

# Transport Policy—The Perspective of Swedish Stakeholders

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## Abstract

Differences between countries' internalization degrees and between transport modes both tend to risk distorting competition and creating socioeconomic inefficiency. This review examines regulations and charges for freight transports for different transport modes in Sweden and compares the situation with other key European countries. The aim was to identify best practices and benchmarking for Swedish conditions. The project involved both a literature study and interviews with different stakeholders. It was found that today's fee structure for goods transports often deviated from the views of different stakeholders and market segments. The problem is that it is difficult to estimate and plan well in advance due to a lack of relevant data. Economic transport data are often extracted from heavily aggregated data where resource consumption and production costs for transport are unclear, preventing reliable estimates and obstructing the calculation of marginal costs and internalization of externalities through charges imposed on the respective transport modes and transport units. Furthermore, there is little research on how railroad and shipping are affected by changes and introduction of truck fees. The latter implies that truck fees must be seen from a European perspective to assess their effect on the overall transport system. Other aspects that are important to highlight are the extent and point in time for railroad deregulation. Further, it became clear from the stakeholder analysis that all fees and policies need to be both comprehensible and transparent through good communication of rules and by explaining the fee structures to all those concerned.

## Keywords

Transport Policy, Fees, Regulation, Stakeholder Analysis, Sweden

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## 1. Introduction

As illustrated in past research and studies by Trafikverket [1] and Nash *et al.* [2], differences between countries' internalization degrees and differences between transport modes both tend to risk distorting competition and creating socioeconomic inefficiency. Possible improvement proposals given by the interviewed respondents have the possibility to influence long-term predictability and transparency among regulators, capacity evolution and capacity allocation. Many of the respondents emphasized current shortcomings related to the condition and maintenance of transport infrastructure. Furthermore, the current fee structure is often viewed as complex and difficult to grasp by many industry players. The latter interviewed respondents also pointed out that the differences in freight fee levels between different transport modes could distort competition. Proposals that have emerged in the study are successive capacity allocation for railway capacity, public-private partnership (PPP) for infrastructure investments and a more quality-based and differentiated fee system. The bottom line is that more knowledge about the transport policy, fee systems, and external costs of transport is required for a better differentiated fee system and a higher degree of internalization of external costs.

Fees and regulations for the carriage of goods are current and controversial subjects that require more and more knowledge as the demand for transport increases and transport policy frameworks for freight transport get more restrictive and complex. The aim of this paper is to identify impairments and best practices related to freight transport policy in Sweden as compared to other European policies by means of a literature review and stakeholder analysis. Special attention is given to road and rail transport policy and regulatory issues.

## 2. Methodology

The context of this study has been developed by means of a literature review of previous research and stakeholder interviews. Special attention has been given to the European regulatory framework related to rail transport and to that of countries with especially predominating rail infrastructure such as Germany, Switzerland, Austria, The Netherlands and France. These countries have been chosen based on many reasons, e.g., they have truck fees, support the development of rail services by subsidies, and/or have liberalised rail services. Switzerland, Austria and Germany have been especially interesting to study since these countries imposed truck fees early and their effects have been thoroughly analysed.

The stakeholder analysis addresses different stakeholder perspectives and opinions about the fees, rules and suggestions for improvement. The study begins with a description of the transport market development in Sweden. Then Sweden is compared with other EU countries' transport markets. The study also looks at the determinants of the transport system stakeholders, while the reference frame provides an inventory and review of policy, fees and structures.

The study applies semi-structured interviews, which means that all respondents are asked the same questions, with open response options [3]. Thus the respondents are treated equally and they have an opportunity to comment on the same questions. The selection method for the respondents is based on the research questions and the purpose is to obtain a broad and thorough description of the problem area. For this purpose, different categories of respondents and experts in Sweden were selected, comprising authorities, industrial organizations, and infrastructure users. Since the purpose of the interviews is not to get a statistical generalization but rather detailed descriptions, the size of the respondent population was kept low in the study and no more respondents were interviewed after the point at which new major observations ceased to be obtained. Before the interviews were conducted, an information letter was sent in advance, containing a personal presentation and information about the purpose of the interviews, the confidentiality of the results, the voluntary nature of their participation and the possibility of subsequently withdrawing their participation, contact information in case of questions or concerns, how the results will be published, how the respondent can take part in it and about possible additional questions that may be asked after the interviews.

The interview guide with the selected questions was tested in a sample interview, which was recorded and analysed. Ethical aspects considered were that answers from the interviews would only be published after the respondent's approval and were therefore not liable to harm the respondents or risk their identification. The survey was presented openly and honestly through an information letter sent in advance of the interviews. It was clear that any participation was voluntary and that an acknowledgment from the respondent was required prior to his participation in the study. The different categories of stakeholders were politicians, policy makers, transport authorities, transport regulatory agencies, transport industry associations, environmentally oriented NGOs

and transport service providers. A total of 18 interviews were conducted with 16 different stakeholders/organizations.

### 3. Theoretical Framework

The demand for freight transport is determined largely by economic development. A weak decoupling between these aspects has been reached, as can be seen in the GDP growth outpacing the freight transport volume over time [4]. However, increasing the efficiency of vehicles and vessels is not sufficient—the efficiency of the transport system as a whole also must be improved. It is in this context that transport policy plays an important role as both an enabler and a facilitator, connecting individual transport movement demands with overall society goals and objectives. The theoretical framework is structured into three main parts comparing railway track fees, truck fees and the degree of internalisation in Europe.

#### *A comparison of track fees between Sweden and Europe*

The Swedish track access charges are low from an international perspective. The track charges' share of rail services costs in 2009 in Europe were 30% for freight and the corresponding figure for Sweden was 6% [5]. [6] has illustrated the widespread fee levels in Europe. Former Eastern European countries charge high fees in comparison to Sweden. In 2006, track charges were abolished for intermodal traffic in Norway, reducing the average cost. Track access charges have varied in France but are expected to increase in the future. In this context, one should also note that infrastructure charges in Sweden have gradually increased up to the year 2011 and have stayed at the same level since that time.

Differences in infrastructure cause different costs for wear. This can explain the spread of fee levels across countries. According to [7], the marginal cost variation could depend on the infrastructure quality and the corresponding traffic volume. Rail track fees are also regulated by the politicians' commitment to and prioritization of rail transport in conjunction with the allocation of resources and investment in infrastructure. Countries with marginal cost pricing, however, tend to have track access charges that are too far below the real marginal cost, since the cost of wear and reinvestment has not been included in this pricing [6]. Sweden has low fees, but at the same time it has high transport costs and a limited tax levy for truck transports. Environmental and climate objectives require that the rail freight transport takes over transport volume from road transport and shipping. With a constant or rising transport demand, this leads to a constant or increasing rail freight shipping volume. This explains the caution in increasing the track access charges for freight during the recent years. A low infrastructure charge is a form of government subsidy for rail transportation. In other countries, similar government subsidies exist in different forms [5].

For Sweden, the total track charges, calculated using the 2009 price levels, are expected to rise from 509 million SEK in 2009 to 2 billion SEK in 2020 [1]. However, the estimated revenues may differ from the prognosis, as higher fees can affect supply and demand. The passage charge in large cities can create incentives to evade the charging system by choosing a place of departure and/or arrival outside the chargeable period. The actual earnings may also be lower than expected as a result of differentiated emission charges for diesel traffic. If the internalization rate for rail freight increases, this is expected to lead to a shift of freight from railway to road transport and the non-internalized external effects will be greater for road transports as compared to what they previously were for railway transports. A reduction of the external effects of railway transports can cause a significant increase in the corresponding effects for road transports, which makes it appropriate to compare the internalization rate by rail and road and to frame the absolute effects in relation to taxes.

#### *A comparison of road user charges for trucks in Europe*

One of the major European events from a toll perspective took place on January 1, 2005, when truck fees were introduced for selected congested highways and on highways in Germany. The fee in Germany is regulated by the amount of emissions and the number of axles [8].

During the years 1993-2003, Austria had a so-called Ökopunkte system that would restrict transit with a number of points each year which were allocated by both Austria and the EU. The aim was to gradually reduce emissions of NO<sub>x</sub> by 60% by 2003. This would have been achieved by allocating a limited number of points, based on their NO<sub>x</sub> emissions, to vehicles with a gross weight of over 7.5 tons. The Ökopunkte system was not compatible with EU laws and Austria's entry into the EU contributed to the discontinuation of the system. In 2004, a truck toll for vehicles with a gross weight of over 3.5 tons was introduced. The special extra fee on some selected highways in the Alps is significantly higher than the toll. A time differentiation of the charge means a

50% higher fee between 22.00 - 05.00. This has been introduced on the Brenner motorway, where the specific charges are highest [1] [8] [9].

Until 2001, there was a vignette system in Switzerland, similar to Eurovignette in Europe although more expensive, for vehicles with a gross weight of more than 3.5 tons. On January 1, 2001 the system was replaced by LSV, Leistungsabhängige Schwerverkehrsabgabe, for the entire road network, including trucks with a gross weight exceeding 3.5 tons. Austria and Germany, however, impose the truck charges only on certain parts of the network and their calculations differ from the ones used in Switzerland. In Switzerland the charges are counted in ton-kilometres by emission class per vehicle or by the vehicle's maximum permissible gross mass. The charge was just over 1.0 cents/ton-km in fee category II and the truck's allowable gross weight was increased from 28 to 34 tons in 2001. The permissible gross weight was increased to 49 tons and the charge was subsequently increased to 1.6 cents/ton-km on January 1, 2005. Subsequently, an increase in the fee to around 1.7 cents/ton-km was carried out on January 1, 2008. The prohibition against driving a truck at night from 22.00 to 05.00 in the morning remained.

In 1994 the Netherlands, Belgium, Germany, Denmark and Luxembourg formed the Eurovignette, which introduced a common fee for trucks on country highways. In 1997, Sweden joined the Eurovignette by an agreement in accordance with the European Council guideline 1993/89/EWG from October 25, 1993 and renewed in 1999 by EC Directive 1999/62/EC [10]. The charge is time-dependent, is collected at the use of the road network and differs depending on the number of axles and environmental performance of the vehicle. Since that time, Germany has introduced distance-based charges and has therefore left Eurovignette, as EU law does not allow both time- and distance-dependent charges in parallel. The Eurovignette charge is relatively low compared with recent years' distance-related toll in Europe. The Eurovignette fee is 1250 €/year and corresponds to a cost of 1.25 cents/mile based on a Euro II/III truck with five axles running 100,000 km/year on the highway. It is comparable to the distance-dependent charge in Germany, which is 10 times higher. Other European countries that have introduced charges on certain parts of the network are Italy, Spain, and France. Truck fees have been decided or have already been introduced in several countries in Europe.

#### *A comparison of the degree of internalisation in Europe*

The internalization rate differs between modes of transport and it varies between different countries. This is a consequence of, for example, the proportion of highway in relation to the whole road network, and how large the infrastructure wear is. Both of the latter factors are country-specific. Shipping has a significantly lower internalization rate than land-based transports. Higher internalized fees and taxes would be needed for shipping in order to internalize the cost of air pollution to a greater extent than currently. The external road transport cost varies between countries. Countries with road tolls such as Germany, Italy and Austria have a higher degree of internalization. Also, tolls for bridges, for example in Sweden, Norway, and Denmark, affect the internalization rate. High tolls and low external costs may explain the high internalization rates in Austria. The internalization rate for railway transports differs depending on the country. Sweden is characterized by a relatively low internalization rate [11].

Concerning external costs, more knowledge exists about road transports than about other modes of transport. This may also explain the difference in fees and taxes. For shipping, for example, restrictions on allowable sulphur levels in fuels are used as a substitute for taxation. Other examples include the railway route Oslo-Rotterdam, which has a higher internalization rate than the route Narvik-Napoli because of the fee system for the tracks [11]. Wear is one of the major factors characterizing the external costs of rail. To reach a full internalization for railway tracks, a review of the fee system that takes into account the external costs is needed. Today's methods for calculating the cost of wear are based solely on maintenance costs. However, the operation and development costs also should be components in the calculation of costs of wear. The internalization for road transports includes some operational costs and development costs, which makes a comparison with the corresponding figures for rail difficult. The largest part of the total external costs for road and rail is the cost of wear. For full internalization, more knowledge about the wear of the infrastructure is needed, as well as a review of taxes within and between countries. The share of highways in relation to all roads, road tolls, and bridge tolls affects the external costs and the internalization rate. Other factors that may contribute to increased external costs are noise and congestion. The use of diesel locomotives as substitutes for electric locomotives affects non-internalized external costs that can also be used in calculating the degree of internalization [11].

Making international comparisons is complex, since the design and structure of taxes and fees may vary by country. An example of this is the Swedish railway charges, which are disaggregated unlike those in the com-

pared countries, which have chosen to integrate all external costs in a track access fee. The knowledge of external costs also differs between countries and transport modes, which complicates a deeper understanding of how the fee system is designed. The calculation methods for external costs vary between different modes of transport and the uncertainties with regard to the calculation of external costs pose a risk for misleading results [11].

For an internalization rate lower than 100 percent, the additional cost to be carried by the society is the remaining non-internalized cost of externalities. A comparison between modes shows the charge level needed for full internalization. Today's measurement problems mean that some externalities are not included in the calculations, which may result in an overestimation of the internalization rate and, to some extent, an underestimation of the economic costs. It is an incentive to work for better documentation and monitoring of the external effects, thereby overcoming the problems. This would lead to more reliable results and a more accurate and appropriate fee level. Road traffic generally has a higher degree of internalization.

Socio-economic efficiency is achieved when the user's total cost is equal to the socio-economic cost of infrastructure use. The sum of the marginal costs of infrastructure use and its external effects should thus amount to the sum of the rates and charges for the use of infrastructure and other external effects. Full cost recovery through marginal cost pricing is not achievable if the total average cost per unit for the use of the infrastructure, including fixed costs, exceeds the marginal cost for using the infrastructure.

Ramsey's rule can be used as an alternative if full cost recovery is not feasible. Ramsey's rule sets prices or fees for the use of the infrastructure that exceed the marginal costs, provided that the distorting effect will be the same for all modes of transport. A decrease in volume due to an increase in prices or fees can have a distorting effect in relation to the first-best, that is, marginal cost pricing. To circumvent this problem, the increase should affect the usage of infrastructure by users with low price sensitivity. Split tariffs with a fixed charge and a marginal cost-based variable fee is an alternative form of second-best pricing. The port fees based on price discrimination are an example of one implementation of the Ramsey rule [12]. [13] shows that marginal cost pricing can be applied with full cost recovery, for example for centrally located ports with congestion problems. External costs can be reduced by alternative fuels and lower speeds for trucks. Reduced road wear, fewer accidents, and less air pollution can be achieved through more efficient and safer vehicles and infrastructure, combined with better community planning with an emphasis on the first step of the four-stage principle. This can be expected to lead to a reduction of the total and the remaining marginal cost of externalities.

Other suggested measures include international collaborations such as the EU emission trading scheme (ETS), changes in the European Transport Directive (ETD) and the sulphur directive regulates the level of sulphur emissions for shipping and affecting international competition [14]. The cost increase may lead to a shift from maritime transport to land transport and possibly have a side effect on carbon emissions. Whether the level of investment, operation and maintenance is sufficient partly depends on the varying cost levels in different countries. Limited resources require a more efficient use and proper priorities. A proposed alternative solution is to examine whether the resource utilization meets society's demands on the transport infrastructure, and to what degree this meets the transport policy objectives. In this case, accessibility problems such as lack of capacity should be taken into account by using different instruments. An example would be high-traffic routes where higher or differentiated fees may apply. The purpose of such fees is to reduce or shift the demand to those parts of the transport system that have a lower load. It could also lead to a skewed distribution as the result of lower accessibility, because a higher utilization rate creates even more strain from an environmental perspective.

Proposed measures that release and increase the capacity for a specific mode of transport can be developed through a point of view covering all modes of transport and their users, and through a more needs-based work. For optimal freight transports, intermodal solutions tailored to the suitability of the transported goods for the respective modes are needed. Different goals require different instruments and whether the instruments are effective or not with regard to the internalization rate may be difficult to assess. Economic instruments have a gradual effect, while users of the transport system are able to adapt to them in a way that is cost effective for them. A socio-economically efficient and sustainable transport system requires better planning by updating and adapting to new conditions. In the current situation, it is difficult to assess the possibility of achieving the transport policy objectives in the medium term. The transport system is facing major challenges with regard to the varying demographic situations and the increasing population concentration, which will require new innovative logistics solutions. Both challenges and opportunities will be created through greater international integration of Sweden's transport network, several common instruments for EU member states and a common transport policy.

Special fees may be charged provided that they meet a socio-economically efficient use of infrastructure and

that they are competitively neutral. The Swedish Transport Administration is working to differentiate the specific charges based on the current capacity utilization. An example is the differentiation of the track access fees with the fee reflecting the current capacity utilization. Similar charges are levied by tolls in major cities, e.g., Stockholm, Gothenburg and Malmö, on non-holiday weekdays and rush hours. The purpose of differentiated fees has been to relieve the tracks with limited capacity and to get a usage spread. This is expected to result in a more efficient use of railway infrastructure and to increase the overall capacity of the transportation system. In the future, based on the current capacity situation, there is a need for more differentiated services and prices partly as an instrument for traffic management, partly in order to increase customer satisfaction and partly for a better adaptation to different market segments. [1]

In the past, a track access charge was levied to cover costs and to free up capacity in the railway network in Sweden. The fee remained constant until 2010. From 2011, a so-called high-level fee was charged on some paths. A crossing charge was introduced in 2011 in three cities, and the performance of the network determined the amount of the charge in combination with demand [15]. Along with globalization and an increasingly international commerce since the early 2000s, the demand for freight transport increased. West, South and North Main Line has had the biggest increases in terms of the number of trains. Today, there is a lack of capacity which causes congestion [1].

#### 4. Stakeholders' Perspective

The stakeholder analysis is structured according to the observed main points of view emphasized by stakeholders.

##### *International cooperation and harmonization*

Fees and rules should be designed in an international context, while major international collaboration should be used to design charges in a correct way.

The respondents were generally positive about the work on charges and rules and believe that these are needed as instruments in the transport sector. The respondents are in favour of instruments that are used to reduce dependence on energy and fossil fuels and reduce the levels of greenhouse gases and other emissions. However, it appeared from the respondents' answers that Sweden should take a closer look at international developments in this area. Respondents also felt that the instruments should be harmonized across the EU, thereby providing a consistent taxation and governance. Similarly, policy instruments should be harmonized within Sweden by equivalent rules in all municipalities and regions.

Respondents also pointed out the possibility of implementing "soft system" measures. An example of positive control measures are subsidies for the introduction of new technology solutions. Other examples include access to public transport lanes for freight traffic, increased loading zones and similar measures for newer vehicles with higher fill rates. One suggestion is to use various designated "corridors" for this type of positive, "soft system" regulation.

It was also found that the existing work regarding fees and regulations for the carriage of goods is bureaucratic and inefficient. The charging system is described as ineffective and the reason is considered to be a hierarchical approach, divided into several parties: the EU, the Swedish Transport Administration, the Swedish Transport Agency and the Swedish Maritime Administration.

##### *Knowledge and awareness about the fees and rules*

Some respondents point out that politicians and authorities have limited knowledge when it comes to the formulation of rules and fees. Respondents emphasize the importance of information and the spreading of information in order to improve users' knowledge of fees and rules for freight. Professional users generally have a good knowledge of fees and rules, partly because of the knowledge that they already possess and partly because they receive information from industry associations and government agencies. Respondents consider that the need for clearer communication is important. According to the respondents, the information on fees and regulations could be improved by a common information portal for agencies in the transport sector and by avoiding so-called special rules.

The transport operators believe they have a good knowledge of the charges and rules but insist that it is an administrative burden. It appeared, however, that it is particularly difficult to reach foreign haulers, although domestically it should not be a problem. Generally speaking, the haulers have very good knowledge of the charges and rules, according to the respondents. However, a better dialogue between operators and regulators is

needed because the decisions are sometimes deficient, according to information that emerged from the interviews.

#### *Design of regulations*

The overall responsibilities for the work on the design of the regulatory framework should, according to several respondents, lie with the Swedish Transport Agency. The authorities can help by giving directives on what levels of fees and taxes are applicable and how and by whom they should be charged. They also stressed the importance of transparent and fair rules that also take into account the users' viewpoints. Respondents requested increased cooperation between government agencies, industry organizations and other relevant stakeholders. In order to create a better synergy, the wish was expressed that all players in the industry should take responsibility and be involved in the process. The importance of creating a greater customer orientation with more client meetings and joint investigations was highlighted by a respondent who also felt that the government should take a greater responsibility in these matters. One idea put forward was that it would require an industry forum to start a dialogue, even if it is simultaneously the authorities' responsibility to listen to stakeholders.

According to one respondent, the current rules are outdated and they are rarely replaced, but instead are constantly supplemented with new ones. According to several respondents, there is a need for an actor who takes overall responsibility for contributions from a multimodal perspective. In other words, there is a need for more clearly defined roles. The view also emerged that the design of the Swedish regulatory framework must take place in an international context, regardless of transport mode. In addition, there should be transparency and uniformity in the design of regulatory frameworks and the different modes of transport.

An experience that emerged from the EU level was that the users are highly involved in the decision processes and are consulted constantly by both the European Commission and industry associations. Often industry organizations present their proposals as alternatives to the Commission. The coordinated responsibility between different actors can be improved through regular exchange of information but it is important to also take into account behavioural patterns and effects. We also need a clearer link between infrastructure, technologies and business models.

More information and communication is required to illustrate the problems and objectives that the government wants to obtain or achieve with the regulations. The problem of too-fuzzy interference and distribution of responsibilities should be clarified by information. If possible, a more common, national and international regulatory framework should also be developed, according to several of the respondents. This becomes more important as the transport market is becoming more international and more foreign haulers are operating in the country.

One or more authorities should take full responsibility for simplifying the rules. Respondents mention the Swedish Transport Agency, and/or the industry's rule committee or an entirely new agency as examples of agencies that could take on this responsibility. Although it is the responsibility of the entire state administration to push for regulatory reform, it should possibly be driven, for example, by a special government commission, according to the respondents.

The bottom line, according to respondents, is that the EU and other international bodies as well as government and parliament together with the Swedish Transport Administration, the Swedish Transport Authority and the Industry and Commerce rule committee could contribute most to simplify the regulations. The players should have different roles depending on the tasks. The Swedish Transport Administration participates and is actively working with standardization and functions of the systems which can help to simplify regulations. According to the respondents, the European Commission's Transport Directorate, DG Move, plays a central role with regard to the cross-border and international character of the freight sector. Furthermore, the Swedish Transport Administration has the responsibility for long-term planning of the entire Swedish transport system and thus an intermodal competency.

#### *Improvement opportunities related to charges and rules*

According to the respondents, clarity and transparency in the regulatory framework is required to the extent that fees are applied, which currently is not always the case. Furthermore, the respondents underline the importance of users being able to easily see how the fees affect the final cost, which requires a clear pricing schedule.

It also emerged that there is a need for more distance-based charges and a better handling of wear and external costs. The respondents suggested that the costs should be better allocated depending on transport modes and external costs.

According to the operators, the authorities should take overall responsibility and, instead of distance-based

taxes, impose fees depending on the vehicle's environmental classification. Operators are generally negative towards the distance driven-based tax.

#### *Regulatory compliance*

Several respondents emphasize the challenges and problems involved with the regulatory compliance sometimes being low. Exceeding the maximum load weight of trucks was named as an example. According to the Swedish Transport Agency, rules cannot be written in another way to increase compliance. But compliance can be increased by focusing more on the purpose of the rule. This could motivate users and create acceptance and understanding for the application of the rules.

The respondents believe that it is important to analyze and show how the rules affect transportation costs. It is also important to show that the rules are relevant and that the users can influence the framing of the charges. Several respondents pointed out that the formulation of charges and rules can be improved by highlighting and promoting good practices.

#### *Infrastructure and capacity allocation*

The industry should have a greater influence on infrastructure posture and capacity allocation in the most important parts of the transport network, according to several respondents. One suggestion is to create specific organizations around the EU's TEN-T core network and around the so-called Green Corridors. Smarter pricing could optimize the use of the existing infrastructure. Likewise, more alternative financing, such as private initiatives and co-financing of municipalities in the development of new infrastructure should be considered. This creates a need for greater cooperation between the public and private sectors and a shorter execution time.

According to several respondents, the slow freight trains should be separated from the fast passenger trains to increase the capacity of the rail system. One respondent pointed out that Sweden needs to invest more in rail in general, but also in high-speed rail passenger service in particular to free up space for cargo.

The problem, according to the respondents, is that the supporting infrastructure is not properly designed, while at the same time the instruments are ineffective. One example that respondents raised was that wheel lathes exist only in a few places in the railway system. The result is that vehicles are moved long distances to get this service performed. The alternative would be to invest or encourage investment in new facilities with wheel lathing. Another similar example is the location of depots. These examples illustrate the importance of a holistic approach when considering an infrastructure system.

#### *Selection and use of infrastructure*

Sweden has made significant increases in funding for the development, operation and maintenance of the transportation system. Despite these increases, several respondents highlight that there are major deficiencies in the transportation system, primarily in the railroad system. This affects the choice of transport mode and in the long term it poses the risk of certain modes being considered as less reliable, making it a challenge to use this transport for strategically important flows.

There seems to be a consensus that the railway should be given higher priority on the political agenda. Based on this opinion the respondents reasoned that there is a need for a long-term perspective when it comes to the rehabilitation and development of the railway. A question that emerged was whether the rules and infrastructure have to be harmonized and promote efficient transport between countries. If the railway had been used more economically and more efficiently in a way that benefits the environment, it would have benefited the Swedish transport sector. The respondents believe that it is vital to create incentives by demonstrating the effects of actions, thus creating a desire to contribute, since "everyone must join the track".

Most respondents believe that overall the vehicles registered in Eastern European countries and used in international industry should be replaced. Further, they say that even foreign haulers should pay the congestion charges to prevent a distortion of competition. They argue that there has never been a common regulatory framework for international freight transport. Therefore, they believe that an international framework for emissions allowances should be made for the carriage of goods as soon as is practicable.

Several respondents believe that it is possible to influence the choice of modes of transport by more monitoring and evaluation with the aim to raise awareness of various modes of transport in general and of intermodal transport in particular. In contrast, they argue that it will take more rules at the EU level to control conveyors and move them towards more sustainable transports. More implicitly, it is about being able to affect the rules for cabotage, kilometre and track fees and information for transport buyers. Cabotage can be improved by clearer rules, but some improvement is already visible, according to the respondents. Furthermore, they believe that rules without the possibility of adequate penalties for violations are a problem.



*Differentiation/internalisation of fees*

An interview with representatives from the Swedish Transport Agency revealed that the authority does not take into account other countries' fees in the impact statement. The cost variations between countries depend on several factors, including the way rules are interpreted, the financing of the management, and the different divisions between permitting and regulatory activities. It emerged in a dialogue with various respondents that the awareness of fees and rules outside Sweden is limited, since very few respondents emphasized good examples of charging or regulations from other countries.

Respondents want tariff differences, which prevent undesirable behaviour, for example when imposing congestion charges. This has the potential to create a better allocation and use of the infrastructure. According to respondents, some economic instruments that could be differentiated and contribute to better governance include:

- Energy and carbon dioxide taxes on fuel;
- Road pricing for heavy vehicles;
- Infrastructure fees for the railway;
- Vehicle taxes;
- Congestion charges.

Track access charges have already partly been differentiated and a certain degree of differentiation of fairway dues has been introduced based on environmental factors. According to some respondents, further differentiation of fairway dues should be considered primarily to achieve a shift from road and rail transport towards shipping. Suggested changes should come from the relevant authorities for stakeholders and affected users.

Some respondents emphasize that the pricing of carbon emissions should be consistent regardless of where in the transport system the discharge takes place and that this is particularly important for the internalization of external costs for all transport modes. Some respondents wish for the instruments to be adapted in a way that benefits the environment without having a negative impact on the market.

In the discussions with the respondents it was emphasized that the differentiation and internalization of fees should be based on actual costs and equal treatment modes in the pricing, which should also take into account the risk of accidents. Differentiated charging based on external costs can create more efficiency in the system, according to respondents. Further, it was pointed out that the mode of transport that is most effective from a socio-economic perspective should be used to a greater extent.

Some political stakeholders state that a distance driven-based tax should be introduced and differentiated by railway lines and geography. This means that road transports will be more expensive where there are railway tracks available, while at the same time it should be cheaper to run on low-traffic routes and during daytimes with lower utilization. Some respondents underscore the need for more and better "green cars" and that there should be stronger incentives to maintain high standards of rolling stock, particularly in the railway sector.

The rail traffic is charged by the marginal cost principle based on gained paths. In addition to this fee, one of the respondents suggested introducing an additional variable fee that may be charged if the path involves the operation of particularly congested routes. This type of extra fee can therefore be used as an instrument in planning train paths.

For road vehicles, vehicle taxes are levied instead of fees, as for railway traffic. Charges such as the vehicle tax are not a direct incentive for an efficient use of the vehicles. Instead, according to several respondents, the charges imposed should to a greater extent be linked to the use of the means of transport, such as distance-based charges. For calculating the taxes, a more sophisticated system that monitors and records the trucks' mileage is required.

Several respondents call for a clear system/framework for what fees should be charged, how they should be levied, the long-term direction and goals with clear milestones. Moreover, a better system for monitoring and control is needed. Shortcomings in this area can lead to a number of shortcomings and problems in the transport system, such as unfair competition and an increased risk of accidents.

*Fees for funding the infrastructure*

Fees which are intended, for example, to fund improvements in infrastructure are in principle acceptable, says the respondent from the transport industry organisation Transport Gruppen. At the same time, it was emphasized that it is important to compare the total load on commercial transports all the time in relation to the industry's international competitiveness.

In order to create a willingness to pay for these types of fees, it is important that users have an understanding

of what they are paying for. Users also need to know whom they can turn to in order to express their views about the lack of quality of the infrastructure, and a clear link between alleged shortcomings and efforts to improve them is important.

According to respondents, a combination of new, well-designed user fees and reductions in other charges or easing of regulations is an interesting area which should be evaluated further.

#### *Quality charges*

One view is that the need for better control and monitoring of who caused which damages and the cost recovery for such damages should be addressed. This is necessary so that fees can be charged directly for the damage incurred. However, it can be difficult to subsequently derive and prove who caused a certain injury. One option is to have a more proactive charging system which attempts to prevent injuries and disruptions. One possible way, according to several respondents, would be to impose fees based on factors such as type of vehicle, engine, etc., to create incentives for the renewal of the vehicle fleet, for example by replacing older vehicles. It was pointed out that today there are quality charges to prevent interference, and that this should be further developed. Rail transports in particular were emphasized as an area with great potential for quality contributions.

One respondent suggested that a premium on transport vehicles which cause less wear on the infrastructure should be implemented, rather than adding additional fees. In this context it was also pointed out that rail operators and authorities providing infrastructure should take greater financial responsibility than they do today for injuries resulting from defective materials.

#### *Instruments for increased utilization of infrastructure*

Several respondents emphasized the importance of more and better economic steering instruments and that the capacity assignment should be multimodal and with a greater spread over the day, for example, by using more transports at night-time. Another aspect that was emphasized and demanded is a gradual capacity allocation, which several respondents are aware of, is being discussed in various forums. It was also mentioned that a combination of knowledge and legal instruments is necessary. Knowledge-based instruments include information and advice, research and development. Demonstrations and examples of good practice, benchmarking and rating, as well as eco-labelling/certification and environmental management systems are other examples of knowledge-based instruments. Legal instruments include fuel classification/regulation and environmental classification of vehicles. Such instruments also regulate vehicle size, length, capacity and weight, as well as environmental zones and restrictions on vehicle circulation/idling.

An efficient infrastructure requires more testing and evaluation, more maintenance and a more efficient use of infrastructure through a better allocation of capacity. Some respondents believe that new investments are required in order to develop the existing transportation infrastructure, while others believe that there should instead be reallocation and a more efficient utilization of the infrastructure. Several highlight the possibilities of shifting goods transports to shipping. A number of respondents state that the focus should be more on the 4-step principle, particularly stages 1 and 2. One point raised is that environmental and climate change should be taken into account in a better way. Generally, measures for steps 1 and 2 are more difficult to assess quantitatively than is investment in new infrastructure.

## 5. Conclusions

Based on the major findings from the stakeholder analysis and the comparison with other European countries through earlier studies, the most relevant best practices and benchmarking methods for Swedish conditions could be identified, revealing important interconnections between rule frameworks in Sweden, other European countries, and the EU.

Rule simplification requires that appropriate actions are determined based on business needs through a coordinated simplification work between companies and business enterprises. The Transport Administration conducts regulatory simplification through corrections and additions with new regulations and monitoring. The aim is to simplify, clarify and create more predictable rules while the review of the applications, manuals and forms facilitates contact between businesses and government. Small infrastructure managers are no longer required to issue a network statement and to collect fees. This is expected to cut administrative costs. In addition, the requirements of permits have been abolished for small railway companies with their own goods and infrastructure and/or who only move carts with two-way vehicles.

Joint international rules, rather than national rules, are expected to yield fewer and more harmonized rules and

increased efficiency. The ambition is that regulation in the EU should be simpler and clearer through collaboration with government and other EU bodies. The Railway Administration should be able to assist companies in improving the regulation of permits and approvals.

The distribution of responsibility in the public sector should be reviewed and improved in order to create a more homogeneous distribution between the public and private management and financing [16]. System responsibility should be allocated by interest principle, up to the level where it does not give rise to distortions of competition. One possible measure would be to coordinate a Nordic transport department organization for the land based infrastructure in order to create economies of scale and integrate Nordic projects.

New and more private investments could be created by construction engagement forms in public organizations within investment and maintenance. Moreover, one could introduce different organizations for each mainline/corridor and possibly make them responsible for traffic and tracks like in the UK. New railway lines could be separated into various organizations and away from the Swedish Transport Administration for a clearer division of responsibility.

The Swedish regulations should better promote competition and the implementation of alternative forms of financing. In the future, the Swedish Transport Administration should consider solely holding a planning and financing function. Future transport infrastructure should meet a more socio-economic and organizational/business efficiency. The control of appropriated funds can be improved for road and rail networks by extending the appropriation time limits for infrastructure measures. Socio-economic calculations should support the decision basis to allow for better investment planning.

An efficient transport system requires a well-functioning payment system for traffic. Traffic should pay for the costs that it generates. A restructuring of taxes moving from fixed annual fees to variable taxes could free up space and provide opportunities to increase the internalizing taxes. This could contribute to more efficient transportation in the form of minimized travel distances, increased capacity utilization and better road choices.

Congestion problems have a spatial and temporal anchoring and therefore cannot be solved with the general policy instruments. For this reason, they should be analyzed and dealt with by using a specific and adapted instrument that has similar spatial and temporal variations.

The taxes and fees would need to be differentiated according to variables such as vehicle type, geographical location and traffic environment. Differentiation of taxes, however, requires considerably more knowledge about the different types of causal and economic relationships. Today's economic transport statistics are very limited and are based on different types of spatial data. As a result, the transport economics need to develop a better production of economical transport statistics [17].

Freight transport movements can be promoted by small measures such as simpler waterway improvements, signal systems, interchanges and passing loops. Key initiatives in freight transport infrastructure should focus on port and terminal connections, partial double tracks for railway tracks, buoyancy investment and dredging of waterways. An entire cargo-specific network is required for the transfer of more freight to the rail system, especially in areas where the numerous different flows of the mining and forestry industries meet.

Based on the stakeholder analysis and the comparison with other European countries, this study points to some potential improvements and investigations worth considering from a transport policy perspective. Some examples include:

- Involving industry participants in a review of the capacity allocation process during the analysis of capacity-enhancing measures;
- Monitoring the effects of increased competition on the tracks and their relation to procured services;
- Analyzing the implications of agreements on co-financing for capacity commitments;
- Investigating the requirement for operators to cooperate on a common portal for information;
- Developing action for better and more efficient freight transport market adjustments;
- Investigating how the management of tracks and terminal facilities should be organized, including the role of Jernhusen;
- Considering whether the Transport Administration should have its own resources for the control of the different projects;
- Investigating how Sweden is affected by EU rule developments and consider how Sweden's operations in rule developments can be strengthened;
- Investigating the accumulation of strategic railway expertise, namely where the skills reside and if a new reformed strategic role should be assigned to any organization;

- Considering the clarification of roles and responsibilities of different actors and how their cooperation can be improved.

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