

James Odeck and Morten Welde (editors)

Resource allocation in the transport sector

– some potential improvements

Concept report No 44



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English summary

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ISSN: 0803-9763 (paper version)

ISSN: 0804-5585 (web version)

ISBN: 978-82-93253-41-9 (paper version)

ISBN: 978-82-93253-42-6 (web version)

SUMMARY: This report is an anthology on current issues in the transport sector. It is edited by James Odeck from the Norwegian University of Science and Technology / Norwegian Public Roads Administration and Morten Welde from the Concept Research Programme, and contains contributions from some of Norway and Sweden's leading transport researchers. It aims to address issues which may impede efficient resource allocation in the transport sector.

DATE: June 2015

PUBLISHER

Ex ante akademisk forlag

Concept Research Programme
Norwegian University of Science and Technology
7491 NTNU – Trondheim
Norway
www.ntnu.no/concept/

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Resource allocation in the transport sector – some potential improvements:

English summary

The overall objective of transport policy is to provide an efficient, safe and environmentally friendly transport system that meets society's need for transport and promotes regional development. Improved traffic flow and reduced transport costs will strengthen industry's competitiveness and help maintain the country's settlement pattern; the long-term vision is no deaths or serious injuries in traffic; and CO₂ emissions and other pollutants shall be limited. Also the transport system shall be universally designed, so that as many people as possible can participate actively in society regardless of their disabilities.

Achieving such objectives is not only possible, but also necessary to further economic development, improve living conditions and preserve the environment for future generations. However, it will require huge resources in terms of investments, maintenance, and research and development.

To organize and implement measures aimed at improving the transport sector is challenging. The transport administration in Norway is still largely decentralised, although the main responsibility lies with the Ministry for Transport and Communications. The trunk road network is the responsibility of the Norwegian Public Roads Administration (NPRA), and connects all parts of the country and carries most of the passenger transport. The railways are the responsibility of the Norwegian National Rail Administration (NRA) and provide environmentally friendly transport in densely populated areas. Air transport is governed by Avinor to provide a safe and efficient mode of transport on the longest hauls. Maritime transport, which is the responsibility of the Norwegian Coastal Administration, is suitable for moving large quantities of cargo over long distances. Because the overall objective is common to all forms of transport, it is important that efforts to achieve it are well coordinated between transport sectors. At the overall level there has been progress towards seeing the entire transport sector in context through the preparation of a national transport plan (NTP).

During the last 10–15 years, appropriations for transport purposes in Norway have increased considerably. In current prices, government grants for roads have quintupled from when the first NTP was presented more than ten years ago to today. If we include tolls, the increase is even larger. The current NTP for the years 2014–2023 is based on a budget for road, rail and sea transport of over 500 billion kroner. Norway currently has a higher proportion of road investments measured against a percentage of GDP than many other Western countries. There

is every reason to believe that the level of road and rail investments will increase further in the years ahead.

When the objectives are many and the resources made available to achieve these are limited, it is very important that funds are used efficiently and that the transport sector is organised as efficiently as possible. Effective use of resources means that transport services will be produced and delivered at the lowest possible cost and in accordance with societal needs and goals.

Former studies have shown that principles for the efficient use of resources, such as the results from the social cost benefit analysis (CBA), play a small role in the selection of Norwegian road projects (Welde et al., 2013). In addition, Concept Report No. 43 (Strand et al., 2015) show that the NTP has shortcomings as a strategic plan and that the order of priority can be rather random. The problem is also emphasised in the Productivity Commission's White Paper (NOU 2015:1), which concludes that there is a need for better goals in the NTP and that economic profitability should have a more prominent place in the prioritisation of road and railway projects.

Transport planning is demanding. On the one hand, there is a plurality of objectives that may be mutually conflicting; on the other hand, there are huge resources that have to be used as efficiently as possible. Most would agree that the funds can be better used through improved methods, more active use of economic profitability criteria, alternative organization, or through new ways of thinking. This report contains 12 articles written by 11 researchers with extensive experience from the transport sector. The report has three parts: the articles in the first part revolve around the development and use of socio-economic analyses; in the second part, we look at the external effects of transport – both positive and negative; and finally, in the third part, we look at how resource usage can be improved through new ways of thinking or organizing.

The development and use of cost-benefit analyses

Transport planning is characterised by needs and desires for new infrastructure in excess of the available funds. That means we need tools that can help us prioritise which projects that should be implemented. CBA is a widely used method, both nationally and internationally, for the appraisal of major public investment projects. CBA may demonstrate the consequences of a particular resource allocation, including whether a project will be (socio-)economically profitable to implement.

CBA for major public investments (not just transport investments) is mandatory according to the Government's Instructions for Official Studies and Reports (Utrekningsinstruksen) and indirectly by the economic regulations for the public sector (Økonomiregelverket), which requires that the use of public resources must be efficient. In Norway, the first guidelines for CBA were developed by the

Ministry of Finance in 1978 and have since been improved several times. The methodology is widely used internationally. Pearce and Nash (1981) refer to the United States Flood Control Act from 1936 as the first modern example of the use of CBA to quantify the costs and benefits of public investments, while Winston (2006) claims that the method first became widespread in the 1960s.

CBA has a long history in Norway. This is documented by Dag Bertelsen in the first article in Part 1, 'Metoder og verktøy for nytte-kostnadsanalyser i transportsektoren'. He shows that when the new road south from Kristiania (present-day Oslo) was built. Today we can recognise the ideas on capacity and accessibility. With developments in engineering technology road construction became more ambitious and nowhere more so than along the coast of Western Norway. In the appraisal of projects such as Krifast, the fixed mainland link to Kristiansund, new solutions for road construction were developed, but the economic appraisal and the modelling work was also marked by pioneering work. Bertelsen shows that the appraisal methodology used at the time to a large extent is the same as the one implemented in the NPRA's transport appraisal guidance and software EFFEKT. Although computer tools and analysis principles have evolved since then, the main principles are the same.

A central part of transport planning is transport models. These are used to produce forecasts for future demand, impact assessments of infrastructure projects, and to estimate the effects of other transport policy measures such as congestion charging, parking fees and changes in tariffs and public transport. In the article 'Hvilke forhold ivaretas i dagens persontransportmodeller? Utfordringer ved bruk og videreutvikling', Odd I. Larsen examines the models used in different transport appraisals, their applications, and their strengths and weaknesses. He concludes that we are entirely dependent on transport models, not least because the necessary data is so large that conventional software is not able to handle it. In Generally, Norwegian transport models are of good quality and in line with international best practice. Studies have shown that the models used are also reasonably accurate, even though many may have unrealistic expectations as to how accurately it is possible to predict future traffic.

In the development of the NTP the NPRA spend substantial resources on the appraisal of various road projects. CBA is a useful tool for identifying good projects and less good projects. Despite this, several studies have documented that the use of CBA in the prioritisation of projects is limited. Politicians have varying degrees of confidence (and possibly insight) in the analyses and seem to be of the opinion that CBA only captures a small part of projects' benefits. Even a government agency such as the NPRA, which is responsible for the development and use of the analyses, has placed little emphasis on projects' profitability (Fridstrøm and Elvik 1997; Odeck 1996, 2010; Nyborg, 1998; Welde et al., 2013).

The main basis for Norwegian road policy is the NTP and the priorities therein. The NTP presents the Government's transport policy and describes the objectives and principles to be followed. The plan is a strategy for the development of the

overall system for road, rail, air and sea transport for the next ten years, and is revised every four years. In his article 'Politisk vilkårlighet eller byråkratisk diktat? Om prioritering av riksvegprosjekt', Tore Sager describes the NTP process in detail. He examines the professional and political processes behind the NTP and how it is finally adopted by the NPRA. The main focus of his article is the distribution of responsibility between professionals and politicians, and specifically whether the NPRA's priorities are set on an unbiased professional basis. Sager shows that the selection and prioritisation of projects in the NTP is a result of a selection process in which professional criteria are balanced against political considerations. Several problems regarding the current selection process are elucidated, including costly local requirements, poor transparency, considerable willingness to forgo economic gains, and unclear criteria that render the distinction between subjects and politics diffuse. The article also suggests how politicians can commit themselves so that the priority of road project is democratic, but also economically more profitable.

Harald Minken discusses this topic further in his article 'Betydningen av samfunnsøkonomisk lønnsomhet ved prioritering av prosjekter i NTP'. The article is highly critical of the current practice whereby economic profitability criteria are hardly used in project prioritisation. The article's main point is that this leads to cases where roads are not being implemented when the willingness to pay exceeds the costs, while instead measures that users would not have been willing to pay for are implemented. This has implications for economic developments locally and nationally. Minken believes this is because the counties and municipalities only pay parts of what it costs to build a new road. The rest is paid by taxpayers in other counties. Similarly, toll financing causes the state to pay only part of the cost of toll projects. Altogether, this leads to the funding parties each paying only a portion of the total cost and that a comprehensive appraisal of costs and benefits in each project it is not undertaken. Minken argues that the NTP is comprised of many bad projects. He further argues that 'the system is tailored for lobbying, economically poor financing solutions and unprincipled and erroneous priorities.' The result is an overinvestment in unprofitable projects and possibly underinvestment in profitable projects. The solution, according to Minken, is that the NTP should align more clearly towards the achievement of stated objectives and that economic profitability should be one of the objectives.

Transport and external effects

One of the most discussed topics in the transport economics research literature is the wider economic impacts of transport. These are effects on markets other than those directly affected by the measure being analysed. Spillover effects can be both positive and negative and not always easy to predict. In classical economic theory this was not an issue that achieved any attention. The supply of transport was assumed to be optimally adapted to supply and demand and any deficiencies would be corrected through a perfectly functioning market (Button, 2010). However, in recent times we have acknowledged that market imperfections may arise in

transport and other markets and that even today, when most improvements must be regarded as marginal, improvements in transport supply could make an important contribution to economic growth. The Hagen Committee (NOU 2012:16) went far in saying that there can be positive wider impacts of transport projects, but current methodology is not sufficient to include such effects in the economic analysis. It was hence recommended to make visible any wider impacts in a supplemental analysis.

Hanne Samstad discusses wider economic impacts in the article 'Mernytte av transporttiltak – finnes det?' She uses examples from Norway and the UK, where methods to assess much effects probably have progressed furthest. Several Norwegian studies have based estimates on wider economic impacts on the British methodology. Preliminary estimates show that some transport investments can give rise to agglomeration effects not included in the CBA, but that the benefits are highest in projects that connect surrounding areas into a regional economic centre of gravity. In other cases the extent of wider economic impacts may be limited and may not affect project net benefits significantly. Samstad concludes that traditional CBA captures the main effects, but that certain projects should make an effort to calculate wider economic impacts.

In the article 'Bidrar transportinvesteringer til å oppfylle målene om økonomisk vekst og regional utvikling?', Eivind Tveter and Svein Bråthen explore the issue of regional development further. They evaluated three major fixed link projects ex post and examined the extent to which the new bridges have since contributed to labour market integration. All three projects have resulted in major reductions in travel time and traffic has increased significantly, but through comparison with a control group they find that two of them have not had any particular impact on commuting patterns, while the impact of the third has been substantial. They conclude, in common with Samstad, that the current CBA provides a reasonable estimate of new effects, but that the benefits of individual projects can be underestimated.

Wider economic impacts are examples of positive externalities (i.e. positive but unintended effects) and are caused by the fact that society's benefit may be greater than the sum of the individuals' benefits. This is relatively new issue in the transport economic literature, which has traditionally focused on negative externalities. In 'Klima, miljø og framkommelighet – kan hensynene forenes?', Lasse Fridstrøm returns to a topic that is becoming increasingly relevant. Local and regional pollution has been a source of concern for decades, but the threat of global warming has highlighted the issue further. He explores the main sources of the external effects of transport and refers to recent literature. The overarching theme he discusses is whether we can maintain our standard of living and our constant insistence on economic growth in a world in which lower emissions are not only desirable but also necessary. Fridstrøm concludes that there are measures to influence both emissions and behaviour directly, but that land use and electrically powered vehicles probably are the most efficient measures.

Long-term plans and toll financing

Transport investments are normally based on long-term plans. In Norway the NTP replaced former sector-specific plans after the start of the new millennium. The purpose of long-term planning is that one should identify the strategic challenges and then formulate measures to solve them. Not everyone believes that the NTP is a real strategic plan. In the article 'Ny giv i den nasjonale transportpolitikken er nødvendig', Arvid Strand argues that the NTP is essentially a list of projects characterised by a continuation of previous years' policy rather than strategic action. He argues that there is a lack direct alignment between the objectives formulated and the resources made available to achieve them. Strand believes that the now prevailing NTP programme must be changed, especially regarding the organization and financing of public transport in major urban areas. Like other authors in the anthology, he points out that it is problematic that the use of NOK 500–600 billion is only to a small extent subject to assessments of alternative uses, particularly related to investments that could have been used to maximize the economic surplus. He concludes that it is difficult to call the NTP a plan and even more difficult to call it a strategic plan.

Through the NTP the various transport agencies are required to cooperate and to prepare a joint proposal. Sweden has chosen a different solution. There, the separate transport agencies for road, rail, and sea were merged into Trafikverket in 2010. Four years later, knowledge on the effects of the reorganisation could be gathered. In 'Sektortenkning eller helhetstenkning. Hvordan bør transportsektoren organiseres?' Jan-Eric Nilsson reviews the experiences after four years. He finds it difficult to identify any clear benefits from the new organisation. Nilsson's article points out that the new transport authority can provide improvements in the work to build and maintain infrastructure. The transition to competition instead of in-house procurement that occurred in connection with the transition gave efficiency gains. Organising investment, operations and maintenance of roads and railways under one authority has given better opportunities to analyse and compare efficiency. However, it is difficult to find evidence that the Swedish authorities have utilised these opportunities. Nilsson thus concludes that a merger of the various transport agencies into one agency (Trafikverket) seems to have yielded few benefits to date.

The transport sector is subject to a large amount of public attention. There is a broad interest in the measures to be implemented, how they will be implemented, and which organisational framework the various measures will be implemented within. Part of the reason is that there are often great expectations as to what can be achieved through major investments in new transport infrastructure. However, there are many examples that such expectations are exaggerated. Despite this, many investments with small effects for both users and society are carried out regardless. Jonas Eliasson discusses why this may be the case, in his article 'Problemstyrd planering: en förklaring till att effektivitet spelar så liten roll för valet av transportåtgärder?'. His main point is that planning that seeks to solve a

‘problem’ or satisfy a ‘need’ is the basis for many subjective interpretations. Both problems and needs are relative concepts and very often they can (or should) not be met at all. For example, it is widely accepted that congestion during morning and afternoon peaks in major cities cannot be solved with large investments in roads or in the public transport system. On the contrary, a number of measures can make matters worse. Eliasson recommends that we should rather move in the direction of improvement-seeking, where the focus should be on how we can achieve benefits for society through smaller investments.

Tolls have been used to finance Norwegian roads for c.80 years. This has made a number of projects possible that either would have had to wait a long time for funding or who would not have been financed by state funds alone. Today, tolls are used both to finance new roads and other transport infrastructure and to regulate the demand in larger cities. The share of toll financing to state finance has increased especially during the last decade, and has led to a huge increase in the toll companies’ debts. This has not happened without public debate, but largely without any professional assessment of the scope, organization and implementation of Norwegian toll financing. In the article ‘Bompengefinansiering – effektiv ressursbruk?’, Kjell W. Johansen examines the Norwegian toll financing framework and discusses the extent to which tolls contribute to efficient economic use of resources both as a financial instrument and as a measure to improve the economic resource allocation. He illustrates this by looking at the typical toll schemes: roads with heavy traffic that can be funded with relatively low tariffs; costly roads where the tolls must be relatively high because there are few users to distribute the costs among; and areas where there road capacity is limited and where tolls can be used as an instrument to regulate traffic. He concludes, not surprisingly, that there are both advantages and disadvantages with tolls, but that in the future we should look in the direction of a national road pricing system with kilometre-based tolls that would vary according to time and place.

Summary

The articles in this report argue that the Norwegian transport sector has great potential for improvement when it comes to the use of resources. The main conclusions are as follows:

1. The methods for economic appraisal are well developed in the transport sector, but there is room for improvements. This also applies to transport models, which are important inputs to the CBA.
2. A weakness of the current economic analyses is that they do not adequately quantify effects in the form of increased productivity and economic growth. Methods should therefore be developed to take this into account.
3. The prioritising of competing projects should be based on economic profitability criteria.

4. It may be appropriate to differentiate between projects that should be prioritised strictly for profitability and others that are prioritized according to other criteria, such as the attainment of national goals.
5. In the future, transport must be carried out in such a way that climate, air quality and nature do not suffer. We must break the link between economic growth and environmental disbenefit.
6. Problem-driven planning – planning by first identifying the problem and then identifying projects to solve that problem – may be the reason why profitability criteria are not always used in the selection of projects. In many cases what is perceived as a problem cannot be solved through large projects.
7. There is need for a holistic approach to the transport sector. Benefits can be achieved through coordinating, if not merging, the road and rail sectors.
8. Tolls may be effective both as an economic policy tool and as a funding source. They should not be implemented indiscriminately, as they may lead to loss of efficiency.

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Concept report series

Paper version: ISSN 0803-9763

Web version: ISSN 0804-5585

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Forskningsprogrammet Concept skal utvikle kunnskap som sikrer bedre ressursutnytting og effekt av store, statlige investeringer. Programmet driver følgeforskning knyttet til de største statlige investeringsprosjektene over en rekke år. En skal trekke erfaringer fra disse som kan bedre utformingen og kvalitetssikringen av nye investeringsprosjekter før de settes i gang.

Concept er lokalisert ved Norges teknisk-naturvitenskapelige universitet i Trondheim (NTNU), ved Fakultet for ingeniørvitenskap og teknologi. Programmet samarbeider med ledende norske og internasjonale fagmiljøer og universiteter, og er finansiert av Finansdepartementet.

The Concept research program aims to develop know-how to help make more efficient use of resources and improve the effect of major public investments. The Program is designed to follow up on the largest public projects over a period of several years, and help improve design and quality assurance of future public projects before they are formally approved.

The program is based at The Norwegian University of Science and Technology (NTNU), Faculty of Engineering Science and Technology. It cooperates with key Norwegian and international professional institutions and universities, and is financed by the Norwegian Ministry of Finance.

Adress:

The Concept Research Program
Høgskoleringen 7A
N-7491 NTNU
Trondheim
NORWAY

ISSN: 0804-5585

ISBN: 978-82-93253-42-6



NTNU – Trondheim
Norwegian University of
Science and Technology

