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Financing Infrastructure Investment and Socio-Economie Development

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**FINANCING INFRASTRUCTURE INVESTMENT
AND SOCIO-ECONOMIC DEVELOPMENT**

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ABSTRACT

There is over the last few years a **clear** trend in Europe to privatise traditional governmental tasks, **also** because of new EU legislation. **Many** of these tasks have traditionally been **carried out** by the government itself, largely because of the 'natural monopoly' argument. Examples of current and future privatisation **policies** are the telecommunication and energy sector. For transport **infrastructure** (in this paper limited to roads and railways) **however**, the picture is less unambiguous, as in the past decade the governments have even tended to increase their influence, e.g., by formally taking over the **financing** of infrastructure.

In this paper it is analyzed in **how** far the traditional arguments for government intervention are still valid. First, the **strategic importance** of transport infrastructure is investigated by analyzing the resulting **economic** impacts at several spatial levels. Next, we investigate **how** this **affects** the **financing** and operation of transport **infrastructure** as a traditional government task, by applying **inter alia** the so-called Pentagon model and by employing the **well-known Coase-theorem**. In this context, the traditional arguments for government intervention and possibilities for private operation and **financing** of transport **infrastructure** are reviewed. It is concluded that the traditional arguments for government **intervention** have become less valid and that privatising transport **infrastructure** may improve the **competitive** position of countries or regions.

1 INTRODUCTION

The influence of public policy on **the** society and the regional and national **economy** has drastically increased since 1945. As a **result** government **expenditures** have significantly **risen** (absolutely and relatively), while **also much** more regulatory measures have been **introduced**. **Social** security systems were, for example, largely expanded, while the government assumed **inter alia responsibility** for the **financing** and operation of transport **infrastructure** (Nijkamp and Rienstra, 1993).

In **the** 1980s **however**, the societal and institutional environment in which **economic** agents were used to act **changed** dramatically (**Fokkema** and Nijkamp, 1994). This **holds** for the public as **well** as the private sector: the devolution movement has induced **an** increased competition between **companies** and countries. As a **result**, a rising need for restructuring and renewal has **come** to the fore, and hence the Schumpeterian paradigm of '**creative** destruction' has gained popularity. Even large **companies** like IBM and Philips appear to face problems **when** lags in renewal **cause** structural inefficiencies. The same **may** hold for countries: the **economic** development of most Western-European countries for example lags behind that of the US and the Pacific, which **may** be due to a more regulatory and **conservative** institutional environment in Europe.

The response of successful **companies** to this challenge has been diverse:

an increasing emphasis on **scaling** up by fusions and take-overs (e.g., in the **financial** sector);

an aggressive market penetration (e.g., **consumer electronics**);

'back to **basics**' strategies with repulsion of other activities (e.g., **car** industry, micro-electronics);

emphasis on quality and flexibility (**just in time principles**, temporary **contracts** for employees);

developing national and international **strategic** alliances, in order to secure the **competitive** position (**car** industry, chemical sector).

These trends are not only found in the private, but **also** in the public sector. As a **result much** more cooperation between countries seems to occur (EU, NAFTA, ASEAN), several activities are repulsed (transport, telecommunication), while unnecessary regulations are abolished (labour market, **capital** market). It **may** be **clear** that a good management in the public as **well** as the private sector **may** be of increasing **importance** for the **economic** development and welfare of countries, regions and their **citizens**.

Also in the transport sector - which is traditionally **very much** a regulated sector - **many changes** occur nowadays. Traditionally, natural public monopolies were thought to be **the** best market organisation. Nowadays, it is widely **acknowledged** that incentives should be **introduced** to make this sector more **efficient** (see **also** Button and Pitfield, 1991).

In the 1980s the investments in infrastructure in **many** EU **countries** decreased largely, because of public budget problems and **an** increasing attention for environmental impacts of transport (Bruinsma, 1994). The past few years the attention for transport infrastructure has again increased, which **may** be a **result** of the increasing congestion, while the attention for Trans-European Networks has emerged because of the integration of the European Market (Nijkamp et al., 1994).

As a **result** it **may** be interesting to **analyze** in **how** far the above **discussed** developments **may** influence **the** management of transport infrastructure and whether it is possible to increase the influence of private parties in this sector. We **will** restrict ourselves to road and rail infrastructure, although the arguments **may also** hold for other kinds of infrastructure (harbour, airports, **telecommunication** etc.).

The paper is built up as follows. First, in **Section 2** the **strategic importance** is **discussed** by assessing the **economic** impacts of transport infrastructure and **identifying** trends in the use of governmental policy **instruments**. In **Section 3** the traditional arguments for government influence are **discussed**. Next, **Section 4** **focuses** on problems related to private **financing** and operation of infrastructure by analyzing transport infrastructure from the viewpoint of a '**normal**' **economic** good. In **Section 5** we investigate **how** private infrastructure provision **may** in **practice** be analyzed. Finally, some **conclusions** are drawn in **Section 6**.

2 THE STRATEGIC IMPORTANCE OF TRANSPORT INFRASTRUCTURE

2.1 Introduction

There is **an** increasing attention for transport infrastructure as a vehicle for stimulating **economic** growth and improving the competitiveness of countries or regions. It is questionable whether **such** presuppositions are valid, **however**, as there **may** be contrasting developments. For example, interregional trade theory claims that the construction of infrastructure has a **clear** positive impact at several spatial **scale** levels (Bruinsma, 1994). Several **costs** for **economic firms** are reduced, because travel **times** are lower and become more reliable (which

makes e.g. just-in-time delivery possible). Therefore, production **factors may** be used more efficiently, which improves the competitiveness of companies. In this way the construction of infrastructure **may** have a positive impact on a national or **regional economy**. On the other hand, it is **well** possible that **the** improved accessibility **will** increase the competition from other regions or **countries**, which **may** then **hamper** the expected **economic** growth.

The **final result** is unclear and therefore empirical research should offer more insight into **such** impacts. To **analyze** this question, we **will first** present a concise overview of some case studies on the national, regional and urban level.

2.2 Empirical research

At the national level several studies have been **carried out** on the impacts of public investments in general and of those in transport infrastructure in **particular** (see e.g., Aschauer, 1993; **Bruinsma** and Rietveld, 1993; **Seitz**, 1993). It appears that investments in several kinds of infrastructure - especially roads - **contribute** largely to **economic** growth. This occurs by **means** of increasing sales of private companies; the impact on employment **may** be smaller **however**, since the productivity of labour **also** increases.

An important question in this respect is whether these impacts are **temporary** or permanent. In **the first place**, construction of infrastructure only stimulates **economic** growth because of the multiplier **effects** of the construction activities themselves. **When** the project is **finished**, the impacts are **fading** away. Secondly, better infrastructure and accessibility improve productivity, which **will** stimulate **economic** growth. As observed by **Bruinsma (1994)**, some studies make **such** a distinction between these impacts, but others don't.

Transport infrastructure **may** not only be important for **national**, but **also** for regional **economic** development. In empirical research positive **economic** impacts are **often** found, especially on employment, the level of investments and regional **economic** growth (see for **an** overview **Bruinsma** and Rietveld, 1993). Other studies **however**, do not find significant impacts (see **e.g., Rienstra** et al., 1994).

An important analytical distinction to be made is between generative and distributive impacts. In the **first** case there is clearly additional **economic** growth resulting from the construction of infrastructure, in the **second** case there is only a shift of **economic** activities, while at a macro-level there is no impact at **all**. It appears **often** to be difficult to disentangle these impacts, because **all may** occur at the same **time**.

2.3 The increasing importance of infrastructure

It **may** be clear that - especially at the national level - generative impacts occur, which **emphasize** the **importance** of transport infrastructure of a high quality. This **importance** is reinforced by some general trends at the European and global level.

First, because of the integration of e.g. the European **markets** and the liberalisation of global capital **markets**, the attention for the competitive position of distinct countries has increased. At the same **time** the possibilities for **governments** to influence **this** position have decreased, since the traditional policy **instruments** - adaptations of the exchange **rate**, monetary and budgetary **policies** - cannot be used because of the EMU-conditions and the liberalisation of capital **markets**. Therefore, the construction of infrastructure (not only transport, but **also** e.g. telecommunication) is one of the few policy fields **left** in order to influence the competitive position of a country. As a **result**, **many countries compete** with another to a larger extent, by improving the business climate via tax cuts, subsidies and offering (semi-)public facilities.

Second, there appears to be **an** increasing competition of 'low wage **countries**'. Next to the competition of Pacific **countries**, the competition of **Eastern-European** and **North-African countries** has dramatically increased. Therefore, labour intensive production **may** be repulsed to these **countries**. The only way for high wage Western-European countries to curb this trend is to offer **products** and services with a high quality and productivity. This increases the need for R & D and a high education level, but **also** for high quality infrastructure.

As a **result** there is not only **an** increasing emphasis on the **quantity** of **infrastructure**, but **also** its quality. Examples are the 'digital highway', the introduction of mobile telephone networks, the construction of a HST network etc.

2.4 Success factors influencing infrastructure

The quality of infrastructure **may** be analyzed by using the so-called Pentagon model, which **contains** the five critical **success factors** which **contribute** to the efficiency of **an infrastructure** network (see **also** Nijkamp et al., 1994).

The hardware aims at the physical features of the infrastructure (terminals, roads, railways, harbours). Software **focuses** on the **control** of it, for example by introducing telematics systems to **provide** information to users. There is a danger that most attention will be paid to the hardware and software, while other **strategic factors may** be largely forgotten. The model emphasizes **however**, that also a variety of other **factors** are of major **importance** for imposing the **economic structure**, welfare and well-being of **countries** and people.

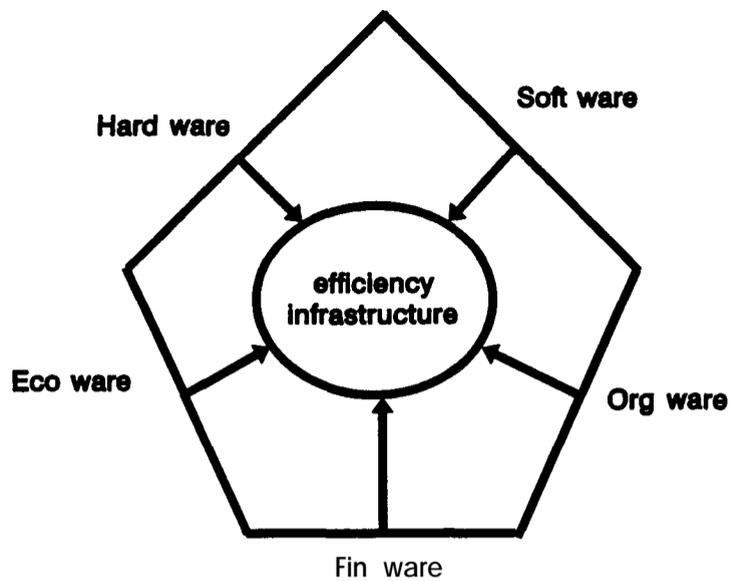


Figure 1 The Pentagon model

As a **result also** the orgware - the organisation and management - is of major **importance** for the efficiency of a country or region. **However**, the construction and use of infrastructure **causes many** - especially negative - externalities, like noise, stench and visual annoyance or local and global air pollution. The **govern-**ment and society have to make a trade-off **therefore**, in which these negative **externalities** are weighed against the positive **economic** impacts (ecoware). It **may be clear however**, that a private delivery of physical transport infrastructure **may cause** more problems than that of e.g. telecommunication.

Finally, the way new infrastructure is **financed** (fmware) is **also** an important **success** factor, which **may** be done entirely public, entirely private or by both sectors (joint venture). In the next sections we **will** analyze some **strategic** policy **factors** which **influence** the orgware and fmware of transport infrastructure, especially **when** new infrastructure **projects** are **introduced**. We **will pay particu-**lar attention to possibilities for improving the overall efficiency by increasing private sector involvement in the organisation and **financing** of **the infrastructure**.

3 GOVERNMENT INTERVENTION

3.1 Introduction

It is clear that there is - and should be - a large **difference** in the **financial and** socio-economic targets and **democratic** responsibilities of **the** private and public sector. As a **result** there are several reasons for the government to intervene in the **economy** and to assume responsibility for the provision of several goods. It **may** be clear that pure **collective** goods (like defence) are normally **an exclusive** governmental responsibility. **When** the use of a good is competitive **however** (as is the case with **infrastructure**), this good **may** in **principle** be provided by the private sector as well.

The question in **how** far goods should be provided by the private sector **may** be analyzed by using the transaction costs approach. Transaction costs include those of e.g. negotiating, **making contracts, control** and requiring information. Within the **Coase-theorem** of a world without transaction costs there is no efficiency **difference** between provision by **either** the public or the private sector, because negotiations continue until there is a Pareto-optimal allocation of goods (**Coase, 1988**).

In reality **however**, there are of course **many** kinds of transaction costs. A good should now be provided by that sector, which **can** offer it against **the** lowest transaction costs. For **normal** goods, provision by **the** private sector will be optimal. For some goods **however**, this **may** not be the case, which **may justify** public intervention. In this respect it should be acknowledged, that **also intervention causes** costs - leading to so-called government failures -, which should be weight against the resulting **benefits**.

In order to analyze **how** far government intervention is desired (in order to correct a biased market allocation), we **will first** present a concise overview of arguments to intervene, while next the concept of government **failures will** be elaborated.

3.2 Validity of traditional intervention arguments

There are several standard reasons for governments to intervene in the market. In light of the above mentioned trends in society, it is questionable **however**, whether these arguments are **still valid** (**Fokkema and Nijkamp, 1994; Nijkamp and Rienstra, 1995**).

First, there is **the** 'infant industry' and 'infant region' argument. Here it is argued that in **an** initial stage of industrial or regional development the **economic** basis of a sector or region is too weak to be competitive and to

survive, and therefore **economic** actors should be protected temporarily. In **practice however**, it appears that these measures are **very** hard to abolish, while these **may** lead to inefficiency and a Pareto-suboptimal allocation. Therefore, there is nowadays more a trend to establish **an attractive general** business climate, while - at least in Europe - protection **also** is decreased by European legislation. Another argument is that in recent decades the accessibility of peripheral regions has increased substantially by constructing new infrastructure (Rienstra et al., 1994), which reduces the validity of the **infant** region argument.

Second, market failures **may** occur because a market system does not always **result** in a Pareto-optimal allocation. The aim of government intervention is then to remedy this sub-optimal allocation and in this way to move towards the theoretically optimal situation of perfect competition. There are several **causes of such** market failures.

imperfect competition; infrastructure is **an** example of this situation, because it is in most cases not **efficient** to **operate** two links on the same corridor. **Also** the special network character of **infrastructure causes** imperfect competition: one given link **may contribute** to the profitability of other links, and therefore **an** unprofitable link **may** be profitable **when** the impact on the total network is taken into account. **Often however**, there is competition with other modes (while for highways **also** a high quality underlying road network is available), which reduces the **importance** of this argument.

imperfect information; this **seems** (besides telematics systems) to be of lesser **importance** in the case of **infrastructure**.

absence of markets: governments intervene in transport to **eliminate** negative externalities or to **generate** positive externalities as **discussed** above. In environmental and transport policy **however**, there is a trend to **cope** with negative externalities in a more market based way, e.g., by increasing fuel **costs** and introducing tolls or road-pricing systems. **Such** measures might **also** be **carried out** by private instead of public **companies however**, since there is in **principle** a direct user charge for the operator of the infrastructure.

Finally, there is the **ethics** and justice argument; **an** obvious example is the provision of non-profitable public transport, because the government wants to **provide** a minimum mobility level for everyone at reasonable fares. In this respect, there is again a **clear** trend towards a market based provision, by using franchising **contracts** in order to link **social policies** to efficiency **incentives** (see **Section 5.2**).

It **may** be concluded that the necessity for governments to intervene has been reduced. As mentioned above, there is at the same **time** a growing **aware-**ness of government failures, which **will** be reviewed next.

3.3 Government failures

When the government intervenes in the market, the market mechanism **will** (partly) be replaced by a budget mechanism, which has its own **rules**. These **may** lead to a suboptimal (i.e., too high) **level** of intervention, because of two important reasons (Frey, 1983):

- civil servants have their own goals and utility **functions**;
- **decision-making** is influenced by lobby and pressure groups.

These two arguments **will** now briefly be **discussed**. Civil servants **may** have a utility function, which differs from the societal one; this **may** lead to a **subopti-**mal allocation of funds. An example is the budget maximisation theory, which takes for granted that the utility function of civil servants **correlates** positively with the public budget he has at his disposal. Since the civil servant has a monopoly position in the provision of information to the parliament, he **will** supply information with the intention that the intervention level is **higher** than in the societal optimal situation. See for a graphical presentation Figure 2, in which a simple situation is presented with **linear** curves and without **fixed costs**. In this figure the level of intervention corresponds with the budget of the civil servant.

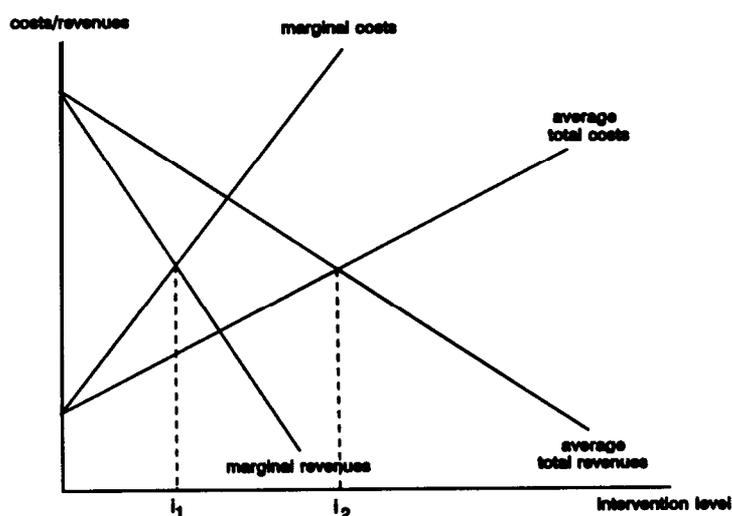


Figure 2 The intervention level under a budget maximising civil servant

When the parliament would have full information, it would choose the intervention level at which the marginal costs would equal the marginal revenues, which corresponds with **an** intervention level of i_1 , which is optimal. A civil servant **however, may provide** only information about the total costs, and as a **result** the parliament **may decide** to intervene at (somewhat **left** of) the point **where** the **average** total costs equal the **average** total revenues, which **corresponds with** intervention level i_2 . This is optimal for the civil servant since it maximises his budget, but it is suboptimal from a societal point of view.

Also pressure groups **may** increase **the** level of intervention. Groups in society differ in power and strength: labour **unions** and employer organisations for example are **well** organized, while consumers and tax payers do not have **powerful** pressure groups. By negotiating, the most powerful groups **may** gain advantages at the expense of the less powerful **ones**. For **each** intervention measure the costs per individual (consumer, tax payer) **may** be so low and unclear, that it is not rational to **resist** the measure (**like** minimum prices, protection measures etc.).

Disadvantages of intervention in general are that **the** market allocation is disturbed, while a non-transparent and complicated legislation **may** be **introduced**, which **may** affect the possible allocation gains of public intervention. As a **result** the management of **infrastructure** by **the** public sector leads by **definition** to efficiency losses. For transport **infrastructure** this **may** have three major impacts:

- the **price** asked for using the **infrastructure** **may** be too low, e.g., to satisfy **car** users (which is a powerful pressure group) and to **maximise** subsidies (**budgets**);
inefficiencies in construction and maintenance of **the infrastructure** **may** emerge, because of **lack** of market incentives;
- construction of (unprofitable) **infrastructure** **may** take **place**, in order to satisfy pressure groups and to **maximise** budgets.

It is **clear** that a trade-off has to be made between the costs of government intervention and the benefits because of the improved allocation, or • in Coasean terms • between the transaction costs of market and public **allocative** regimes.

When the government **decides** to intervene, this should be done in the most **efficient** way. It **may** be **clear** that in **many** cases market-based intervention • in which the private sector takes **care** of the provision • **may** lead to lower **transaction** costs than in case of public provision; in **this** context, it should be **acknowledged** that **also** equity considerations are important, **however**.

In order to **analyze** the extent to which private provision of infrastructure is possible, we **will** in **the** next section **discuss infrastructure** from a viewpoint of a private investor .

4 INFRASTRUCTURE AS A PRIVATEGOOD

4.1 Introduction

In the development and construction of infrastructure four stages **may** be distinguished, which are important for investors. The **first** is the R & D-stage, in which the idea and the technical features of a project are developed. This stage is followed by the **financing** stage in which **financiers** become interested, while **also** the profitability of the project should be analyzed. The next stages are the construction and exploitation stage.

The R & D-stage is mainly a technical one, in which the infrastructure is developed, investigated and tested. It is important **however**, that **also economic factors** like the market potential **will** be considered. A **political** decision has to be made about the introduction as well. The outcome of **this** stage is supposed to be a given **fact** in the remaining part of this section. Most attention **will be** paid to the **financing** stage, because this is the stage in which **economic possibilities** have to be analyzed.

4.2 The financing stage

Four important issues **may** be important in the **financing** stage, which **may** to a large extent influence the possibilities of a market provision; in **principle** these **may** hold for **all** investments. These are the characteristics of investments in infrastructure, the risks involved, the expected **costs** and the expected **revenues** of the project.

Characteristics of investments in infrastructure

Most investment **costs** of a project are **normally** made **when** the **infrastructure** is constructed; the other **costs** (e.g., rolling stock) form a smaller part of the total **costs**. According to Emanuel (1991) **the costs** of a newly realised project consist for about 80% of construction **costs**. For society, the infrastructure **costs** are even more important, because the external **costs** of the construction and the operation are mainly **discussed** during the decision procedures about the construction and **site** of **the** infrastructure.

Investments in infrastructure **may** differ from competing investments **such** as immovables and **capital** goods in several ways (Nijkamp and Rienstra, 1995). Especially the high investment costs and the long construction and planning periods **may** make **an** investment **very** unattractive for a private investor, because in the beginning of a project a lot of capital is needed while the **pay-back** period is **very** long. As a **result** the interest costs are **very** high at the beginning of a project, while **the** cash-flow and the return on investments are low. In most cases there are no **revenues** at **all** before the operation starts. **When** it starts, the profits tend to increase over **time**, because more repayments are made, which **reduce** the interest costs. The problem is that these high profits and **revenues** **often** start decades **after** the initial investment, which make the uncertainty and the risks of infrastructure **projects very** high.

In practice **however**, it is **very well** possible that there is no **profit** at **all** (Nijkamp and Rienstra, 1995). The construction costs of infrastructure are (up to a certain **level** of **demand/transport**) **fixed** costs; the **other** costs are partly **fixed** and partly variable. From this it **follows** that compared to competing investments **fixed** costs in infrastructure are **very** high for **an** investor, while variable and marginal **costs** are relatively low. **When** the **price** in this case is set according to the marginal costs, it is **often** not possible to make a satisfactory return on investments.

An important factor is **also** the planning procedure. **Often first** a political decision is taken in which private **financing** is **already** assumed, and next a private investor has to be found. This gives private investors a **competitive** advantage in negotiations with public agencies.

Risks of investments in infrastructure

Risks are **included** in **all** kinds of investments, but for investments in infrastructure these are particularly high. This is the **result** of the long **pay-back** period, which **makes** it **difficult** to make good estimations.

The **political** risks are the most important **difference** compared to alternative investments, **however** (see **also Section 4.4**). In practice, governments always wish to influence the planning of **infrastructure**, because of the important positive and negative external **effects** and the national **importance** of high quality **infrastructure** (see **Section 2**). There is always also a danger of **changes** in laws or new regulations or even nationalisation, since a change in transport policy **may** influence the charges which **can** be asked as **well** as the competition by other modes.

In conclusion, the **risks** of infrastructure investments are **very** high compared to alternative investment opportunities; this in turn **makes** these investments **unattractive** for private investors, therefore a high risk compensation is needed. In theory, this compensation should be given on the basis of high **profit expectations**, as **can also** be shown from recent tunnel projects in the Netherlands. Another possibility **however**, is that the government guarantees (part of) the **revenues** in one way or another, or **makes** the investment **attractive** in a different way (e . g . , tax exemption).

The expected investment costs

The expected costs and **revenues** are of course important for the calculation of the return on investments. It appears to be **very difficult** to estimate the costs of construction of major infrastructure projects, **however**. These projects are **often much** more expensive than estimated beforehand; well-known examples are the Channel tunnel, High Speed Train-sections and the Betuwe freight railway line in the Netherlands. This problem arises especially **when** the project is a completely new transport mode or **when** new **technologies** are used. Then **many** costs are not **known** at the outset of the project and the estimates appear to be too low in **almost all** cases (Rienstra et al., 1995).

Another important **cause** of rising costs are relatively expensive solutions, **chosen** to **cope** with resistance in society, e.g., to avoid external **effects** (this **may** lead e.g., to (half-)subterranean infrastructure and noise-shields). It is **however** **very** important that the **cost** estimates are made on a reliable basis; otherwise it **will** be impossible to **assess** the **economic** viability of the project. And if no return on investment **can** be calculated, private investors might withdraw.

The expected revenues

To **calculate** the possible **revenues** of a project several issues are noteworthy, which are mainly important for **the** transport mode(s) which **use(s)** the **infrastructure** at hand. First, **an** assessment of the market in which the mode **will operate** is important. Therefore, the (sub-)market(s) one is **aiming** at should be analyzed. These sub-markets **can** be distinguished according to **the** residential zones of clients, their destinations, the **reasons** for travelling etc. **When**, for instance, a project serves a **mass** transport mode, the **price** must be low, while the comfort, speed and service **may** be of lesser **importance**. **When the** project is **aiming** at the **higher** level business-market, the speed, reliability, service and comfort are **very** important, while the **price may** be set somewhat **higher**. The **latter** is of course **also** dependent on the **prices** of competing modes.

Next, it is important to **quantify** the sub-markets the mode is **aiming** at. The alternatives for the traveller must be analyzed in light of **the** criteria which determine the choice. **When** this is known the mode **may** be constructed and exploited in the most **competitive** way. It is **also** important to consider the changes that are expected in the sub-market(s) in the future. Several issues regarding future transportation use **may** be distinguished (Nijkamp et al., 1994):

- demographic factors; for example declining population density in urban **areas**, the age **structure**, migration, labour participation, decline in working hours etc. ;
- political factors; for example, the European integration, the opening up of new **markets** in Eastern-Europe, the transport aim and environmental policy of the government **and/or** municipalities etc. ;
- socio-economic factors; for example, **economic** growth, growth of and changes in trade flows, spread of production, the development of trade blocks etc.;
- technical factors; for example, the emergence of new competing transport modes, **improvements** of existing modes and telecommunication etc.

When this is analyzed, the number of travellers **can** be estimated. In this case it is important to **investigate** the uncertainty about these estimates, **especially** because these have to be made for **the** long term. It is especially **crucial** to analyze in **how** far the **demand** depends on characteristics of the **infrastructure** (which **may** be **influenced**) and on external factors (which cannot be influenced). Next, the optimal **price can** be set, eventually there **may** be **price** differentiation in one way or another, to **reach** different submarkets.

For total **revenues** it **may also** be important to **generate** other **revenues** than those which are directly related to transportation. Catering on **long-distance** travelling and tax-free **shopping** at airports are **well-known** examples of indirect revenues. But there **may also** be other possibilities. For example, railway stations are popular sites for several **companies** like bookshops, snackbars, flower shops, travel agencies etc. **Another** possibility for generating **revenues** is a development based on **the** value of the locations around transport terminals, which **may** arise **after** the construction of e.g. a new railway station. The question here is of course whether it is possible for the investor to **receive** (part of) these revenues.

When all revenues are known, **the** expected **revenues** for the investor **may** be calculated for the long run.

4.3 The construction and exploitation stage

When the financiers of a project (private and/or public) are identified and the procedures are completed, the construction of the project can start. It is in this stage very important that the costs are kept under control, because this causes often a lot of problems (e.g., the Channel tunnel). It appears that often the costs of construction are higher than expected, or certain financial items have been neglected. It is also important that the construction contracts are clear about who pays for excess costs; this often leads to conflicts, which can also have economic implications (e.g., delays, higher costs).

Reducing annoyance to local people during the construction is essential, especially when the construction takes place in densely populated areas. When the annoyance is high, the resistance in society against the construction will be high, which may cause delays.

When the transport mode is relatively new, it will have to work hard to get its share of the transport market. In most cases new modes will have to find a new niche in the market first, while later they may also start to compete with existing transport modes. A good marketing strategy is very important to get a profitable market share. It is common practice that ticket prices have to be relatively low at the beginning, in order to attract new travellers and to give users of alternative modes an incentive to shift. Later on the charge may be raised towards the economic (or social) optimal level.

4.4 Current trends and lessons from existing projects

Since 1945 almost all infrastructure has been financed and operated by governments or by public organisations tied to the government. Especially in the case of railways, there is at present a trend to separate the financing and operation of infrastructure, as is the case in Sweden, Switzerland and the United Kingdom (Hansson and Nilsson, 1991; Nash, 1993). In this model, the management and financing of infrastructure is the responsibility of the government, while the operation takes place on a private basis, where the operator imposes user charges. In this situation there may be several suppliers of transport services, which allows competition. This model corresponds to recent EU-regulations and is proposed or under discussion in several countries (Germany, Italy, Netherlands).

Road (and waterway) infrastructure is mostly the responsibility of the public sector however, although there are in several countries discussions about introducing toll or road-pricing systems.

It is **noteworthy that** in recent years several projects have been **financed** and exploited (**partly**) privately (Nijkamp and Rienstra, 1993). This concerns **car** traffic projects, like **toll roads (France, Italy) and** several tunnels and bridges (e.g., **the** Mont Blanc tunnel, Dutch tunnels, the **Dartford** bridge), but **also** rail projects like the TGV-Sud-Est and the Channel tunnel. **Public** intervention in these projects is **still** relatively high, **however**. Even the Channel tunnel, which is said to be a private sector initiative, would not have been constructed without a significant indirect support of the governments concerned (**Marcou**, 1993). Intercity rail traffic is in some countries profitable, and is therefore not subsidised by the government (UK, Sweden, Switzerland). Local and regional **traffic** are almost everywhere exploited at big losses. Regional rail traffic and public road transport are subsidized in most European countries, as is the case with local transport modes.

As **discussed** above, it is **very** important that traffic flows have a critical mass, and hence projects which **reduce** the **importance** of barriers (borders and natural barriers) are relatively **often** privately **financed**.

It should be added that in several cases the government appeared not always to be a reliable partner. This **may** be **an** important **failure** factor for future projects, since this increases perceived political risks. Examples are interventions of the government **after** the **success** of the Mont-Blanc-tunnel and the Cofiroute. The government obliged here **the** investors to **finance** new **infrastructure** with the profits they had made **out** of these projects.

It **may** be concluded that there is a **clear** trend towards governments **stepping** back and of **an** increasing **influence** of the private sector in the **operation** and **financing** of transport **infrastructure**.

5 PRIVATE PROVISION IN PRACTICE

5.1 General conditions

As **discussed** above there is a **clear** privatisation trend in society. The **arguments** for government intervention have become less important, while **any** case of public intervention is **often** done in a market-based way. Therefore, privatisation of **infrastructure** **may** be **an** interesting option.

One of **the arguments** against privatisation is that the government **may** attract **loans** at lower interest **rates than** the private sector; public **financing** and operation is cheaper because no risk premium is needed. There are **however** two reasons which **may** make this argument less **valid**.

First, this argument **holds** for **all** investments, so that **- when** argued **consistently** **-** the government should **finance** or guarantee **all** investments. The reason that this is not the case is **-** as a **second** argument **-** that the private sector **may provide** the infrastructure in a cheaper way, which **may compensate** the **higher** interest costs. It is questionable of course, whether this **also holds** for **investments** in transport **infrastructure**.

As argued in Nijkamp and Rienstra (1995), two conditions have to be met for private financing possibilities:

- the private investor should take the risks of the investment (at least to a large extent);
- user charges should be levied.

The first condition is, for example, not met **when** the government **provides** guarantees for the **pay-back** of loans. **When** the government guarantees loans, it runs the risks instead of the private investor, while possible additional **revenues** are handed over to the private investor. In this way there are **also** less incentives to **provide** the infrastructure efficiently. In conclusion, **such** a model is not **economically** feasible and is therefore in the long run unattractive for governments.

Next, levying user charges, e.g. by introducing **toll** or road pricing, is **also** a necessary condition. An alternative is that **the** government **compensates** the investor from the public budget, e.g. by providing a revenue per passing **car**. In this case **however**, the government **accepts** long term obligations, while the private investor **will** ask a **considerable** risk premium. Therefore, the costs for the government **will** be **much higher** than with public financing, while the **government** still pays for **the** project **out** of the public budget. From this argumentation, it **may** be concluded that private **financing** is only feasible **when** there are **considerable revenues** from user charges. Private operation **and** management is therefore a sine qua non for private financing, while this relationship does not hold in the opposite direction.

Private financing constructions, which do not meet the above mentioned conditions, are sometimes politically **very attractive however**, because the funding of the investment **can** be postponed, while the public **control** over the **infrastructure** is not reduced.

5.2 Cooperation between the public and private sector

It **may** be **clear** that in theory transport infrastructure **may** be provided by the private sector. In **practice however**, the influence of governments **tends** to be high, not only because of the **strategic importance** and the **specific** characteristics

of infrastructure, but **also** because of various environmental and **equity** issues involved. As a **result**, private **financing** and operation is in practice faces **many** problems. Therefore, joint ventures **may** be **an** interesting option by combining the advantages of both regimes. In **such** joint undertakings the above mentioned conditions should of course be met, while market incentives should be **introduced** to a maximum extent in order to **achieve an efficient** management and to **reduce** the transaction costs of infrastructure provision.

In **many** cases private sector involvement **tends** to be introduced by franchising (Andersen, 1993; Nash, 1993). A franchise **can** be defined as a contract between a transport authority (the franchiser) and a private company (the **franchisee**), by which the **latter** obtains the right to **operate** a transport system. Under a conventional franchise contract, the **franchisee** pays the franchiser for using his property rights. In the case of transport infrastructure, this **situation may** be reversed: the transport authority **may compensate** the private company for **an** expected operational deficit. These franchise **contracts may** be allocated by **means** of tendering. There **may** be two different kinds of **contracts**: a given transport system is transferred to the company which offers to **operate** it at the lowest costs or **the** contract is transferred to the company which offers the best transport system for a given budget. The following management constructions **may** be introduced (Gidman et al., 1995):

- affermage; the government **controls** the formal regulations, but **contracts out** the operation (as is the case in some countries for rail infrastructure); leasing the infrastructure; this **may however** not meet the above **discussed** conditions;
- build, own **and operate (BOO)**; in this model the private investor gets the concession and **will** become the **legal** owner of the **infrastructure**;
- build, **operate** and transfer (BOT); this system is similar to BOO, but at the end of a prespecified period the right to **operate** the infrastructure is transferred to a public authority; this is **the** option which is most **often** used in practice (e.g., Dartford bridge, Channel tunnel).

6 CONCLUSIONS

The trends towards liberalising European and global **markets**, as **well** as the reduced **efficiency** of traditional policy **instruments** have led to **an** increasing attention for transport infrastructure. In this respect it is important that not only the 'hardware' and 'software' are considered as direct and **clear success factors**,

but that **also** 'orgware', 'fmware' and to a lesser extent 'ecoware' are taken into account. It should be acknowledged that the **latter** three factors are **also** of critical **importance** for the **economic structure**, the welfare and well-being of countries, regions and their citizens.

In orgware, current trends **indicate an** increasing attention for market **incentives**, in order to improve the competitive position vis à vis other countries, while reasons for government intervention have become less valid. It is clear **however**, that infrastructure - and the transport sector - cannot be left entirely to the **competence** of the private sector, because of the large number of externalities involved and because of equity reasons. Public intervention is therefore still necessary, although a trade-off has to be made because of the high transaction **costs** of intervention (government failures). **When** the government **decides** to intervene, market-based measures **may** be most **efficient**, which **may** not **hamper** privatisation.

It is clear that privatising infrastructure - **first** in the operation (orgware), and **second also** in **financing** (fmware) - **may** lead to efficiency gains, while at the same **time** other policy **objectives** (environment, tax level, government deficits) **may** be served.

In **practice however**, there are several problems which **call** for a solution. For example, it is important that the **costs** of constructing and exploitation of infrastructure **will** be **well** estimated. In this respect, it is also important that the calculations are consistent and do not underestimate **real costs**, as is **often** the case. The same **holds** for the expected **use** of infrastructure, since this is **often** information which is not available for private investors. Besides direct revenues, the generation of indirect **revenues** might be important, in order to **reach an acceptable** return on investment.

To attract investors, the **risks** have to be reduced to a maximum extent, with taking into account the above **discussed** factors. These **risks** follow especially from the long **pay-back** period and the associated political risks. Reducing these **risks may** be (**partly**) a task of the government, **however**, therefore joint ventures **may** be **attractive** too.

It **may** be concluded therefore, that several modes of privatising **infrastructure may** provoke various practical problems, but on the other hand a more intensive involvement of **the** private sector **may** be essential for the enhancing competitive position of countries, without **having** negative impacts on other relevant policy **objectives**.

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