

Freight transport modes:

Competition, cooperation or areas of advantage?

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The modal split

i.e., the way traffic is shared between transport technologies (“modes”), is commonly considered to be the result of competition between several modes, among which the customer chooses according to his own criteria.

Another, less confrontational, approach is to consider the various modes as complementary, putting the stress on cooperation within more or less integrated “multimodal” or even “intermodal” chains. Focusing on freight transport issues, this paper will endeavour to show the limits of these two opposing approaches. On the one hand, competition between modes is not as frequent as theory assumes. In many (or even most) situations, only one mode is available. On the other hand, integration of several modes into intermodal solutions is rare, and accounts for only a small percentage of total inland transport. As for intercontinental transport, this is, by necessity, multimodal (successively using maritime or air transport and final haulage), but is seldom integrated into combined intermodal chains.

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1 Basic facts: modal split, differences and evolution

In referring to the following figures, note that, depending on available data, some refer to inland transport only, while others cover all modes. For intercontinental transport (and more generally, every time inland itineraries are interrupted by the sea), maritime and air transport are the only available technologies. At the same time, though, one should also keep in mind the degree to which local traffic is handled by coastal shipping in certain parts of the world (Europe, Japan, China, etc.).

Modal split data show **a great variety at an international level** (considering national statistics, which can cover even stronger differences between regions inside the same State). In the following

chart, members of the European Union have been classified according to the share of freight transport (measured in tonnekm or tkm) carried by road. Whereas some countries rely entirely (or mostly) on road for their inland transport (Cyprus, Malta, Greece, Ireland, Spain, Portugal), others use inland waterways intensively (accounting for nearly one-third of freight traffic in the Netherlands), while still others rely more on rail (particularly among Member States in Eastern Europe, such as Lithuania and Poland, but also Sweden and Austria; Switzerland, which is not an EU Member State, shows a similar modal split to that of Austria).

FIGURE 1. MODAL SPLIT - EU 2007 (INLAND TRANSPORT, TKM)

Pipeline | IWW | Rail | Road Total

SOURCE EU Energy and transport in figures, statistical pocketbook, 2009

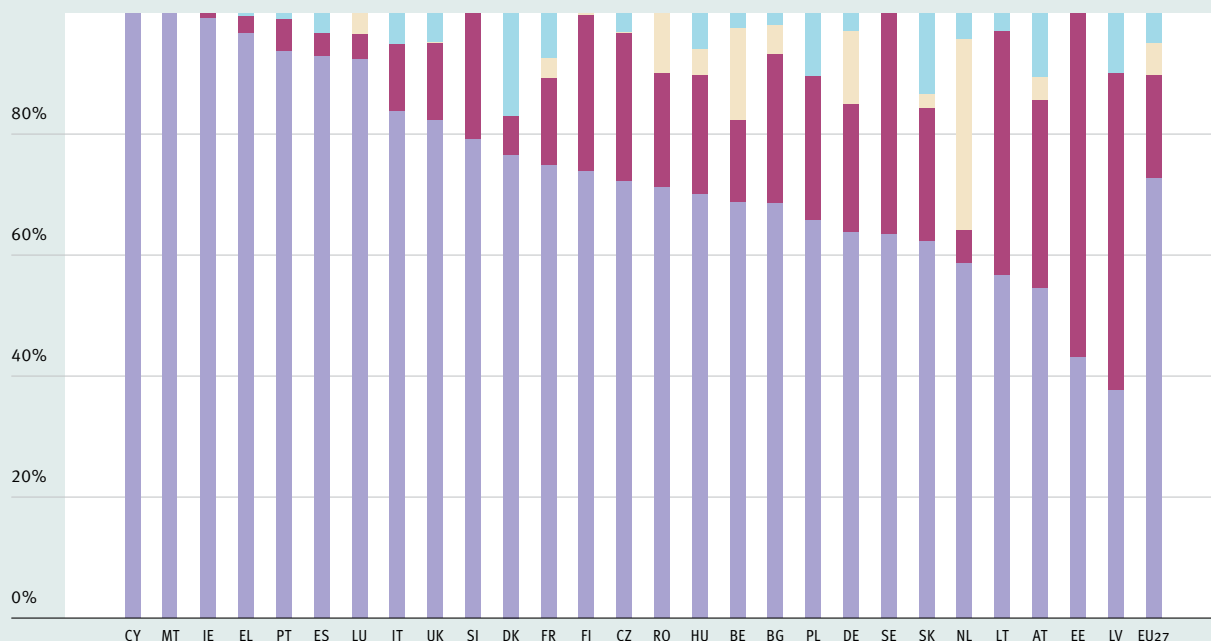
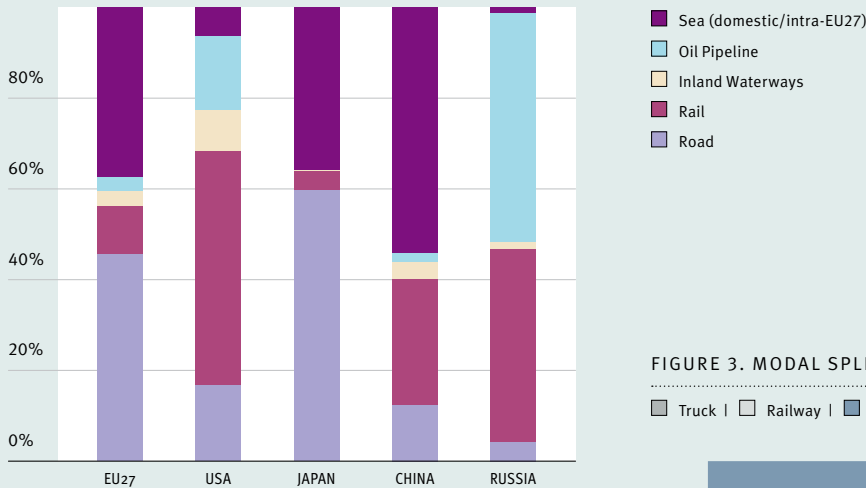


FIGURE 2. MODAL SPLIT
INTERCONTINENTAL COMPARISONS (ALL MODES, TKM)

SOURCE *EU Energy and transport in figures, statistical pocketbook, 2009*
(for China, inland waterways includes coastal shipping; for the US, road transport does not include local traffic)



Intercontinental comparisons show even greater **differences**, even between developed regions, such as the United States, the EU and Japan. Such differences have yet to be explained, but, considering they affect otherwise comparable countries (concerning the type and level of development), they infer that the freight transport mode strongly depends on the **context** in which it takes place, including geography, as well as a strong path dependency process (history matters), and **not on a universal, uniform mechanism**.

Over the long run, there is a **shift** taking place in most countries, including Japan, from rail and inland waterway to road. If we consider the entire European continent, including the 44 member States of the European Conference of Ministers of Transport (now the International Transport Forum), then, contrary to what is occurring in the Western part of the continent, rail remains the primary mode of transport, and this remains true even at the pan-European scale, when both parts of the continent are combined. Nevertheless, there is a clear trend, over the last 30 years, in terms of a shift from rail to road.

FIGURE 3. MODAL SPLIT IN JAPAN 1955-2005 (% , TKM)

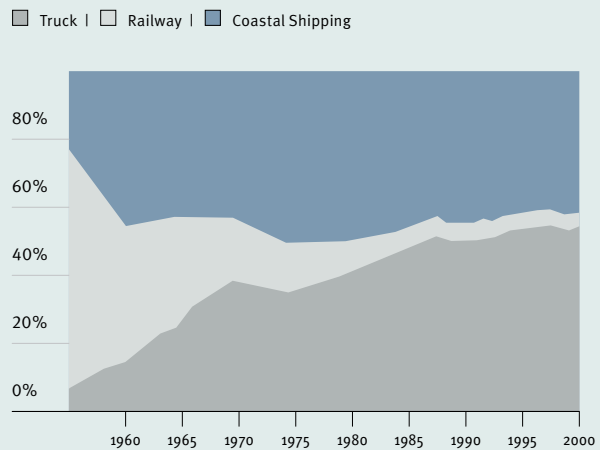
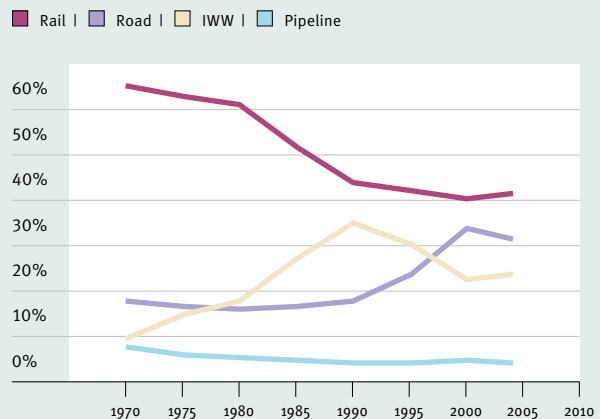


FIGURE 4. MODAL SPLIT IN EUROPE
1970-2004 (ECMT, 44 MEMBERS, %, TKM)

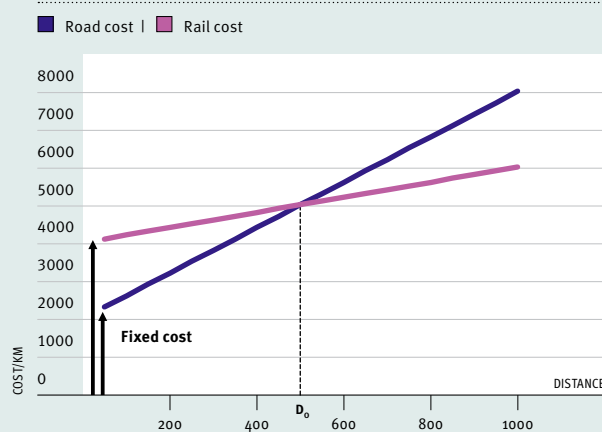


SOURCE
– Yoshi Imanishi, *Freight Transport Policy and Measures in Japan, Public Planning & Policy Studies, 2004*
– *Trends in the Transport Sector, 1970-2005, ECMT, 2007*

2 Rationale for modal split

Most firms seek to **minimize production costs** and the freight transport sector is no exception. This effort to reduce costs explains, to a large extent, the choice between modes. We shall look at the choice between road and rail (though, comparisons between other modes are possible, following the same methodology). The main idea is that transport cost varies (admittedly, in a linear way) according to the **distance of haulage** (mileage), but not proportionally. It also comprises a **fixed cost**, independent of distance, covering such operations as packaging, loading and unloading, preparation of the vehicle, invoicing, organisation and transaction costs, etc. For railways, this fixed cost is particularly important when taking into account **collecting the individual wagons** to form a train, or the **pre- and post-road haulage** between transshipment yard and final destination in multimodal solutions, given that many origin and/or destination sites are not directly linked to the rail network with their own siding. In contrast, at least for FTL (full truck load) consignments, road does not require any time-consuming and costly **transshipment**.

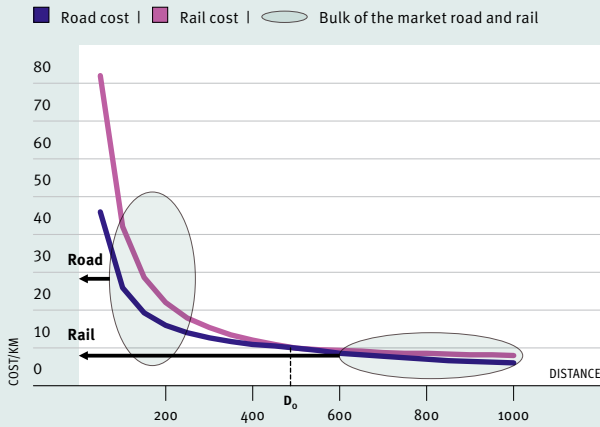
FIGURE 5. TRANSPORT COST ACCORDING TO DISTANCE ($Y = AX + B$)



The divide between road and rail solutions takes place according to a **threshold distance**, D_0 , whereby, road is cheaper for short distances, rail for long distances. The value of this threshold is debatable, although the average of 500km or even 800km is often quoted (surprisingly, considering the average length of rail haulage in Europe is only 240km; source: Statistics in Focus, n° 17, Eurostat, 2007).

When one considers the average cost (per kilometre), it depends of course on the distance, and the comparison between the average costs of road and rail. It is a misconception to contend that shippers accept a higher cost from road carriers, compared with rail carriers, because **the quality of service** of road haulage is better. Since the bulk of freight traffic by road travels only a short distance (in terms of tonnes, 56% of freight carried by road in Europe covers a distance shorter than 50km), the choice of road is the result, first and foremost, of the difference in transport **cost**, reflected in its price; the fact that the average price for road is about four times higher than for rail results from the fact that they correspond to different transport distances: on the following graph, each mode appears as cheaper than its competitor, in its own **area of advantage** (comprising the bulk of its market).

FIGURE 6. TRANSPORT AVERAGE COST (PER KILOMETRE) ACCORDING TO DISTANCE ($Y/X = A + B/X$)



Considering this sketch, one would expect that 100% of freight is consigned to road, up to the threshold distance D_0 , and 100% to rail, beyond this limit. This is obviously not the case, however, since road, indeed, has a near-monopoly on short distances, as well as remaining dominant for long distances. The first reason for this discrepancy is that the value of parameters is not the same for every product or every transport operation and that, on a macro level, the divide between road and rail according to distance is a gradual logistics curb and not a “staircase step”, suddenly jumping from 0 to 100. In addition, this sketch does not take into account other determinant factors, which result in different values for parameters and different behaviours from the shippers. The **size of the consignment** is an important factor: a small load requires light transport means, even for long distance haulage – lorry or airplane – and large consignments call for heavy means, such as block trains, river barges, etc. At the same time, there is a close link between the size of shipments, the **value** of goods (in terms of value density) and the **length** of haulage. For small consignments, road is commonly preferred to rail, even for long distances.

FIGURE 7. SHIPMENT WEIGHT AND TRANSPORT DISTANCE

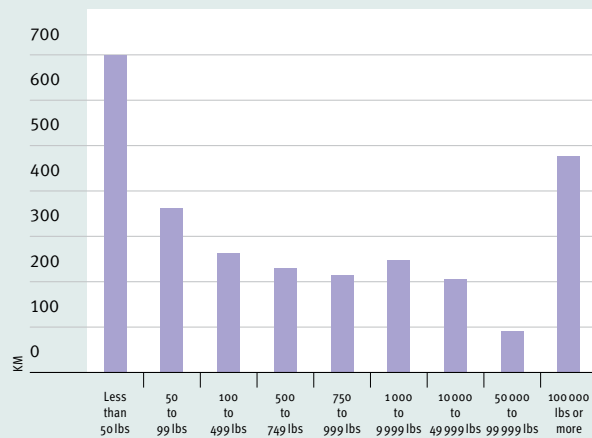
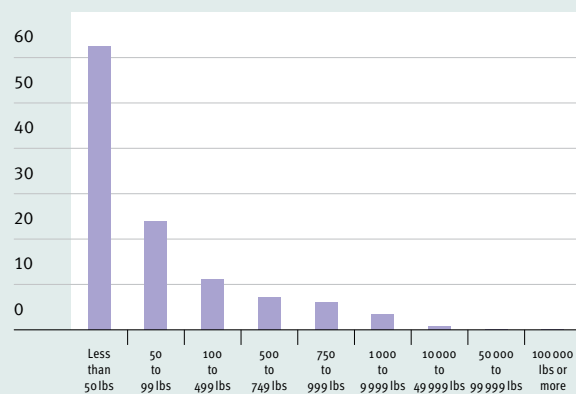


FIGURE 8. SHIPMENT WEIGHT AND VALUE DENSITY (\$ / T)



SOURCE 2002 Commodity Flow Survey, United States, Bureau of Transportation Statistics, 2004

In some cases, **quality of service** can be a key concern, which justifies a costlier solution, such as road, or even air, rather than rail, for long distances, for reasons of speed, safety, flexibility, etc.

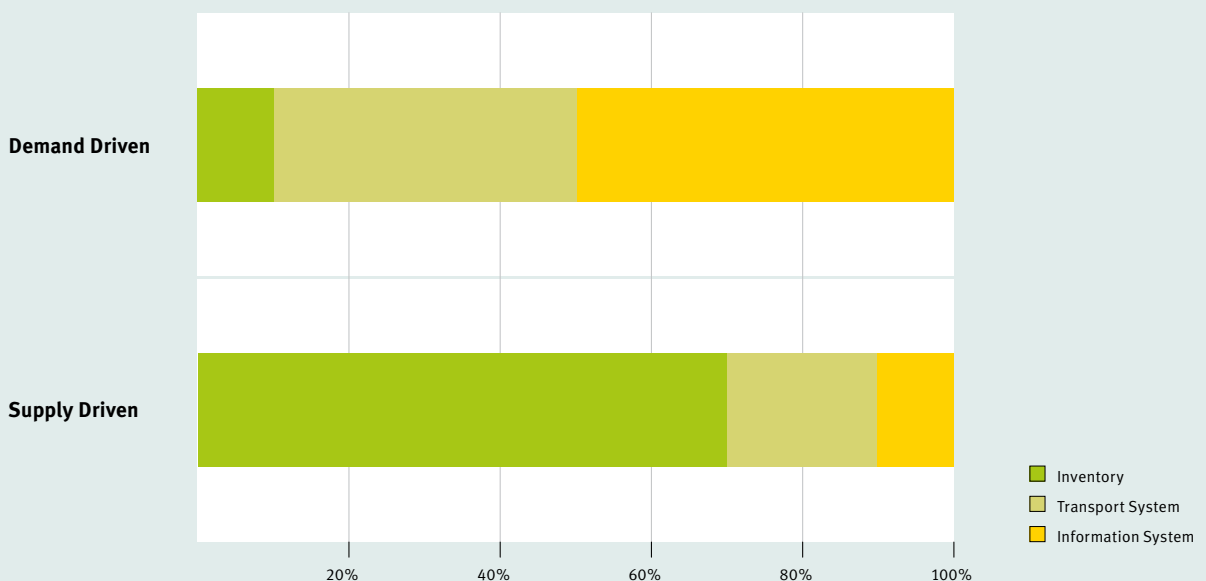
More generally, a growing proportion of shippers tend to seek to **optimise their comprehensive logistics costs**, and not just to **minimize their transport cost**. Optimisation means that the best solution is not necessarily the cheapest; it corresponds to the requirements of the customers (consignees) and to their willingness to pay for it. Optimising logistics, rather than just transport, means that a total cost, comprising transport, inventory and information systems, is taken into account, particularly in the context of today’s “just in time” management practices. This means that a more expensive transport solution can result in a lower inventory volume and therefore an overall cheaper logistics solution.

Another non-negligible element is that inland waterways, rail, short sea shipping (and combinations of these various modes with final road haulage) must all be able to **consolidate** important quantities of goods in order to reach sufficient levels of productivity to compete with road prices. **Economic geography** matters, and explains why road is also used for long distances, when the amount of goods transported is not sufficient to justify the use of other, heavier means.

Finally, in many cases, **road** is selected for long distance freight transport just because it is the only solution available to shippers: there is **no alternative supplier** on the market. In this case, **competition** between modes, even if feasible, simply **does not exist in actuality**.

FIGURE 9. TRADITIONAL (“PUSH”, SUPPLY DRIVEN) AND CONTEMPORARY (“PULL”, DEMAND DRIVEN) FLOW MANAGEMENT, STRUCTURE OF LOGISTICS COMPREHENSIVE COST

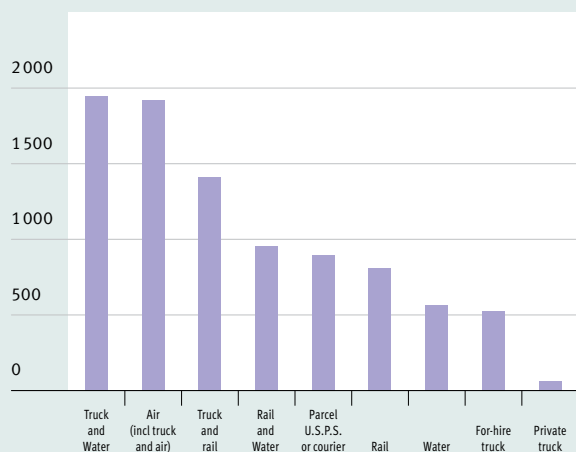
SOURCE Highway Administration, Office of Freight Management. <http://ops.fhwa.dot.gov/freight>



3 Characteristics of different modes

The result of this specialisation process is that modes have very distinct **characteristics**, considering the type of **commodity**, the **size of shipment**, the **distance** of transport, and the **geographical coverage** they provide (road being able to serve the entire territory, while waterways are limited to a few axes [natural geography also matters] and rail tends nowadays to be limited to trunk lines), etc. Each mode is strongly **focused** on a specific market: the average distance is shorter for truck than for water transport, for water transport than for rail, etc. In the United States, the average mileage for truck and water, as well as for air transport, is nearly 2000 miles, whereas it is only 64 miles for private truck (own account road transport). The same relative taxonomy can be established in Europe, although absolute mileages are shorter. Simultaneously, it is notable that the value density of goods (in terms of \$/t) carried by air is about 2000 times higher than that of goods carried by rail or water!

FIGURE 10. AVERAGE MILES PER SHIPMENT BY MODE



SOURCE 2002 Commodity Flow Survey, United States, Bureau of Transportation Statistics, 2004

In the comparison between transport costs by road and rail, a **second threshold**, therefore, appears, together with distance D_0 and influencing it: the **size of shipment**. A big shipment allows important economies of scale, not only on the haulage factor (the variable cost of transport related to distance), but also on the fixed factor, dealing with terminal operations and interface transaction costs. **Consolidation** of freight and **rationalisation** of supply chains is a crucial condition for rail (as well as waterways, or short sea shipping or intermodal inland transport) to be competitive vis-à-vis all-road solutions. Comparing the following charts, reducing fixed costs appears to have a stronger influence on rail transport competitiveness than reducing haulage costs.

FIGURE 11. VALUE DENSITY BY MODE (1000 \$ / T, LOGARITHMIC SCALE)

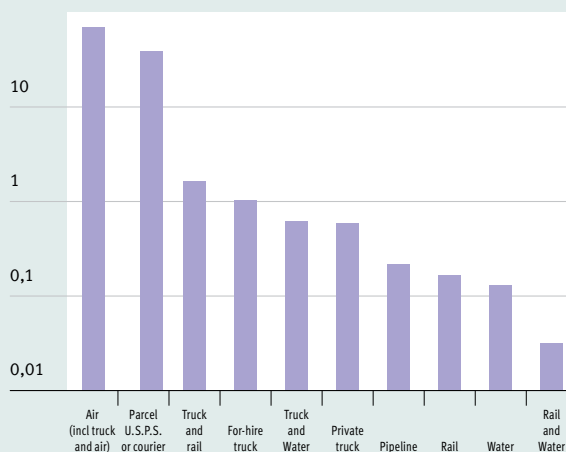


FIGURE 12. RAIL AND ROAD COMPARISON:
REDUCTION OF RAIL MARGINAL COST

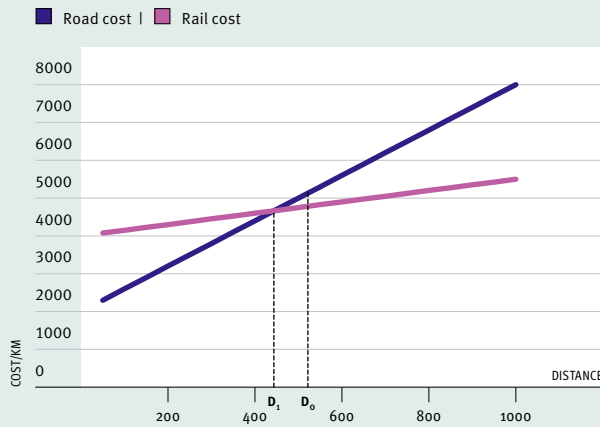
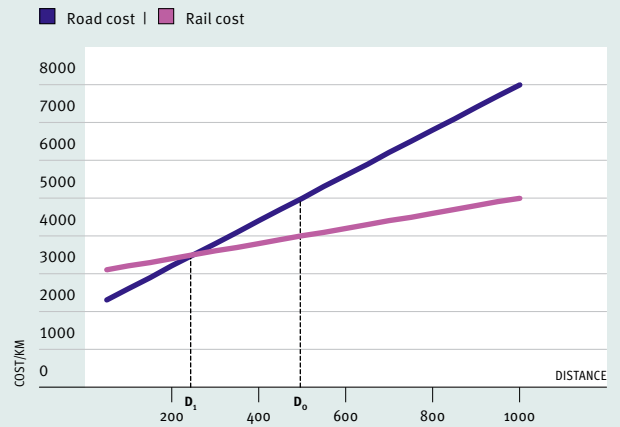


FIGURE 13. RAIL AND ROAD COMPARISON:
REDUCTION OF RAIL FIXED COST



In the following diagram (figure 14, page 11), we have represented the core fields of these two transport modes according to two key criteria: the **distance** of transport and the **size** of shipment. Both parameters, as seen earlier, are linked to the nature of the commodity and its density of value. Considering distance of transport, a distinction must be made between **inland** transport (on short, medium and long distances) and **intercontinental** transport. When considering the size of shipment, a technical and economic segmentation comes into play between: small consignments, at a scale much smaller than the capacity of a vehicle and therefore requiring a complex process of consolidation so as to preserve transport productivity (courier, parcels, up to LTL); medium shipments (corresponding to the capacity of a lorry or of a container: FTL, FCL) and large consignments, often exceeding several hundred tonnes and carried in bulk. For sake of clarity, **other modes have been omitted** from the table, to wit: inland waterway, pipeline, short sea shipping, and various multimodal and intermodal combinations.

The table is quite intuitive, mixing differentiation in the size of letters and colour blending. For inland transport, **road** is the dominant – if not exclusive – mode today in Europe for short and medium distances, as well as for small and medium-sized shipments. Rail is only used for large quantities and over long distances (with some exceptions to this rule, such as successful medium distance rail shuttles), but is no longer dominant, even in this segment. On continental long distances, air transport is used only for courier traffic, “air” general cargo being carried by road (possibly with an air waybill!). For intercontinental transport, **maritime** transport is by far dominant in terms of tonnes carried (at the same time, with only 0.3% of total tonnage, air transport carries about 25% of worldwide trade in terms of value).

This table provides a generic framework, which could be applied to various contexts when adequately qualified: average distances are longer for all modes in the US than in Europe, which partly explains the difference already mentioned

concerning the modal share. It is, in particular, questionable whether, with the gradual decrease of the “border effect” in Europe (a coefficient which diminishes exchanges between two regions if they belong to different countries, even inside the single market), European average transport distance will go on increasing, and whether European modal share will get closer to the American level...

FIGURE 14. TRANSPORT MODES: MAIN FIELDS OF OPERATION, ACCORDING TO DISTANCE AND SIZE OF SHIPMENT

■ road | ■ rail | ■ air | ■ sea

LARGE, BULK	ROAD, rail	road, rail	road, RAIL	SEA
MEDIUM: FTL, FCL	ROAD	ROAD	ROAD, rail	air, SEA
SMALL: PARCEL, LTL	ROAD	ROAD	ROAD, air	AIR, sea
SIZE OF SHIPMENT DISTANCE	INLAND SHORT	INLAND MEDIUM	CONTINENTAL LONG	INTERCONTINENTAL

The differences between modes are so distinct that it leads to the inescapable conclusion that there is very **little overlap between the realms on which different modes are operated**. Freight transport is divided into different **segments**, with a single mode of transport tending to be best placed to serve each segment.

4 Actual and potential competition

Actual competition takes place only on the **fringes** of the respective **areas of advantage** of different modes, and the change in modal split will result from a shifting and broadening of these fringes.

Competition: within modes or between modes

Competition in the freight transport market is therefore mainly **within modes** (among firms implementing the same technology of transport) and much less **between modes** (firms offering different technological solutions for the same flow of goods).

In Europe, competition within railway transport exists only where the “unbundling” of infrastructure and services will likely allow network access for several carriers (historical as well as new entrants), thus facilitating intra-modal competition. In other parts of the world, rail transport remains vertically integrated, with each carrier controlling its own infrastructure. In the US, two overlapping pan-American networks compete, covering the same territory with more or less parallel tracks.

When there is no actual competition between modes (in fact, when road is the only available mode), one might expect a degree of **virtual competition** to arise, for example, a new supplier, relying on another mode, could compete with road haulage (thus putting the present single-mode situation **into question**). This situation certainly exists and justifies attempts, here and there, to develop alternative solutions to all-road haulage.

Still, in many cases, an alternative supplier is just not feasible, due to the lack of **infrastructure**, or

its poor quality, shortage of capacity, or due to long route mileage (road is more likely to go “as the crow flies” than rail and river, since it accepts tougher slopes). To make sense, **virtual** competition requires being at least **feasible**, i.e., that physical conditions exist to make it **possible**, if not **actual**.

The key role of infrastructure

Transport is an industry where an important part of productive capital, **infrastructure**, is mainly provided by **public authorities**. The building of a **network** (in recent history, motorways/highways) requires about two human generations and large amounts of financing, the profitability of which is hardly assured (as the Channel tunnel, entirely financed by private funds, has shown). The availability of infrastructure is, therefore, a matter both for **institutional and public economics**, as well as for **evolutionary economics**, considering the **path dependency** of infrastructure building, operation and efficiency. Today’s practice of inland waterways in the Netherlands is the result of centuries of constant efforts to control rivers.

On a local basis, many modern production and distribution sites are only **accessible** by road (whereas, in the 19th century and first half of the 20th century, they were systematically located along a canal and/or equipped with a railway siding). The choice of a freight transport mode is now pre-determined by real estate developers, and the modal split is biased long before shippers have to make any decision.

In other words, actual **competition** between modes explains only a part of the modal split, given that this competition requires an adequate, pre-existing context, which is not the case in every country or along every route, particularly as far as **infrastructure** is concerned. Switzerland provides

a relevant example. In this country, rail's share of total freight transport is about 30%, i.e., more than twice the EU average. This is due to public support of the railways, including two additional – and costly – tunnels under the Alps, in operation or under construction, so as to alleviate road transit. Britain provides a contrary case in point, where little investment at all has been devoted to rail (before a new renovation effort was recently launched). Far **upstream from the modal choice** by shippers, the **framework** for such a choice has been established, decades in advance, by public policies. For this reason, **facilitating competition** between modes (and not only within modes) is a long-term

policy issue, which will be addressed below, together with the modal shift question.

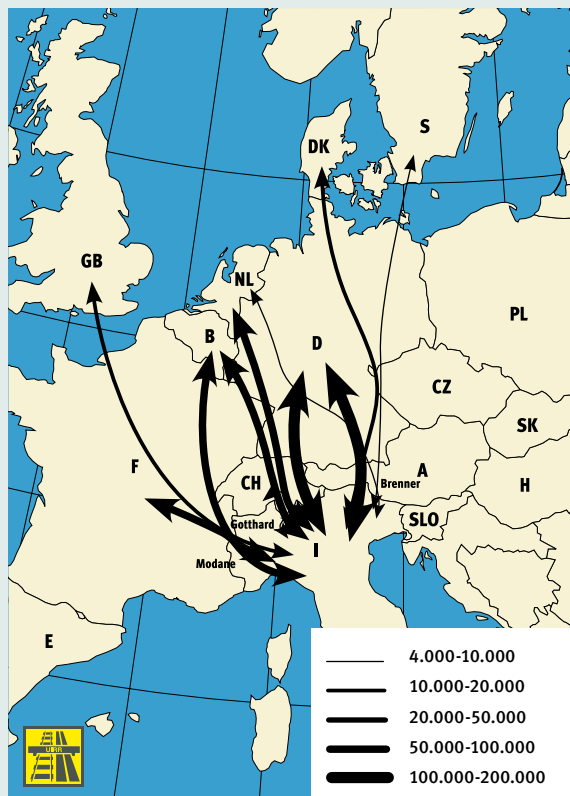
Cooperation between modes

Multimodal and **intermodal** transport are popular causes in both political and academic literature. The reasons for this infatuation include a cooperative vision of the relationship between different transport modes, the optimal use of each mode, and their contribution to sustainable development. Intermodal is therefore a political as well as business matter. Still, the volume of intermodal transport represents only a **small portion of total transport** and is presently stagnant

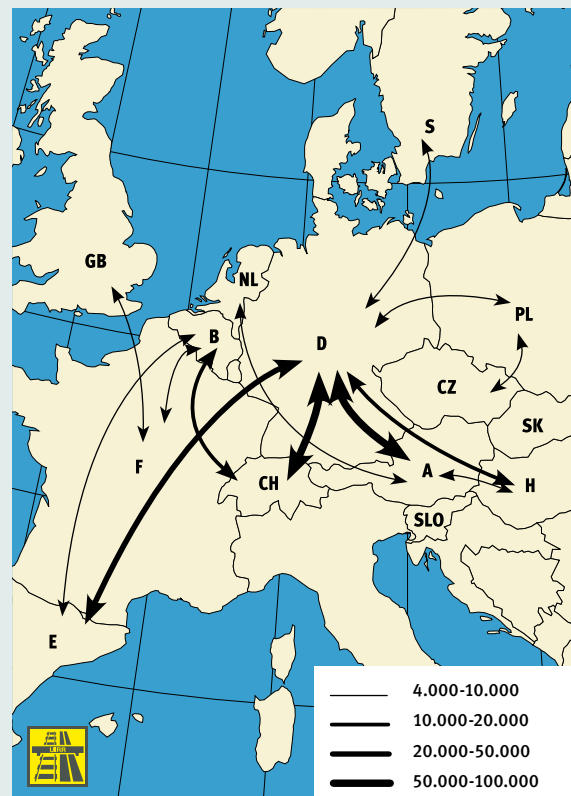
FIGURE 15. MAIN RAIL-ROAD INTERMODAL TRANSPORT IN EUROPE

SOURCE UIRR

Unaccompanied international traffic in 2001 (without alpine traffic)



Unaccompanied international traffic in 2001 (alpine traffic)



or even declining, representing roughly 5% of total freight in Europe, 25% of railway transport (tkm), 5% of waterway transport and 10% of maritime transport. It remains a niche market, mainly at the international level and, in Western Europe, concentrated in a few corridors, particularly across the Alps.

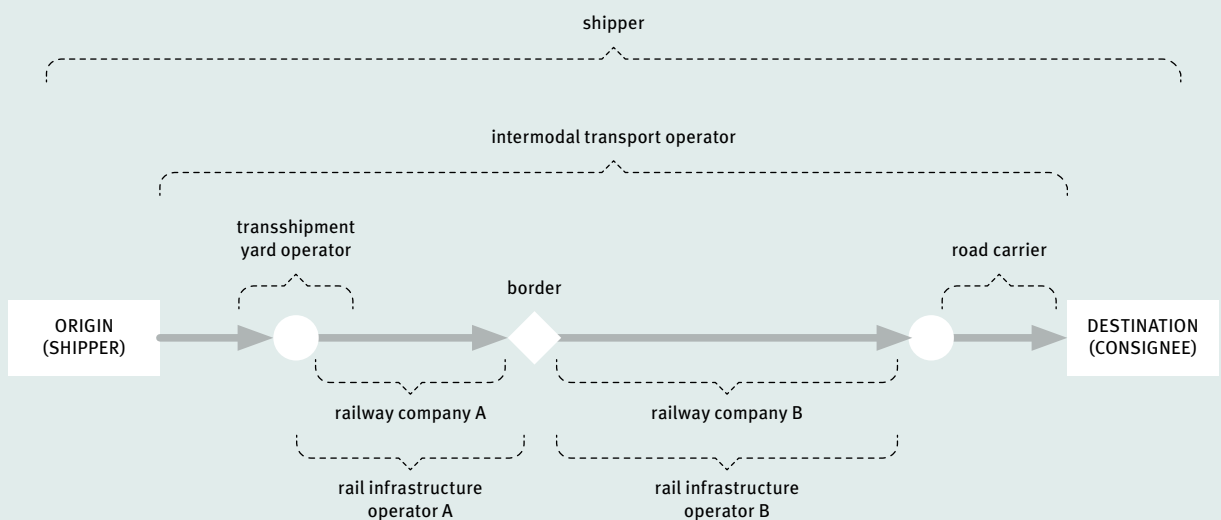
The reasons for this situation are complex. One factor is the inefficient performance of traditional operators, who are hampered by a fragmentation of intermodal organisation among many autonomous actors. This encourages **newcomers** to set up simple, integrated arrangements, often dedicated to one type of traffic, or even one single shipper, consisting of a shuttle service between two fixed points. They abandon the notion of network and create bespoke intermodal transport chains, organised under **a single agent's control** (a shipping company like Maersk for ERS, chemical industry for Rail4Chem, steel industry for CFL Cargo, etc.).

The contrast with existing complex solutions is sharp, all the more so as the following chart provides only a simplified vision of a traditional intermodal arrangement, as it comprises only one border, two modes of transport (road, rail), and ignores technical discontinuities in terms of energy, signalling, gauge, etc., resulting in a poor **“interoperability”** outcome. Additional factors are also ignored, such as wagon, container and locomotive renting companies, freight-forwarders and 3PL, real estate owners, local and State authorities, infrastructure regulators, etc.

The common characteristics of these new arrangements are, beyond their simplicity, that they promote **internal coordination** rather than external market driven cooperation; planning rather than **transaction; integration** rather than **vertical competition**. Here, again, the basic explanation of freight organisation through competition and market mechanisms is challenged.

FIGURE 16. TRADITIONAL INTERMODAL ARRANGEMENT OF ACTORS

SOURCE RECORDIT, 2001.





5 From modal split to modal shift?

Overlap between freight modal markets is the exception; segmentation and specialisation are the rule. Is this situation satisfactory or sustainable?

In the short run, transport supply is a given, and modes compete only where they co-exist. The general expansion of road haulage at the expense of other modes, which occurred in recent years in Europe, but not in America or Asia, reduces actual **competition** to a few **corridors** where heavy modes such as train or barge demonstrate their competitive advantage: increased productivity for massive shipments and long distances. Rail has lost the general coverage function it provided up to the middle of the 20th century and has been reduced to a “core” trunk line network (as shown with the example of the shrinking of the French

railway network, since its acme in the 1920s). As a result, road haulage is often the only available mode and there is little **actual** competition.

In the long run, this situation can be reversed, but will require weighty decisions. To make competition **feasible**, even only in a **virtual** way (a simple threat by another competitor to enter the market), it has to be **possible** – this means the infrastructure must exist to enable an alternative solution. The provision of a new transport mode, as an alternative to road, requires massive, indivisible and irreversible investments, which rarely reach private profitability rates and have to be provided, or at least guaranteed, by public authorities (States, European Union, etc.). History matters and countries where the rail system has been kept up to date differ from those where most investments, over recent decades, have gone to road and where a shift to other modes will require a complete renewal of competitive solutions.

FIGURE 17: RAIL NETWORK IN FRANCE AROUND 1920



FIGURE 18: RAIL NETWORK IN FRANCE 2008



Taking into account **new concerns**, such as **energy** consumption and **climate** change due to the greenhouse effect, governments can be expected to match their words with actions, and develop alternative solutions to road. However, they should not just support any type of project willy-nilly - rather, they should spend their scarce resources in an efficient way by focusing on projects likely to succeed, i.e., to capture a significant share of freight. Supporting **abstract competition mechanisms** is not enough, as demonstrated by the European railway reform effort to open the market to intra-modal competition, launched in 1991, which has yet to result in any broadening of rail's modal share. **Real** competition must also be made **possible**, by setting up adequate infrastructure and up-to-date operational technology, along long corridors serving substantial traffic markets.

Some 50 years ago, a comparable situation existed for passenger transport, when traditional railways had reached their peak development and new modes (private car and plane) represented the future. The invention of the high speed train, based on **a large capacity dedicated line**, enabled a real breakthrough, which provided rail a new area of advantage and put it back into the market of passenger transport in the following decades. Is such a change in store for freight?

6 Long range perspectives

The conclusions of a recent long-range study carried out on freight transport in France (which also took into account European integration as well as globalisation), entitled *Fret 2030* (Freight 2030), can be extended to most European countries. The study proffers different **scenarios**, based on the extent to which two main assumptions, concerning the rhythm of European economic **growth** and the way **transport is “coupled”** to it, are impacted by the degree to which a **sustainable development** strategy is applied to freight transport policy. This results in four schematic perspectives.

In the following table, S1 corresponds to a high rate of growth of transport with little public regulation, S2 to high growth but strong public intervention so as to promote “sustainability”, S3 to a low rate of growth of freight volume and little public policy, and S4 to low growth of transport and strong public policy. Figures are only given for likely orders of magnitude and do not represent extreme possibilities, such as an energy shortage due to an international military crisis, a pandemic, a global economic crisis or collapse in international trade (such events may not be all that improbable and would merit further study). They merely provide limits for **a possible, non-chaotic evolution**.

Transport volumes are expected to continue **increasing**, either at a slow rate (+21% over a quarter of a century) or a more rapid one (+49%), depending on the scenario. No **“decoupling”** of economic growth and transport growth is envisaged, as the *White Paper* of the European Commission proposed in 2001. But the **elasticity** linking the two phenomena will diminish: this was recently much higher than 1 (transport growing quicker than GNP), but is now lower. If decoupling



did not seek to slow down **transport**, but, instead, to reduce **traffic** or **nuisances** due to transport, then more room for manoeuvre would exist and an ambitious policy could achieve its objectives. Thus, progress in transport technology and organisation could sustain the same amount of transport (tkm) with less traffic (vehicle-km) and less greenhouse gas (tons of CO₂) emissions.

In all the above scenarios, **road will remain the dominant mode** in Western Europe, as its share of transport will fluctuate between 72% and 88% of tkm, depending on the hypothesis. Moreover, there are **no realistic transport solutions** that could accommodate expected transport flows and respect for the environment without including **road transport**. The margin of progress will be greater, at least for short ranges, with incremental progress in road transport, rather than with a radical development of alternative modes, given the difference in relative starting positions. At the same time, this does not mean that progress

through solutions other than road, where relevant, should not be sought.

In any event, there will be **no absolute modal shift**, as road transport will grow under each of the scenarios (with a growth ranging from 6% to 60% within the relevant time period). Any modal **shift**, if it happens, will only be **relative**, with a change in proportions of various modes benefitting alternatives to road - the biggest such change occurring under scenario S4.

However, all these assertions ignore the essentially **spatial** dimension of transport. Non-road solutions and a possible modal shift are only relevant in precisely defined **corridors**, where conditions, such as long distance transport of heavy flows of goods, rely on available infrastructure. These conditions can notably be met for servicing main harbours to and from the hinterland and for major metropolitan areas.

FREIGHT TRANSPORT IN FRANCE – LONG-RANGE PERSPECTIVES (TKM)

BILLION TKM	2002	2030 S1	2030 S2	2030 S3	2030 S4
Road	257	412	340	296	272
Rail	50	50	80	76	87
IWW	6.9	7	20	15	20
Total	314	469	440	387	379
with SSS*				427	419

*SSS = short sea shipping

FREIGHT TRANSPORT IN FRANCE – LONG-RANGE PERSPECTIVES (MODAL SPLIT, %)

%	2002	2030 S1	2030 S2	2030 S3	2030 S4
Road	82	88	77	76	72
Rail	16	11	18	20	23
IWW	2	1	5	4	5
Total	100	100	100	100	100

SOURCE Fret 2030, 2008

The presentation of the choice between different modes of freight transport as being settled according to neoclassical mechanisms of competition is, as a whole, unrealistic. **Segmentation** is the rule; actual competition (i.e., where alternative supply modes exist in the same market) is the exception. Modes of transport are broadly specialised in specific and separate **area of advantage**, and they are more **complementary** than rival. Intermodal combinations only play a limited role, due to their complexity and fragility, as well as the non-cooperative attitude of their actors, unless one of them integrates the complete chain under his control.

Till now, **policies** to change the modal split have, in Western Europe, mostly **failed**. This does not mean that attempts to increase the use of alternatives to all-road long distance haulage have no chance to succeed. However, they require demanding conditions, which are seldom fulfilled, and must only be supported where they are meaningful: that is, on a few corridors, equipped with adequate

infrastructure, serving important sources or destinations of heavy traffic. In such cases, they should not be considered as hostile to road transport; shrewd road carriers will understand that such measures will alleviate traffic on congested trunk roads, while leaving them with the value added terminal operations. According to all plausible scenarios, **road transport will go on increasing** in the coming decades.

Going forward, efforts to **reduce greenhouse gases** will have to use **all available tools**, simultaneously: technology and standardisation, organisation and management, regulation and taxation, etc. In any case, the modal shift will only provide a limited part of the solution, and **the main prospects for progress will remain within road transport itself**. The European road industry, including vehicle makers as well as carriers and logistics service providers, should take up this challenge and turn it into a crucial competitive advantage in the global market of the future.

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