistral and local (distribution) networks* with regard to the structures presently forming.

This distinction of the two types of networking system can by originate from other infrastructural branches. We can present it here by referring to the European gas pipeline networks[5]. Namely the Atlantic *distribution* system is an organic development of local pipeline networks relying on local sources, where – with some reminiscence of the operation of electricity networks – exports could be accounted for in the form of equivalent amounts through chain-transactions between neighbouring areas.

Unlike the above, the main feature of the *magistral* system is the construction of long, independent, large–diameter export *target lines.* It is built in situations where the source country cannot itself finance the production, and where its supply network is also deficient. The user of the gas will then provide funds so that gas is able to reach him/her after overcoming local difficulties. While technically this is up-to-date and represents a high level of development, in the source country it results in an enclave-like formation to produce and transport exclusively raw material largely independent of the local economy. This was characteristic of gas exports from both *Algerian* and former *Soviet* territories.

Figure No 25

Existing and planned railways of major importance to the international traffic in Central and Eastern Europe



Source: International Transport in Europe[7]

Referring back to traditional transport networks, the starting point is provided by the centralised hierarchical domestic structures of the individual Eastern and Central European countries and their reliance on the capital cities. It is an unfortunate circumstance that today, when western interest towards these countries has increased, the most conspicuous fact remains the difficult western access to these *capitals*. All those western proposals, credits and support packages targeted at improving the relation between East and West as well as the construction of infrastructure are most frequently designed – logically for the investors – to build *magistral* lines *towards these cities* (motorways, high speed trains, telecommunication) capitalising on the fact that the 'countryside' is most easily accessible via the capital.

This way, however, development projects would build precisely on the existing centralised domestic structures. The capital becoming the access route of the country towards the more developed world strengthens the dependence of the domestic regions with regard to centre; the capital as centre would continue to be the origin of innovation and control, while the capital itself would be connected – instead of Moscow, as it used to be – to an unquestionably more developed point of the world, i.e. to Brussels for example. At this point we need to ask whether this scenario has a *realistic alternative,* and whether we will be able to reinforce our internal structures at the same time as external ones if we do not begin with the former.

2.1. Water transport: unexploited possibilities, or haunting illusions?

Similarly to many other regions of medieval Europe, this region of Central Europe also saw the one available waterway of the region, namely the Danube, as the only means of large-volume water transportation. Water transport, as a direct effect, triggered the growth of a few river-bank settlements, promoting them into town status, and as a secondary effect, also , attracted a modest manufacturing industry. Economic growth lasted until the final thirty years of the last century with some set-backs caused by wars, which had a negative effect overall on safety, but also had favourable consequences from the point of view of transportation. Even then, in the late 19th century, the problem was not navigation, but wheat, which was expensively grown and shipped here, and squeezed out of western markets by American and Ukranian wheat shipped by sea[6].

This period *before the arrival of the railways* was the first flourishing of canal construction with the intention that small barges could be moved by horses. They mostly proved unfit for steamboat traffic. In the second part of the century, the spread of rail transport further revalued the role of water traffic.

In the last forty years, the significant amount of exchange of mass-products among the Soviet Union and States of Central Europe and to some extent even Soviet exports to West Germany gave a major impetus to the Danube's international exploitation for water traffic. The broad navigation line sees the gradual development of traffic in ship-propelled 6-barge batches. On the Danube, specifying the parameters of the waterways is based on this method of navigation. These are the batch sizes of which two have to fit on the river at all times. Contrary to this, in Rhine navigation the available width is less, but the ships are deeper-bodied and are engine-driven. The control of the Rhine-Main canal was designed for a Europe-type fleet, and now we see this type of ship taking over on the Danube.

In order that water traffic once again becomes competitive – at least in places where economically it is supposed to have straightforward advantages i.e. long-distance shipment of mass-products between settlements along the river – it is essential to ensure standard parameters on water ways and especially so on the Danube. As a guide-line for the development in Hungary we might say that a particular class of water way should be ensured for the minimal parameters rather than increasing existing classes. It makes no sense at all to push for the achievement of a width of 180 m with reference to an earlier plan to access the Rhine-Main canal, when the canal itself only provides 80 m of navigable width. At this point then, the fairness and rationality of international relations requires the revaluation of earlier standards.

As regards ports, a programme has been produced on how to establish a European level basic domestic network. Besides the location of major settlements along the river, the network also takes into account the road and rail network, and, primarily is based on the location of already planned and existing Danube bridges.

2.2. Rail: we build it on top and pull it down below

The point where the European railway network suddenly becomes denser does not coincide with the former *iron curtain*, but with the traces of even earlier Empires. This is how some define the edge of Central Europe: up to where the railway station buildings known from the Austro-Hungarian Monarchy have spread. The dense network also covers former German areas; the dividing line stretches from the East-Polish sea coast up to Poznan, then to Krakow and Szatmárnémeti, from which it reaches Austria via Oradea, Belgrade, and Zagreb.

The 'development' presently experienced in Hungary has two objectives: on the one hand it is forced to give up part of the local network due to unprofitable operation, whilst the State, as it did before in the 1970s, sits and stares at progress beyond its control. On the other hand, there is the pressure to develop the magistral network and the intercity lines (there have even been bids by TGV (French high speed train). The connection of cities naturally cannot be objected to as far as passenger transport is concerned. However, real priority is only given to lines towards the capital, and the plan to build the network for freight trains *to by-pass Budapest* has once again been dropped by the railway company as unrealistic, in spite of its significance in last year's programme.

Similarly little attention is focused on the possibility of the restoration of railway lines discontinued at national borders; more precisely, there is insufficient investigation taking place as to the extent to which these lines could promote the upswing of local relations across borders which would become increasingly easier to cross, and thereby turn the proximity of the border – *formerly a regional disadvantage – into a regional benefit.*

2.3. Public roads: in an old or in a new structure?

The origin of the basic grid of public roads goes even further back in time than railway construction, yet the connection of small settlements to the basic grid with surfaced roads was only completed in the 1970–1980s. In a comparison among countries we find that the economic possibilities of the last decades are also reflected in the *level of surface.* But developed and undeveloped Europe markedly differ, especially in the density of their *motorway networks.*

In the tracing of the traditional main roads the *local surface* formations of the land were of lesser importance compared to topographically conditioned traditional cart roads or to a network of side-roads developed from it. With the traditional main roads, the primary issue was the as-straight-as-possible connection between certain towns or other major targets of traffic. So this main grid developed according to a logic independent of the subordinate grid, and created *a new spatial structure* in the early days of car traffic.

The same cannot be claimed for motorways, which replicate the *same structure* as mirrored by the traditional main grid. This flows directly from the method by which the design of motorways is done, namely that at sections where the traffic (over)load of the main grid is highest, stretches of motorway are built next to the main road in order to relieve the load on it. That is to say that the way the high-speed grid developed was determined by capacity problems of intercity traffic, and even more specifically, by the needs of the capital, by the overload on the urban incoming roads, or especially in Hungary by the intention to ameliorate car-access to Balaton, a weekend 'extension' of the capital. This meant providing for the traffic needs and reinforcing the former grid structure, further preserving the grid's focus on Budapest, maintaining or rather increasing the imminent consequences. The possibility that a new grid structure could also have been created by building up the motorway network remained unused. Instead, the grid ensures the traffic drain-off of the region within a circle of 100–120 km around Budapest instead of the 60–80 km, which has so far existed.

International experience, however, indicates that from among the effects of motorways extending into a network, the resolution of capacity problems is a less significant change than the one triggered by the possibility of continuous high-speed in long distance traffic.

Motorways extending into a road network have a primary and a secondary *effect.* The original intention to resolve the capacity problems that triggered the extension becomes secondary, while the primary effect is that they change *long distance traffic* through providing the possibility of continuous high-speed travel. International experience indicates that the primary effect remains the real lasting one. What happened, then, was not simply that local travel/transport – i.e. the drain-off range of a particular city – constituting the majority of traffic grew in distance by 30–50% due to the 30–50% increase in average speed, but *an even faster change commenced, whereby long distance transportation and international*

traffic gradually shifted over onto public roads. Traffic of a continental scale came about which had already very little to do with *cities,* or the life in the cities along the road – similarly to cart roads formerly connecting villages having to break their dependence from *villages* in order to properly serve the emerging car traffic.

Questions concerning the creation of a high-speed network would be sensible to consider on a continental level, where the point of departure of such consideration is the *relations of Europe's chief regions*. When in the mid 1970s the International Road Federation altered the numbering of Europe's main roads, there was a shifting from the earlier London-centered radius-system onto the net-system based on east-west and north-south main axes. This measure reflected the fact that the network reached a level of density where the consideration of inter-regional connections levels became feasible. The new numbering naturally included Eastern Europe, where the majority of the selected roads did not have and even today do not have the standard required for high-speed traffic. On the other hand, the region was not considered to be so important for long-distance traffic as to prove a shortage for the West.

A design principle gradually began to be associated with the net-pattern numbering system in Western Europe. This design principle for example divided Europe into north-south corridors and analysed traffic along these and also assessed development needs on that basis. In the wake of the 1989 political changes in Eastern Europe the need arose for the analysis of similar, but *east-west* positioned corridors.

Yet, in practice, the groundwork of the high-speed road network in Eastern Europe, even in 1992, really meant the in-coming urban roads around *a few large cities,* while 'network' in this region means no more than *a planned connection of these beginnings [Figure No 26*]. Neighbouring countries, too, have built stretches of their motorways in order to compensate for the main grid being deficient on capacity. Besides, in doing so they also strengthened structural centralisation, which was in full harmony with the centrally operated *economic and political* establishment of these countries' .

We have referred above to the fact that the fast construction of the east-west magistral grids tends to exactly preserve this structure. This is *in no way* related to the corridor concept or to the new structure of the magistral lines. On the contrary, what we see is just the superimposition onto the already existing internal centralised structure.

What would be practical for the whole of the Hungarian *high-speed public road network* is a system that uses elements of the former radius-structured and the later ring-radius-structured development concepts, but which, instead of connecting again the individual node-points, bears in mind the principle of establishing an open *grid-system [Figure No 27]*.

The grid concept – in harmony with the above and the corridor-concept – is trying to promote the establishment of the most varied relationships rather than serving one privileged system of relations. This also answers the common need namely that in today's quickly changing and rearranging Europe *it is impossible to fore cast today which directions in politics, trade, or society turn out to be more important than others in ten, twenty-five or fifty years' time*, and which choices are going to stand the test of time. It is necessary to establish grid structures that can flexibly adapt to rearrangements of centres of gravity, but which at the same time are able to substitute for temporarily out-dropping stretches.

To sum up, the development of this grid requires the *establishment of corridors*. For a *more detailed* design of the corridor – turning traditional priorities upside down – it would be sensible to start by 'sign-posting' the zones *that have to be by-passed by all means* when it comes to tracing the roads and moreover by marking, which ones we should refrain from approaching too closely. In Hungary these zones typically include the proximity of the capital, the district of the Balaton, and generally settlements and nature reserves.

The concept of the Hungarian high-speed public road network answering the above requirements is currently in the making. This grid consists of three east-west axes and of other axes crossing these, approximately in an east-west direction, but it takes into account certain transversal relations as well.

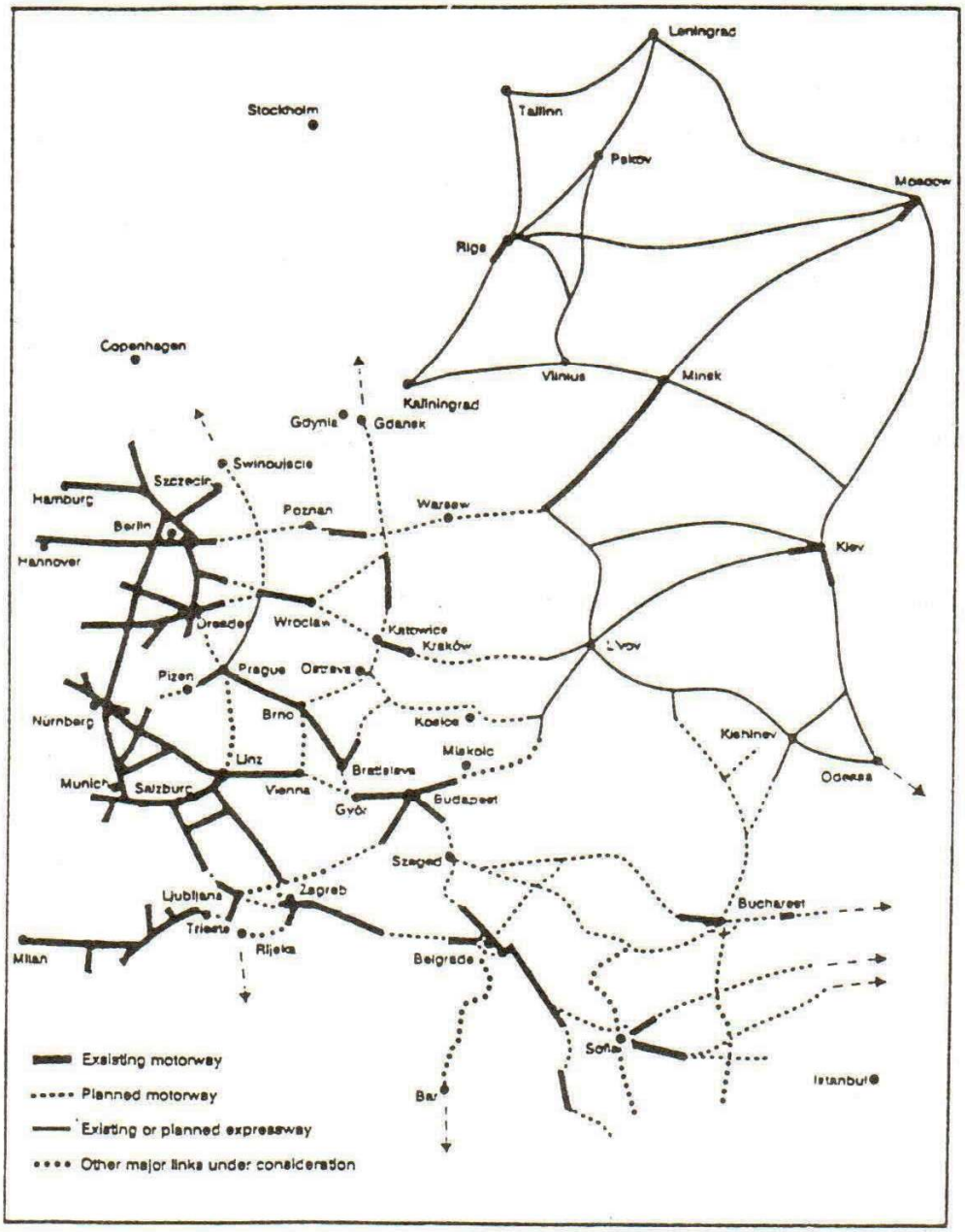
2.4. Urban transport: changing priorities

One can say that in urban transport the impossibility of solving the problems by constructing more and more roads become clear earlier than for regional and national scales. We can present here two definitely different approaches, based on two different sets of values.

In these approaches, one concept considers traffic as a technical possibility where the planner has the task to measure, analyse and satisfy *demands*. Though it is this that can be regarded as the traditional design engineer's

Figure No 26

Existing and planned roads of major importance to the international traffic in Central and Eastern Europe



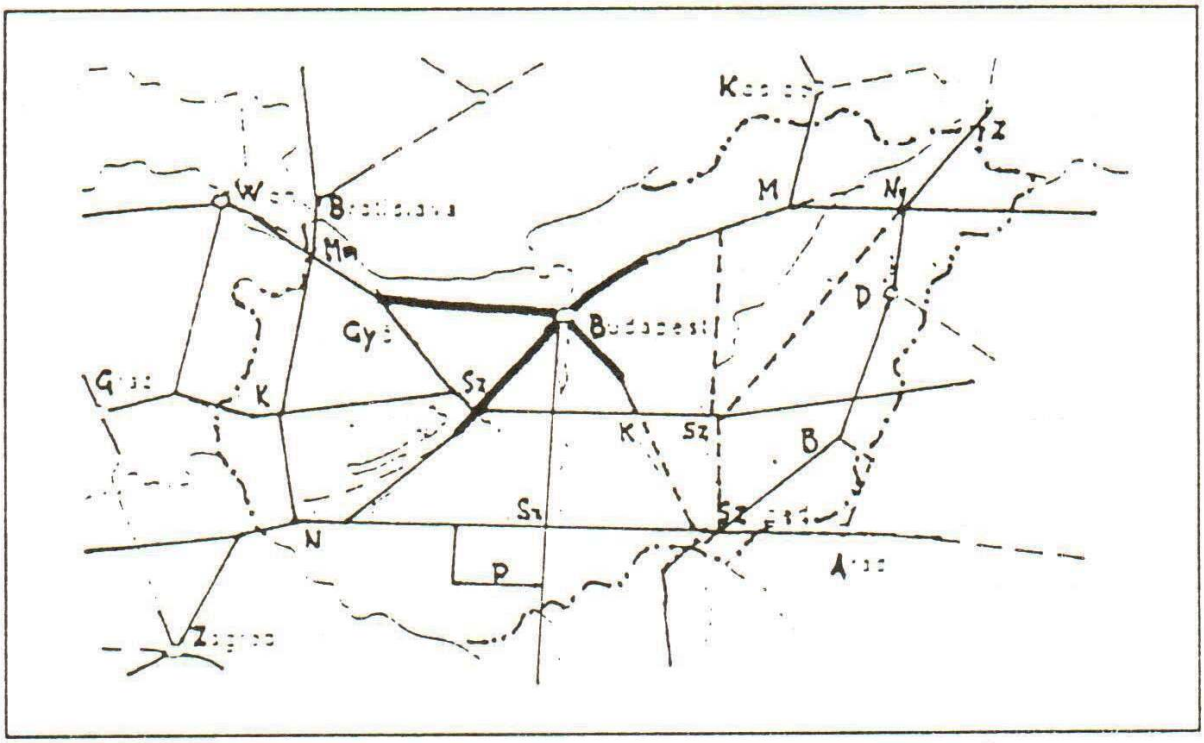
Source: International Transport in Europe[7]

attitude, a coherent projection of this system of values is usually rarely met with. What is more characteristic is to set out from individual problems and refer in the meantime to partial value viewpoints as evidence. The typical mode of approach consists of surveying and describing the various obstacles and bottlenecks emerging in traffic and of formulating plans and proposals for their solution as individual cases. In this situation, the establishment of problem ranking and the formulation of priorities implies giving consideration to where problems are the most pressing, where there is the longest coherent set of problems, rather than where intervention is most urgent.

Those in support of the other approach claim that it is *not the phenomena but the underlying causes that need treatment*. The form of emergence of problems does not necessarily coincide with the real problem needing solution. If a network is overcentralized, and today all connections can be established only through the centre, it is naturally in this centre that traffic jams and congestions occur and it is *here* that no place for parking can be

Figure No 27

The scheme of the grid-structured high-speed road network in Hungary



found, and furthermore it appears that it is *here* that more lanes and stopping places must be created and more bridges must be built. However, this does not automatically mean that the construction of all the above would be the best solution. If, in fact, overcentralization and the main structural problem of the capital are increased by further construction, then – instead of bringing a solution to – we would just strengthen the consequences which cause congestion. In actual fact, it is not the available area that is too limited in the inner-city but, due to constrained solutions, *it is traffic that is too much, it is the number of cars that is too high there.* These problems of a structural nature cannot be remedied through either the establishment of further target points in the inner part of the city or enlargement of the inner-city. Solutions are needed which make it possible for people not to go to the inner-city with demands for functions that can be satisfied elsewhere.

The key to the solution of lots of problems of the inner-city is not to be sought in the inner city itself, as it may lie in spatially more distant developments. The local centres of the individual districts and parts of town must become more attractive in order to take some burden off the Centre. An increase in the mutual relations of these outer centres can only make it possible for local inhabitants to have alternative destinations and a choice of alternative travel routes as against the constrained routes leading to the inner areas. It can generally be claimed that *the possibility of choice, a spatial unfolding is more important for the town-dweller himself than* an improvement as enforced according to the previous concept, that is, a *permanent capacity enlargement to satisfy contrained relations.*

2.4.1. The plurality of value-related principles

In reality, the mode of conceiving, of formulating the problem does not emerge as a purely technical issue (implying the depth of problem analysis) but is connected with value viewpoints, too. Accordingly, the conceiving of the problem decides at the very onset – in the case of the issue of the Budapest network structure as well as of other sets of issues – what result may be expected of solutions. In *Table No 1* we list the modes of approach, according to the two different principles of value, of the most general terms and key elements of town traffic, which implies how the key problem of the individual subsectors is defined according to the given value principle.

Here, as can be seen, we have matched the conventional transport sector concept by a possible "alternative" set of values, namely terms and definitions of an environmentally oriented urban traffic concept.

The conventional concept is characterized by the attitude that it practically considers the road surface to be established for individual transport as a goal. From the international comparisons of road capacities, parking lots and levels of motorization it exclusively draws conclusions wich shon underdevelopment and shortage of capacity. Simultaneously, pedestrian and cyclist and traffic as well as public transport stopping-places are, according to this planning concept, by no means priority objectives but factors disturbing vehicle flows.

Table No 1

FORMULATION OF THE PROBLEM

KEY ELEMENTS	TRANSPORT PROBLEMS IN BUDAPEST. TWO APPROACHES	
	Traditional traffic planner approach	Environmentally oriented approach
Urban road network Metro	missing capacity	over-centralised structure
Passenger car traffic	lack of traffic lanes lack of parking places	air pollution waste of energy
Public transport operation	missing maintenance missing subsidy (of the company)	high expenses, tariffs non-attractiveness (for the people)
Bicycles & Pedestrians	risk of accidents lack of discipline vulnerability	missing lanes health risks

The environmentally oriented set of values is, in many respects, just the opposite, where priority is unambiguously accorded to the pedestrian, the cyclist, and the public transport passenger. According to this concept, it is the car that becomes the factor disturbing the pedestrian way of life (risk of accident, health hazard), which definitely needs to be eliminated from many urban areas while in other places the damages caused by it must be reduced.

We consider it important for the judgement concerning the set of values to be distinguished pronouncedly from the methodological, technical issues dealt with above. The acceptance of the set of values is unambiguously a social issue and not a professional one in the planning, technical sense of the word. On the basis of his conviction, a planner may declare himself to be in support of one of the sets of values and may promote its assertion, however, this should be done by him as a social activist and not as a professional.

At the same time the planner as a specialist is obliged to do planning, within the scope defined by the given set of values, by the use of up-to-date methods and with all circumspection. Although there are no financial circles and lobbies in support of the interests of pedestrians and cyclists which would make these an actual hazard, on the level of planning also a partisan of the environmentally oriented set of values may commit various mistakes referred to above, such as intervention without an analysis of the problem, lacking due knowledge of real relationships and on the basis of mere symptoms; concentration on an unlimited enlargement of the pedestrian precinct already established instead of the establishment of ones initiated in other districts, on the technocratic viewpoints of traffic planning in the narrow sense with reference to "demands" and simultaneously leaving all other aspects out of consideration; ignorance of harmonization with other trades and plans, planning without alternatives or the presentation of alternatives unsuitable for real choice, sticking to a single solution, inadmissible corrupt interweaving of interests, immersion in plot and real estate related speculations.

In what follows we are going to set forth in detail ideas connected with an environmentally oriented set of values. However by no means we want to propagate anything as a single possible solution or as an imposed taste to be realized on the basis of a set of values differing from the currently prevailing one. Nevertheless, we consider it necessary to prove that it 'is' possible to conceive a metropolitan traffic concept on the basis of a set of values showing greater sensitiveness to the environment and in reliance on

professional traffic planning methods. We remark it only in parenthesis – in order to avoid overemphasizing an own value-related principle – that we also hope to see it proved that this concept, actually, makes life in the capital more pleasant, more attractive, and – by no means incidental – essentially cheaper than the concept officially represented today.

2.4.2. New priorities in the life of the capital, in traffic. A vision

We must imagine a capital where environmental values, the traditions of the past coexist with the present-day inhabitants and represent meaningful contents and values for them. From the traffic aspect, this means a town where it is the pedestrian, the cyclist, the public transport passenger that enjoys priority.

The priority of the pedestrian shall mean that residential streets must be revived in the town. The street should not, primarily, be a storage place for vehicles and garbage-disposers but part and parcel of the living space of those having their homes in the street. This requires that respect for the pavement should be restored. The pavement must be protected from motor vehicles, from dustbins, from fouling by dogs. It should be made possible for those affected to get everywhere with their prams – or invalid chairs –, and where this cannot be ensured on the pavement, unambiguous signs should be used to warn road users that absolute priority shall be due to the pedestrian over all other modes of transport. It must be ensured that the street can be cleaned, for which parking must be regulated so that cleaning can be done on at least predetermined days.

Today inhabitants tend to turn their backs on the street, as the only thing that can be expected from there is the noise of traffic, dust, and polluted air, from which – with good reason – they would like to be isolated and for which reason they prefer staying in their flats. This turning of backs is well illustrated, symbolically and in reality, by the fact that while previously the storage place for dustbins was the back staircase or the back-yard, today in most houses it is the doorway or entrance-way. Unfortunately, the more people turn their backs on the street, the more this becomes something alien, the empire of strangers and as people lock themselves up even the neighbours become alien.

The priority of the cyclist means that it must be ensured that everybody wishing to use their bicycles may do so and be able to get, by that means, everywhere in town. It must be ensured in this connection – and special

consideration must here be given to teenagers – that safety and security should be provided for everybody and they should not suffocate from the exhaust-gases of cars. Facilities should be made available for the safe storage of cycles (and prams) so that these need not be taken up to, say, the fifth floor. Naturally, all this implies not only planning and regulation tasks but also ones of building and surface reconstruction, which may sometimes be quite costly.

Giving preference to public transport means that the use of public transport vehicles must be made attractive (as against car use). At variance with the general belief, this is not just an issue of financing. It is also one of regulation and competitive conditions concerning public transport companies but, at this juncture, we would prefer emphasizing the relevant desirable goals, including an improvement and more careful planning of the conditions of changing trams or buses, the restoration of longer services instead of the short-cut lines reduced to a feeder service status. In general, priority must be given in the organization of public transport – and even of the whole traffic system of the capital – to the viewpoints of the passengers to be transported as against operational viewpoints.

This shall not imply a transport made either free or cheap. In fact, what means an improvement from the aspect of life for the whole of the capital is not – at variance with the general belief – that transport in the town shall be made outstandingly cheap through an input of major sums withdrawn from other beneficiaries for reallocation. A transport artificially made cheap makes the economy and the population insensitive to distances. The greatest problem in this connection is not what transport senses itself, namely that the consumption of this service becomes wasteful and unsatisfied demands emerge. (Naturally, this is also a problem, and this very fact makes public transport of an unacceptable standard and, despite the price differential, is not attractive for a great number of car users.) Actually, it represents more serious consequences for the shaping of the urban structure if the cheapness alone of the urban transport urges people to travel to "the" centre for everything, and people in fact do so, as this would restrain an assertion of the "local market – local entrepreneur – local resident" self-generating process, that is, no local developments would take place, no local trade and entertainment facilities would be established, and not even jobs would be created locally, or in brief, no local subcentres and local markets would emerge.

Taxis should have special features to be compared not with the above public transport modes but to individual transport, and should include the possibility of access (with considerably reduced speed) to various major areas closed to vehicle traffic in general.

An increasing proportion of the restrictions – indispensable from the viewpoint on the whole of the town – on the individual use of cars shall be made subject to flexible and self-regulating measures instead of to strict authority controls. Such flexible regulation may imply road pricing in the busiest central areas – not free from traffic – in relation to not only parking but the time of stay, within the whole of the zone, or making it an exclusive right of residents – in the zones partially closed to traffic – to hold one (or less) parking licence per flat, which could possibly even be offered for sale.

In conclusion, following the key elements according to *Table No 1* in a backward order, we come to the issues of network development. Here we should mention that – although a professional methodological theme is at issue – the question of the promotion of network development 'outwards from inside' or 'inwards from outside' has entered the currently ongoing debates as a principle-of-value based case of confrontation. Naturally, we consider only an 'inwards from outside' type enlargement of network capacities as acceptable. In actual fact, this principle is no longer called in doubt even by the professional community, yet it is just the opposite which occurs in practice, sometimes on the grounds that the available scarce resources are sufficient only for this (which is diametrically opposed to the accepted principle of priority) or more frequently without any justification of principle, merely as part of the ad-hoc type problem solution attempts dealt with previously (enlargement of the capacities of services taking traffic to the inner-city). Even inside cities we sadly witness the operation of a mechanism whereby it is easier to force a HUF 200 billion metro-construction project (or an Expo-project) – which later turns out to be an economic strait-jacket – onto city-politicians than drawing up a well considered city-development policy, or have regular city-cleansing organised.

What needs to be reviewed is the priority system of the whole of the city traffic design. Currently, when it comes to plans, the drivers' interests are given priority, this is what ultimately determines the placement of the stops for public transport, the conditions of changing transport and possibilities for cycling, while the surface to be used by pedestrians only comes last. The 'habitability' of a city requires the consideration of the same *but in a reverse order.* At the same time, a city shaped on an

investment basis and what is more, without prior concepts laid down on city policy will provide no opportunity to have change in that respect. A few sterile model-zones may be formed due to the self-defence of the rich districts forming on a segregatory basis.

3. Summary

The first part of the study presents a comparative analysis of the transport infrastructure of 29 European countries of which 10 are ex-Eastern bloc countries.

The *railway* ***network*** and the *non-urban road network* show quite a good correlation with the *population of the country*; while the *motorway network* shows the greatest interconnection with the *development level of the country*. An infrastructure development model of the Eastern countries can only be distinguished in the last case, but even here the behaviour of these countries does not differ significantly from the moderately developed other European ones.

This kind of quantitative analysis in itself is not able to direct attention to the consequences of the command economy and central power. The study attempts to focus attention to that fact too using some maps.

Concerning the **equipment** or parks, the per capita data of the Eastern countries do not differ significantly from those of the Western ones in the case of the *navigation* and the *railway* capacities, and slightly overdeveloped relative to the GNP level. In the case of the passenger car park the Eastern motorisation level fits the GNP-trends, in comparison both with the highly developed and the moderately developed countries.

The **traffic** characteristics of the different modes are, to a large extent, interdetermined by the network and the park. The *total freight transport* demand of the Eastern countries fits well with the transport/population and the transport/area interconnections of the Western countries, while this transport demand is much higher projected to the unit of GNP than that of the Western countries. (The share of the total passenger transport in the Eastern countries is less than in the Western societies.)

The relative share of *rail* in the total freight transport is two-three times higher (35–70%) in the Eastern countries than in the Western ones (5–40%), while in the latter road transport possesses a share which is twice the size. The transport structure of the Eastern countries is promising – but there is little chance to reserve their advantages.

This first part of the study was not able to take into account other differences behind the statistical data, due to the age, condition, or technical level of the networks and equipment. In the next part we focused on spatial and structural differences of the regional, national and local transport networks.

The endeavours that urge the soonest possible connection of the east and the west through high-output magistral networks usually *overlook* the fact that the *internal structure* of eastern grids should be modernised first of all so that they can link with the more developed western systems as adaptable, flexible grids capable of independent development, rather than as a dependent burdensome extension to them.

The more disproportionate the interests concerning the grid, the larger the share of the magistral network elements will not be based on and having little direct access to local conditions. It should be stressed that magistral elements constitute an important level in the development of networks, that is to say that they do *not* only represent lack of development. A certain sign of lack of development, however, is if the magistral link is created *before* the basic grid, or *before* the well balanced operation starts on the basic grid. In such a case the link would not be established with the grid, but with isolated quasi-independent points, enclaves; (or, if it is exclusively a transit a line, then not even with such points). These potential sources of danger must be carefully considered by all means when determining relative priorities of traffic and telecommunication.

Concerning urban transport, the study points out two sets of diametrically opposed sets of values. What is very important today is to make it clear, that there *are* possibilities for the elaboration of efficient traffic management techniques that incorporate the priorities of the environment oriented approach. Only correct and efficient alternative solutions for traffic management worked out using sets of values differing from the traditional ones could make the real effects of various development projects comparable, and could offer viable alternatives and choices both for politicians and laymen.

4. Annex

4.1. Data and data sources

We applied four groups of volume data as a basis. All of them relate to as many "Eastern" countries as was possible, and at the same time we collected the same sort of data for some European reference countries and the United States.

As there was no data later than 1990, we had to consider the "traditional" Eastern countries, that is USSR, Czech and Slovak Republic and Yugoslavia as units. Since in the U.N. statistics there are some special data for Belarus and Ukraine, we used these units too (– but at the same time their volumes are included in USSR). As there were separate data for Eastern and Western Germany, we used them as separate units, because it was interesting in the context of the general comparison.

The first group of data, or **general information** relates to the population, area, and a kind of development index of the different countries. The first two are clear, but not the third. In the usual statistics there are no GDP or GNP data for the Eastern countries, as the majority of them did not calculate this index. There are two World Bank publications[1,2], we could use. The first of them (World Development Report 1992) contains the GNP and GNP per capita data for practically all countries excluding the USSR, in USD at 1990 price levels. We had to realise, that in the case of the Eastern bloc countries this calculation of the "correct" GNP underestimates the civilisation level of these countries, and in the comparison of infrastructure was extreme. The second publication mentioned (Historically Planned Economies, The W.B. 1991) gives a "CIA or LWI" estimation for GNP relating all these countries excluding the USSR. In other places this collection gives estimation for the USSR in Roubles and a key to convert it to USD as well. There is an estimation of the GDP of member countries of the USSR in Roubles, and for Belarus and Ukraine we used this proportion.

This second estimation is generally high, overestimates the development rather then under, still we used this second series in the calculation. The reason for this was, that from our earlier experience the *exaggerated demands* for transport in the Eastern countries was even more significant, than the underdevelopment of the transport infrastructure *in quantitative terms*. Using a very low development index, it is easy to show over-demand

in transport. We found it useful to make the comparison this time with the higher development estimation, keeping in mind this choice before drawing any conclusions.

A second group of volume data or **network information** relates to the long-term infrastructural fundamentals: length of railways, motorways, non-urban and urban roads, inland navigable waterways. It is in this group, that we feel our approach incomplete as there is no disposable information relating the territorial characteristics and hierarchical linkage of the networks.

The third group of data or **equipment information** relates to the medium-term production possibilities: number and capacity of different crafts and vehicle parks using the given network; if it was possible we tried to distinguish the passenger and the freight transport park and capacity.

The fourth group of data or **traffic information** relates to the different outputs: passenger and freight transport in volume. Adding to that we put into the traffic data the figures relating to the energy consumption of the different branches of transport.

The basis of the source of the volume data was the U.N. collection: Annual Bulletin of Transport Statistics for Europe 1992[3]. This collection made possible the relative comparability of the data. In some cases there were different disposable data from other sources. We used them only when it was clear from the basis collection, that the data there were incomplete. In such cases we wrote the figures in *italics* in the tables. Sometimes we have found many different figures for the same place, in some cases with significant differences. We did not use these numbers, if it was not clear, why they differed from the U.N. statistics. Here we have to direct attention to this fact, that is to the general uncertainties of the data. However we hope the data are useful to show tendencies even if it is not, to a large extent suitable for explaning unique or special differences.

4.2. Secondary – or specific – data

During the analysis of the connections and the comparison process we used the above classification of groups systematically.

As the table shows all data were projected to the general data – to the population, (in some cases to the area of the country as well) as this is a certain and *correct* way of comparison; and to the per capita GNP, as it is an *important* point of view.

So the *network data* (column 1) were specified by the general data – or by other network data, because in some cases we calculated the indices of the diagonal too: such as urban roads per all roads, motorways per non-urban roads.

MAIN TYPES OF SECONDARY DATA FORMED

	Volume data	General	Network	Equipment	Traffic
		1	2	3	4
Secondary data					
General	1	[G/G]	[N/G]	[E/G]	[T/G]
Network	2		[N/N]	[E/N]	[T/N]
Equipment	3			[E/E]	[T/E]
Traffic	4				[T/T]

In the case of the *equipment* and the *traffic* data (column 3 and 4) the division was made with the general data and with the previous volume data too in order to use these natural specific data as well to the comparison. Here too, in some cases we calculated the indices of the diagonal: such as transit traffic per total traffic, energy consumption per traffic volume, or the ratio between rail-, road-and total freight traffic.

We have to underline that during the whole process our purpose was the analysis of the information and **not a direct policy suggestion**. So, even if something seems to be *too* much or *too* little concerning a specific country, or group of countries, it is not sure, that the solution is to use less or to build more. Only a deeper analysis could try to show causes behind the figures, and the whole infrastructure question is embedded into a general development phenomenon.

4.3. The figures

The analysis of the data is presented mainly by three sorts of diagrams. The first one presents simple one-dimension data series with columns, showing the name of every country under its appropriate column. The normal order of the countries on this kind of diagram is – unless otherwise stated – a decreasing row based on their population size from left to right. Generally in the case of specific data we used normal scale, while for the

original volumes we had to use a logarithmic scale, because otherwise a group of data disappears.The second and third type of diagrams show two-dimensional connections. The *y-axis* shows the volume data or the specific secondary data while the *x-axis* relates to the population or the GNP per capita of the given countries. Generally these diagrams have a double logarithmic scale. In the case of all type of diagrams there is a distinction between the *"Eastern bloc"* and the *"other"* countries. In some cases we made remarks to explain very special differences of a specific country, but the main purpose was just to compare the behaviour of the eastern and other countries. All data the diagrams based on are presented as tables. The tables are organised by the principal modes of transport: *Road transport, Railways* and *Inland waterways navigation* while the cross-modes connections are under the title *Transport.*

In the presentation of the results we followed the above-mentioned order of the *general, network, equipment* and *traffic* data, so each chapter contains all modes of transport. During the presentation text we use only the most important figures.

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CONTENTS

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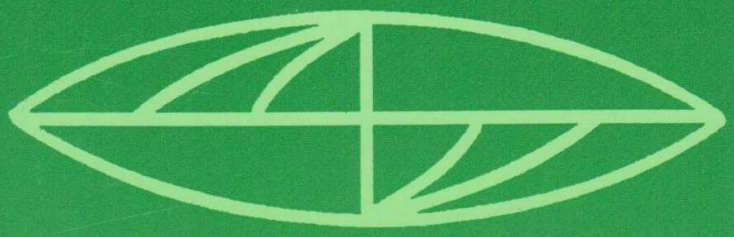

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