Transport objectives, Instruments and Indicators

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1. Introduction

The relation between freight transport and economic activity gets more and more attention from researchers, planners and policy makers. The demand for transport services both by companies and households is the result of the spatial separation of the production and the consumption of final and intermediate goods, as well as factors of production such as labour. At the same time, transport itself is considered as a production factor, creating value added by moving raw materials, intermediate and finished goods from origin to destination. On top of this, the role of investments in transport infrastructure as a stimulus for economic growth and development gets more and more attention of policy makers. Briefly, transport is important and necessary for the present-day economy.

Still, the relation between transport, transport policy and economic activity is not fully understood yet. This is partly due to the fact that the objectives of users and producers of transport, on the one hand, and the government on the other hand, are complex and not always easy to evaluate. This paper wants to unveil part of this complexity by looking into more detail into the relation between objectives, instruments and accomplishment measures.

The starting point is a welfare economics framework to formulate overall long term and medium term transport objectives². For each specific mode and node, the instruments to realise the objectives are derived. Finally a list of indicators for the identification and measurement of the final realisation of the objectives is made.

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When identifying the objectives, instruments and indicators, it is important to take into account their interrelationships. This is illustrated by a specific example for rail freight transport.

2. Transport objectives, instruments and indicators

The main goals of economic policy are undoubtedly to serve general interest and promote overall welfare. In general, the objectives of economic policy can be extremely varied: stimulating economic growth, reducing inflation, creating employment, redistribution of income, etc. However, one should always bear in mind that, to achieve the highest welfare benefits, the most efficient means has to be chosen. This implies that policymakers should select the most appropriate and especially the most direct measures from the whole range of measures, so that no welfare losses or inefficiencies occur, e.g. equitable income distribution is realised through direct transfer of income, employment is stimulated by a direct reduction of taxes on labour, etc. This approach is commonly referred to in welfare economics as the 'first-best optimum'.

Past practices in most European countries, however, reveal that transport is often used as a means to realise all kinds of objectives that lie beyond the field of transportation. Transport policy has been used to promote regional development, to support branches of industry, to provide social assistance, to boost employment and to achieve other general political goals. Often policymakers never bother to ask themselves whether transport measures are in fact the most efficient means of realising such objectives (Blauwens, De Baere and Van de Voorde, 2002, p. 334).

The main objective that remains for transport policy is to optimise transport itself. This implies that the utility of transport should outweigh its social cost by the greatest possible social surplus, so that transport will contribute maximally to the general welfare. In order to clarify this objective, two curves need to be considered: the marginal social cost curve (Msc) and the demand curve (D) as illustrated by Fig. 1.

The utility of transport is reflected in the willingness to pay of the transport user, which, in its turn, is represented by the demand curve. The marginal social cost of transport encompasses all the sacrifices that the economy as a whole is required to make for the production of an additional unit of transport. The concept not only includes the private cost borne by the transport user as represented by the marginal private cost (Mpc), but also the cost for the society as a whole. The latter includes costs that the transport user does not cover but rather imposes upon third parties – called external costs. Combining the demand curve and the marginal social cost curve gives the optimal volume of transport performances which is attained at the intersection of

both curves. At this point, the utility of transport to the users exceeds the social costs maximally.



Fig. 1 - Social optimum and external costs

Source: Blauwens G., De Baere P., Van de Voorde E. (2002).

If we want to derive transport objectives, instruments to realise these objectives and indicators, our starting point should always be the first best optimum approach so that efficiency and welfare gains are maximised. As such, objectives that lie beyond the scope of transport and for which more direct measures are more appropriate, are not taken into consideration³. The tables listing the indicators for the different modes and nodes were drafted from this point of view (cfr. infra).

For transport policy, most of the time two major overall objectives are considered: economic efficiency and equity. As is summarised in Fig. 2, these two overall objectives cover a number of long-term objectives⁴: economic efficiency for both passenger and freight transport, environment and health, liveability, safety and security, economic development and inter-/intragenerational equity. In order to translate the long term objectives in more practical and measurable targets, a number of intermediate or

³ We would like to stress that we restrict this point of view to the European context. For developing countries, a 'first best approach' might not always be the most obvious and socially optimal solution. ⁴ Within this

⁴ Within this process, use is made of the concept (common within general economic literature) in which a distinction between long and medium term is made on the fact that long term changes require large investments and structural adjustments whereas medium term changes don't.

medium term objectives are used. Whereas the long term objectives are general and common to all transport modes, the intermediate targets are in most of the cases modeand/or node-specific, as are the instruments to reach the objectives. As such, a classification per node and mode is introduced. Finally, the indicators should give an idea of the effectiveness of the instruments in realising the final objectives.



Fig. 2 - Approach to derive the indicators

Source: Own composition.

In deriving the specific objectives, instruments and indicators, three stakeholders' points of view are considered: those of the government, of the producer and of the user, resulting in a two-dimensional table (cfr. Tab. 1) which is the overall structure used for further analysis.

| | Т | ransport mode / node | e | |
|------------|-------------------------|---------------------------|-------------|------------|
| | Long term objectives | Medium term objectives | Instruments | Indicators |
| Government | | | | |
| Producer | | | | |
| Consumer | | | | |

Tab. 1 - Working structure for determining indicators

Source: Own composition.

Completing this table for every node and mode leads to Tab. 2. It gives an overall framework which can be used as a starting point to deduce more specific transport objectives, instruments and indicators for specific countries, regions or situations. It should be noted that a given indicator might be linked to several objectives and instruments.

As far as the consumer is concerned, the long term objective for households is intertemporal utility maximisation. For companies using transport as an input for their production activities, this translates into profit maximisation. The long term objectives of the government can be brought together under the heading of maximisation of social welfare. In general this implies guaranteeing economic efficiency and fair competition, safety and minimisation of negative external effects. For some modes additional objectives such as ensuring regular services in public transport or facilitating transhipments in freight transport enter the picture. For the private producers or providers of transport services, the ultimate long term objective is or should be profit maximisation.

The medium term objectives help to realise the long term ones and are more specific and easier to control. For the producers the way in which profit maximisation is realised will depend upon a number of intermediate targets such as the generation of added value, the increase of the market share, the improvement of safety and quality, etc. Which of those objectives are actually emphasised, will depend upon a number of factors such as the market structure, the mode and type of transport, the capital and ownership structure, etc. The medium term objectives of the consumers of freight transport services can in general be summarised as minimising their logistics costs and obtaining a good price/quality relation. The users of passenger public transport systems require punctuality and reliability, good connections and an optimal price/quality relation.

For the government the medium term objectives will depend largely upon the mode of transport and the actual legal and market structure of the type of transport. To improve competition within and between modes, the intermediate targets are amongst others: fair and efficient pricing with internalisation of external costs, transparency of the market, facilitation of market access, harmonisation of competitive terms, etc. For the reduction of negative external effects a number of medium targets such as internalisation of the external costs, the reduction of accidents, the promotion of public transport, etc., can be set. Tab. 2 gives a more detailed list of the medium term objectives for each transport mode and node.

The instruments to realise all those objectives are rather complex and can be very specific but they can be grouped under a number of headings. For the users of freight transport services the realisation of price/quality conditions will mainly depend upon their negotiation power and the size and quantity of their shipments. In public passenger transport, the consumers have practically no instruments to realise their intermediate targets. They depend largely on the providers and quite often the only alternative they have is private transport. For the providers of transport, a set of instruments is at their disposal to set up strategies for the realisation of their objectives. They can try to organise the production more efficiently in order to reduce costs, they can use marketing instruments to improve their market share, they can adjust their investment strategies to guarantee higher returns, they can introduce technological innovations to improve productivity and the quality of services, they can look for different types of co-operation to generate economies of scale or to increase their negotiating power, etc. The government can use control and regulation instruments, tax instruments, infrastructure improvement and investment policies, allocation procedures, technological innovations, etc.

For the evaluation of the realisation of the objectives and the effectiveness of the instruments, a large number of indicators can be used. Some are readily available or easy to calculate, others require some in depth analysis of the transport system, the market structure and the providing companies. For the evaluation of some of the medium term objectives, one indicator or a limited number of indicators can suffice. However, for the long term objectives, most often a much larger set is needed.

| Freight transport: rail | Indicators | Regulations and legislation Marbet penetration, Marbet penetration, accessibility of railway network Pricing and cost indicators Proportion of damaged / lost cargp Accidents per freight train hm Energy halance Expenditures for information provision Technical performance | Marheting expenditures Pricing structure Capacity utilisation Capacity utilisation Number of market entries Cost structure Norsege return per ton-hm per goods category Share of productive freight train-hms (%) Return on investments, internal rate of return | Accessibility of the railway network Price per ton-Jan and per goods category Services offiered, frequency of service Share of on-time deliveries Average parcel size |
|-------------------------|-------------------------|--|--|---|
| | Instruments | Inspection and control Socioecoromic negotiations and taxation Accurate information flows and interoperability Infrastructure policy (licensing), allocation of railway infrastructure (pricing) | Cost control, cost minimisation Fares Rationalisation of activities Marketing Investment policy Negotiating power | Negotiating power Quantities and shipment size |
| | Medium-term objectives | Allocate slots in a uniform and non- discrimunatory way, use infractructure efficiently and optimally Regulate access to railway infrastructure Establish separation between infrastructure management and the operation of the transport service Make / keep management independent from government Harmonie of competitive terms Charge external costs Promote and facilitate the use of rail transport freight train km | Increase market share Entry new markets Guarantee safety and quality | Low price, minimisation of logistics costs Reliable and flexible services Good connections |
| | Long-term objectives | • Improve competition • Guarantee safety • Reduce negative external effects | • Maximise profit | Maximuse utility for households Maximuse profit for companies |
| | | turnmaroD | Toducer | User |

 Tab. 2 - Transport objectives, instruments and indicators per transport

 mode or transport node

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Source: Blauwens G., De Baere P., Van De Voorde E. (2002); Nationale Maatschappij Der Belgische Spoorwegen (2001); Wobbe W. *et al.* (1999); Secretariat Of Unctad (1976); Talley W.K (1994); White P. (1995); Meersman H. *et al.* (2001).

| | | Fre | ight transport: road | |
|-----------|---|---|---|--|
| | Long-term objectives | Medium-teum objectives | Instruments | Indicators |
| trannavoD | • Maximise social welfare • Improve competition • Guarantee safety • Minimise environmental damage | Internative external costs (congestion, environment, accidents, infrastructure) Uniform and non-discriminatory allocation, efficient and optimal use of infrastructure (tolls) Harmonisation of competitive terms (social, fiscal and technical) Reduce the number and intensity of accidents / freight vehicle km Transparency of frares Harmonisation of regulations and technical standards (dimension of vehicles, environmental norms, safety norms,) | Maintenance, extension, of infrastructure Socio-economic negotiations Allocation procedure of road infrastructure (tolls) Quality inspections Safety regulations | Regulations and legislation with regard to e.g. professional competence, licencing, during time and rest time, speed limits, permissible maximum weight, night during restrictions Market penetration, accessibility of mad retwork Charging principles (pricing and cost indicators) Proportion of damaged / suben cargo Number of accidents per freight while-hom Energy halance (energy use per freight void void freight transport Proportion of road accidents caused hy road freight transport |
| Producer | • Maximise profit | Increase market share Guarantee safety and quality Realise added value | Cost control, cost minimisation Fares Rationalisation of activities Marketing Investment policy, technical & technological improvements Megotiating power Quality standards, quality controls | Marlæting expenditures Pricing structure Capacity utilisation Cast structure Cost structure Average return per ton-lan per goods Average return per ton-lan per goods Share of productive freight vehicle-lans (%) Share of productive freight vehicle-lans (%) Return on investments, internal rate of return Size, average age & condition of the fleet |
| *36U + | • Maximise utility for households • Maximise profit for companies | Low price, minimisation of logistics costs Fast, punctual (JIT-deliveries), reliable and flexuble services High accessibility (penetration, density of the network) | • Negotiating power • Quantities and shipmert size | Price per ton-Jon and per goods category Services offered, frequency of service Share of on-time deliveries (%) Average parcel size Customer loyalty |

Tab. 2 (ctd.) - Transport objectives, instruments and indicators per transport mode or transport node

Source: Blauwens G., De Baere P., Van De Voorde E. (2002); Nationale Maatschappij Der Belgische Spoorwegen (2001); Wobbe W. *et al.* (1999); Secretariat Of Unctad (1976); Talley W.K (1994); White P. (1995); Meersman H. *et al.* (2001).

| Freight transport: sea | Indéators | Regulations and legislation with negard to egprofessional competence, licensing, terms of employment, working conditions, Proportion of damaged / bot (stuben) cargo Number of accidents per freight-mile Energy halance (energy use per freight-mile Energy halance (energy use per freight-mile Maribet transparency Maribet transparency Barniers of entry in the market Charging principles (pricing and cost indicators) | Priring structure Capacity utilisation Cost structure Cost structure Cost structure Average return per ton-mile per goods category Return on investments, internal rate of return Site, average age & condition of the fleet Sitae, average age & condition of the fleet Sitae, average age & condition of the fleet Alliances and consortia | Price per ton-mile and per goods category Services offered, frequency and time table of services Share of on-time deliveries (%) Average parcel size Customer loyalty, customer satisfaction |
|------------------------|-------------------------|--|---|--|
| | Instruments | • Socio-economir negotiations • Inspections • Safety negulations • Licensing | Cost control, cost minimisation Fares Rationalisation of sailing schedules Investment policy, technical and technological improvements Negottating power Economies of scale | • Negotiating power • Quantities and shipment size |
| | Medium-term objectives | Internalise external costs (congestion, environment, accidents, inffastructure) Harmonisation of competitive terms (social, fiscal, technical) Transparency of fares Uniform regulations for ship and navigation safely and technical requirements Harmonisation of the conditions for boatmasters' certificates Decrease surphs fleet capacity Improve the terms of the ployment and the working conditions of the ship crew Facilitate market access Reduce the number and intensity of accidents / freight mile | Increase market share Guarantee safety and quality Realise added value Realise added value New market entry Guarantee negular services to a wide range of destinations | Low price, minimisation of logistics costs Reliable and flexible services |
| | Long-term objectives | Maximise social welfare Improve Competition Guarantee safety Minimise Minimise Minimise Guarantee regular services | • Maximise profit | Maximuse utility for households Maximuse pooffi for companies |
| 1 | | tusunisvoD | reauborg | 1950 |

Tab. 2 (ctd.) - Transport objectives, instruments and indicators per transport mode or transport node

Source: Blauwens G., De Baere P., Van De Voorde E. (2002); Nationale Maatschappij Der Belgische Spoorwegen (2001); Wobbe W. et al. (1999); Secretariat Of Unctad (1976); Talley W.K (1994); White P. (1995); Meersman H. et al. (2001).

| Indicators | Regulations and legislation Charging principles (princing and cost indicators) Proportion of damaged / lost cargo Number of actidents per 1000 full freig combined flights Energy halance (energy use per freight aircraft-mile) Share of delayed flights (%) | Marheing expenditures Pricing structure Capacity utilisation Cost structure Average return per ton-mile per goods category category Return on investments, internal rate of1 Sire, average age and condition of the fl | Price per ton-mile and per goods catego Services offered, frequency of services Share of on-time deliveries (%) Average parvel size Customer loyalty |
|-------------------------|--|--|---|
| Instruments | Socio-economic negotiations Safety regulations Quality inspections Quality inspections Allocation procedure of aiways (slots) Technological improvements (e.g. for air traffic control and delay management) Introduction of satellite navigation systems | Cost control, cost minimisation Fares Marketing Marketing Investment policy, technical and technological improvements Negotiating power Quality standards, quality control Quality standards, quality control Doorsto-door services Generate value added activities Track & trace service | •Negotiating power •Quantities and shipment size |
| Medium-term objectives | Internalise external costs (congestion, environment, accidents, infrastructure) via congestion charges, fuel taxes, noise charges, Uniform and non-discriminatory allocation, efficient and optimal use of the ainways capacity Facilitate market access Realise a 'European Single Sky' (harmonisation of the rules for airspace usage) Irausparency of fares Coordination in air traffic management Creating a European Aviation Safety Authority (establishment of minimum safety conditions) Harmonisation of regulations and technical standards | Increase market share Gnarantee safety, quality and punctual services Realise added value Increase productivity New market entry | •Fast, punctual (IIT-deliveries), reliable and flexible services •Low price, minimitation of logistics costs •Frequent, regular services |
| Long-term objectives | Maximise social welfare Improve Competition Guarantee safety Minimise envirionmental damage | •Maximise profit | Maximuse utility for households Maximuse profit for companies |
| | Long-term Medium-term objectives Instruments objectives objectives | Long-termMedium-term objectivesInstrumentsInstruments• Maximise social welfare• Internalise external costs (congestion, welfare• Socio-economic negotiations• Regulations and legislation• Maximise social welfare• Internalise external costs (congestion, welfare• Socio-economic negotiations• Regulations and legislation• Impove competition• Impove competition• Consection internations and legislation• Regulations and legislation• Impove competition• Uniform and non-discriminatory allocation efficient and optimaluse of the aiways competition• Colarging principles (pricing and or indicatous)• Regulations and legislation• Impove competition• Uniform and non-discriminatory allocation efficient and optimaluse of the aiways competition• Allocation procedure of aiways (slots)• Proportion of damaged / bot crasp indicatous)• Minimise emviconmental• Fincient and optimaluse of the aiways combined flight for air traffic control and delay aircraft-mile)• Regulations and technical islots)• Minimise enviconmental• Facilitate masket access (slots)• Allocation of satellite navigation systems• Regulations and technical systems• Coordination in air taffic management cestablishment of minimum safety conditions)• Share of delayed flights (%)• Harmonisation of regulations and technical standards• Share of delayed flights (%)• Realistion• Standards• Share of delayed flights (%) | Longeneration Inducements Inducements Inducements -longenerations -Maximus social -Maximus social Inducements Inducements -Maximus social -Maximus social -Maximus social -Maximus social Inducement -Maximus social Inducement -Maximus social Inducement -Maximus social -Maximus |

Tab. 2 (ctd.) - Transport objectives, instruments and indicators per transport mode or transport node

Source: Blauwens G., De Baere P., Van De Voorde E. (2002); Nationale Maatschappij Der Belgische Spoorwegen (2001); Wobbe W. *et al.* (1999); Secretariat Of Unctad (1976); Talley W.K (1994); White P. (1995); Meersman H. *et al.* (2001).

| Passenger transport, public transport: train, metro, tram and bus | Indrators | Regulations and legislation with regard to e.g. schedules, farres, professional competence, safety Share of public transport use Share of public transport use Marlet penetration, accessibility of the network Marlet penetration, accessibility of the network Energy halance (energy use per passenger-hm) Expenditures for information provision Expenditures for information of the network) Valing time (~ penetration of the network) Vehicle time (~ speed, number of stopping places) | Occupancy rate Marleting expenditures Cost structure Cost structure Average return per passenger-løn Average distance travelled per passenger Share of productive passenger-løns (%) Size, average age and condition of public transport vehicles (vehicle comfort) | • Ticket prices • Service offered, frequency of services • Share of on-time arrivals (%) • Customer loyalty |
|---|-------------------------|---|--|---|
| | Instruments | Efficient use of infrastructure Accurate information flow Stipulation of operating conditions Imposing fixed schedules Imposing tarification nules (public services according to published, government approved fares) Imposing the duty to provide transportation services as stated Marketing Socio-economic negotiations Safety negulations Quality inspections | Cost control, cost minimisation Rationalisation of activities Marketing Investment policy, technical & technological improvements Quality standards, quality controls | •Negotiating power |
| | Medium-term objectives | Promote the use of public transport Good inter- and intra-mode connections Transparency of fares Transparent tarification rules Transport network Guarantee the existence of an integrated public transport network Efficient and optimal use of infrastructure Reduce the number and intensity of accidents per passenger-km | Increase market share Guarantee safety and quality Increase occupancy rate during off-peak periods | Punctual, reliable services High accessibility (penetration, density of the network) Comfortable transportation at a bw price Good inter- and intra-mode connections Short traveltime, minimum waiting time |
| | Long-term objectives | Maximise social welfare Ensure regular services Guarantee safety Minimise environmental damage Enforce regional equity of mobility | Maximuse pnofit (private company) Provide the government- imposed transport services at minimum cost (public company) | • Maximise utility |
| | | tusumonog | лэжролд | User |

Tab. 2 (ctd.) - Transport objectives, instruments and indicators per transport mode or transport node

Source: Blauwens G., De Baere P., Van De Voorde E. (2002); Nationale Maatschappij Der Belgische Spoorwegen (2001); Wobbe W. *et al.* (1999); Secretariat Of Unctad (1976); Talley W.K (1994); White P. (1995); Meersman H. *et al.* (2001).

| Transport node: railway station | Indicators | Regulations and legislation with regard to e.g. safety, schedules, fares, pmfessional competence Chargingprinciples (pricing and cost indicators) Proportion of damaged / lost cargo indicators) Expenditures for information provision Expenditures for information provision Subsidisation Allocation procedure of railway infrastructure | Markeing expenditures Pricing structure Capacity utilisation Cost structure Cost structure Average return per handled ton per goods category Return on investment, internal rate of return Goods storage capacity, (un)load capacity | Services offered, present facilities Customer satisfaction Prices Average parcel size |
|---------------------------------|------------------------|---|---|---|
| | Instruments | Quality inspections Marketing Socio-economic negotiations Infrastructure policy Accurate information flows Quality standards | Cost control, cost minimisation Rationalisation of activities Marketing Investment policy, technical & technological improvements Quality standards, quality controls | Negotiating power Quantities and shipment size |
| | Medium term objectives | Uniform and non-discriminatory allocation, efficient and optimal use of infrastructure (slots) Establishing a multi-functional rail platform Good hinterland connections, intermodal connectivity Concentrate passenger facilities Internalising external costs (congestion, environment, infrastructure) | Increase market share Guarantee safety, quality and punctual services Realise added value | Wide range of services and facilities (comfort) Good inter- and intra-mode connections Low price, minimisation of logistics costs Fast, reliable and flexible services |
| | Long tem objectives | Maximuse social welfare Offer railway services Offer railway enviconnental damage Provide efficient transhipment activities | Maximuse profit (private company) Provide the government- imposed services at minimum cost (public company) | Maximise utility for households Maximise profit for companies |
| | | รนระแบเอกอฏ | лэтролд | 198N |

Tab. 2 (ctd.) - Transport objectives, instruments and indicators per transport mode or transport node

Source: Blauwens G., De Baere P., Van De Voorde E. (2002); Nationale Maatschappij Der Belgische Spoorwegen (2001); Wobbe W. *et al.* (1999); Secretariat Of Unctad (1976); Talley W.K (1994); White P. (1995); Meersman H. *et al.* (2001).

| Transport node: sea port | Indicators | Regulations and legislation Charging principles (pricing and cost indicators) Proportion of damaged / lost cargo Energy halance Infrastructure policy Capacity utilisation Trequency' of dredging activities New investments in port infrastructure Berth occupancy rates | Average tumage per ship call Productivity of (un)loading operations, labour productivity(e.g. containers handled per crane, units per man-shift, tuns per ship-hour in port, tomage handled per metre quay) Time factor: waiting time, service time, turnround time | Prices Average parcel size Customer loyalty, customer satisfaction Share of services delivered on-time (%) |
|--------------------------|-------------------------|---|---|---|
| | Instruments | Quality inspections Marketing Socio-economic negotiations Socio-economic negotiations Accurate information flows Quality standards Quality standards Accurate informations Land & corression policy Infrastructure policy Princing Princing Princing Nautical access, land access | Cost control, cost minimisation Investment policy, technical & technological improvements Quality standards, quality controls Economies of scale Value added activities (stuffing & stripping, storage, inspections,) | • Negotiating power • Quantities and shipment size |
| | Medium teun objectives | Promote the use of seatransport, promote familiarity with the post abroad familiarity with the post abroad Internalise external costs (congestion, environment, infrastructure) Uniform and non-discriminatory allocation, efflicient and optimal use of post infrastructure of Transparency of fares Transparency of fares Improve maritime access (deepening, deedging), navigability and post infrastructure (berths, locks, docks,) Provide good and flexible hinterland connectivity Provide a wide range of services (pilotage, towing service) Guarantee optimal land use | Increase market share Guarantee safety and quality Generate added value Increase productivity | •Good inter- and intra-mode connections •Low price, minimisation of begistics costs •Fast, reliable and flexible services |
| | Long term objectives | Maximise social welfare Improve competition Offer post facilities Guarantee safety Minimise Guarantee estety Minimise Provide efficient transhipment | Maximise profit (private compary) Maximise throughput (public compary) | Maximise profit for companies Maximise utility for households |
| 1.2 | | WRUUIAAOG | 19302013 | 1950 |

Tab. 2 (ctd.) - Transport objectives, instruments and indicators per transport mode or transport node

Source: Blauwens G., De Baere P., Van De Voorde E. (2002); Nationale Maatschappij Der Belgische Spoorwegen (2001); Wobbe W. et al. (1999); Secretariat Of Unctad (1976); Talley W.K (1994); White P. (1995); Meersman H. et al. (2001).

| Transport node: airport | Indicators | Regulations and legislation with regard to noise, safety Pricing (e.g. component for external costs in landing rights) Energy halance Energy halance Infrastructure policy (apacity utilisation (apacity utilisation) Number of inhabitants exposed to noise pollution Nonse levels in the vicinity of the airport of area in use for airport infrastructure | Productivity of (un) loading operations, of transhipment activities Capacity utilisation Capacity utilisation Pricing structure Cost structure Cost structure Return on investments, internal rate of return Handling, storage and transhipment eapabilities Present connections to other transport modes (intermodality) | Services offered, present facilities Average parrel size Customer loyalty, customer satisfaction Prices |
|-------------------------|-------------------------|---|--|---|
| | Instruments | Socio-economir negotiations Quality inspections Safety regulations Safety regulations Land use policy Untiming of noise contours Moise regulations, glegislation (limit ations, prohibition of night flights, expropriations, isolation measures) | Cost control, cost minimisation Fares Investment policy, technical and technological improvements Negotiating power Quality standards Generate value added activities | •Negotiating power •Quantities and shipment size |
| | Medium term objectives | Internalise external costs (congestion, environment, infrastructure) Uniform and non-discriminatory allocation, efficient and optimal use of infrastructure (slots) Provide good and flexible hinterland connections, guarantee easy and fast transhipment to all transport modes Concentrate passenger facilities Transparency of fares Transparency of fares Guarantee the quality of living of the arrout surroundings Outarantee the economic exploit ation of the airport Optimal land use planning of the arrout zone | • Increase market share • Guarantee safety and quality • Realise added value | Low price, minimisation of logistics costs Reliable, flexable and fast operations and services Good inter- and intra-mode connections |
| | Long term objectives | Maximuse social welfare Improve Competition Guarantee safety Minimise Minimise Minimise Minimise Provide efficient transhipment activities | • Maximise profit | Maximise utility for households Maximise profit for companies |
| | | thoundary | renthrug | ×0.11 |

Tab. 2 (ctd.) - Transport objectives, instruments and indicators per transport mode or transport node

Source: Blauwens G., De Baere P., Van De Voorde E. (2002); Nationale Maatschappij Der Belgische Spoorwegen (2001); Wobbe W. *et al.* (1999); Secretariat Of Unctad (1976); Talley W.K (1994); White P. (1995); Meersman H. *et al.* (2001).

3. Links between transport objectives, instruments and indicators

In order to clarify the links between the different objectives, instruments and indicators listed in Tab. 2, a closer examination of a particular case is used as an example, showing the position of the government with regard to rail freight transport. This is summarised in Fig. 3.

As a first long term objective, the national or supra-national government, wants to improve competition in the rail freight sector. In order to reach this objective a number of intermediate targets are set. They are all related to the establishment and realisation of the conditions for free competition. This requires first of all the separation between rail infrastructure management and the operation of transport services to improve, amongst others the transparency of the market. A uniform and non-discriminatory slot allocation is not only needed to regulate the market entry but also to realise a more efficient and optimal use of infrastructure. On an international level, there should be harmonisation of competitive terms such as social conditions, taxation schemes, legal environment, technical requirements, etc.

The major instruments for the government to realise the aforementioned objectives vary from full privatisation as in the UK, to full government ownership of infrastructure. The accessibility of the infrastructure is mainly organised by licensing procedures and slot pricing mechanisms.

Indicators for measuring the degree of realisation of this objective are numerous and mostly complementary. First of all there is the adaptation of the legal framework. This can vary from general recommendations by supranational institutions to very specific laws at a regional level and focussing on specific competition issues. A typical example is the EC Rail Infrastructure Package with directives 91/440 and 2001/12 to introduce a degree of liberalization, more competitiveness, directives 95/18 and 2001/13 on licensing of railway undertakings, and directives 95/19 and 2001/14 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification. The liberalization and improved competition should result in more efficient railway operations which, in the long run, should result in lower costs and prices of rail freight services. Finally one could construct indicators for measuring the degree of accessibility of the railway network for different rail freight companies.

In order to realise the second long term objective of reducing the negative external effects of transport as a whole two intermediate targets are set. The first is the full internalisation of the external costs linked to congestion, environment, accidents and infrastructure in order to stimulate the fair competition between all freight transport modes. In addition, an active promotion and facilitation of rail transport should stimulate the shift from road to rail.

The internalisation of the external costs goes not without controversy. Theoretical the idea of fair and efficient pricing is rather simple, but once put into practice a large number of questions arise. The most important one concerns the implementation of the specific taxation scheme to enforce this internalisation. Furthermore there is opposition from the road haulage sector against this principle. Even with severe theoretical and practical underpinnings, the introduction of internalisation of external costs will require a considerable amount of negotiations of the government with the parties concerned. The success of the internalisation can be measured by the supporting legislative environment and by more efficient and fairer prices.

The facilitation of rail freight transport is stimulated mainly by improving the interoperability. For example, in Europe electrification systems differ, as do track gauges, signalling systems, drivers' working conditions, etc. Interoperability should lead to a better technical performance and higher efficiency which might result in lower costs and prices for rail freight transport.

Finally, the third long term objective is to guarantee safety by reducing the number and intensity of accidents per freight train km. By increasing the frequency, quality and effectiveness of inspection and control, damage and accidents can be minimised.



Fig. 3 - Social optimum and external costs

Source: Own composition.

4. Conclusions

Understanding the relation between freight transport and economic activity requires a thorough knowledge of the objectives which drive the government and the users and producers of transport. For the realisation of these objectives a set of intermediate targets and instruments is needed. The complexity arises from the large number of actors involved and the characteristics of the various modes and types of transport. This paper gives not only an overview of the objectives, intermediate targets and instruments, but also a number of indicators which can be used to measure or evaluate the degree of success of the instruments in realising the objectives.

For making the framework offered in this paper operational, a detailed analysis per mode and node for each of the actors is needed, as well as quantifications of the indicators. This will result in an instrument suitable for benchmarking and evaluation of transport policies.

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