INFRASTRUCTURE FOR GROWTH

Analysis of the importance of infrastructure investments for growth, regional development and regional enlargement

SUMMARY

SIKA Report 2004:1

Preface

A lot of discussion has taken place on the importance of the infrastructure for growth, regional development and regional enlargement.

Practically everyone agrees that there is a strong correlation between the development of transport and the general organisation and form of society. However, since the interaction of the transport system with the surrounding environment takes so many forms and has so many ramifications, the correlations are difficult to isolate and quantify. Just as it is evident that the transport system has a big general effect on growth and welfare, it is equally evident that this effect cannot have the same strength at all times, at all places and for all individuals and activities.

SIKA has had reason in different contexts to attempt to shed light on these issues. This report contains a summary of the different qualitative and quantitative analyses of the correlations between infrastructure investments and growth, regional development and regional enlargement that SIKA has carried out recently.

Anders Wärmark has been project manager and the main author of this report. Helena Braun has been responsible for the commuting studies and Roger Pyddoke for ordering the calculations of the location effects of investment plans and SIKA's analysis of the calculation results. Matts Andersson has also participated in the project.

The Swedish National Rail Administration and the National Road Administration have provided coded networks for investment analyses and Inregia AB has carried out the calculation of the location effects of long term planning by the Swedish National Rail Administration's, the National Road Administration's and the counties.

Stockholm, February 2004

Staffan Widlert
Director

Transport, infrastructure and growth

A lot of discussion has taken place relating to the growth effects of the infrastructure. Practically everyone agrees that there is a strong correlation between the development of transport and the general organisation and form of society. Transport affects the everyday life of every business and household. There are an infinite number of choices and decisions that are made in different quarters of society that are affected by the opportunities and limitations provided by the transport system. This continuous process of adaptation between the transport system and society as a whole has successively expanded the geographical sphere of activity of businesses and households, led to benefits of scale in different activities and made considerable contributions to economic growth and regional development.

However, since the interaction of the transport system with the surrounding environment takes so many forms and has so many ramifications, the correlations are difficult to isolate and quantify. Just as it is evident that the transport system has a big general effect on growth and welfare, it is equally evident that this effect cannot be of the same magnitude at all times, at all places and for all individuals and activities. It is therefore also difficult to translate assessments of the overall consequences to specific effects of particular measures.

The objective for Swedish growth policy is to achieve sustainable growth. This means that there can be a conflict between short-term growth effects and endeavours to achieve sustainable growth. Applied to the area of the infrastructure, this make less self-evident which type of investments can be considered as being most growth-promoting. Growth and accessibility benefits of infrastructure measures are not therefore necessarily of greater interest in a growth perspective than, for instance, road safety or environmental benefits.

A bearing idea underlying the present policy for growth and regional development is that the better each region can make use of its potential and strengthen its relative competitiveness in relation to the surrounding world, the better Sweden's economy as a whole will develop and our overall prosperity. At the same time, there are goal conflicts between, for instance, the regional and national level. A fairly clear illustration that this is the case is the hard-to-reconcile claims for infrastructure measures from different parts of the country.

A further goal conflict is that the national growth rates are affected by how different growth-stimulating measures are distributed between different regions. In the field of the infrastructure, this goal conflict is partly linked to the question of whether regional growth effects arise from the appearance of new activities or existing activities being relocated in the country. Both types of effects can be of interest in a regional development perspective, although, in principle, it is only the first-mentioned effect that leads to growth in a national perspective.

Regional enlargement has been identified in regional development policy as an important means for, among other things, being able to combine high growth with

positive regional development. Regional enlargement by increased commuting can at the same time come into conflict with the transport policy, road safety, environmental and equality goals. An additional goal conflict is that accessibility improvements to promote regional enlargement compete with measures to improve, for instance, connections with the international transport networks or to maintain good intra-regional access – measures that can also be important for economic growth, among other things.

The fact that functional regions can expand by increasing access does not either necessarily lead to the strengthening of the existing structure of population centres. Profits from increased accessibility in the transport system normally successively spread to other sectors of society in the form of, for instance, a more widely spread pattern of population, changed organisation of private and public service, specialisation in production, etc. This means that one cannot be certain that growth takes place precisely in the places or regions where the infrastructure has been improved. The effect can instead be that service, production and population move to places that are viewed as more attractive with the improved access.

Socio-economic profitability is still the best measure of growth

There is an extensive literature focused on trying the estimate the correlation between the transport infrastructure and economic development. Even if the results vary greatly between different studies, most of these indicate that infrastructure investments contribute to increasing productivity. The growth effect of further development of existing infrastructure seems to be less, however, than the effect of creating a new network. Research results do not either give any clear support for there being a deficit of infrastructure in society. A further limitation is that this overall research approach does not provide a basis for stating exactly which infrastructure measures should be given priority from the point of view of growth.

Research does not contradict that cost-benefit analyses should be an important basis since long-term plans already measure at least part of the growth effects of the infrastructure. This takes place, in among other ways through time and delay values for freight transport and time values for business and work travel. The forecasts of transport demand on which the analyses are based also contain descriptions of population, employment and the business sector based on overall growth scenarios.

The fact that the traditional object analyses partly, and, in many cases, almost wholly also include the growth effects of infrastructure investments does not exclude that there may be additional effects that are not recorded. This may, for instance, apply to the effects given a theoretical interpretation in the “new” economic geography and theories on knowledge externalities and cluster effects. The way at present regarded as most accessible in research for recording this kind of correlations for individual investments or investment packages is to estimate the location effects with the aid of accessibility measures.

Growth, regional development and regional enlargement are considered to be important starting points in the long term planning of the Swedish National Rail Administration, the National Road Administration and the counties. However, it is difficult to determine exactly the importance given to these aspects in the plans. The assessments of growth and regional enlargement effects of individual projects, if they exist, are of a qualitative nature. It is then difficult to compare different measures and to see the overall effects.

In SIKA's view, there is therefore no better visible indicator of value in the long term planning than their socio-economic profitability. The conclusion will be simple if the objective is only to maximise sustainable growth nationally and within each region: Give priority to measures in accordance with falling net present value ratio! SIKA makes the assessment that an exclusive growth indicator of this kind would give rise to a different composition of measures than those now included in the long-term plans of the transport agencies and counties.

Large investments but small commuting effects

In order to shed light on the effects of infrastructure measures on work commuting between municipalities – and thus on regional enlargement – we have made a closer study of two major investments included in the long term plans for the period 2004–2015. These investments are the Botniabanan railway line in the counties of Västernorrland and Västerbotten counties and the motorway construction between Uppsala and Mehedeby in Uppsala county.

Botniabanan consists of a completely new single-track railway between Nyland in the municipality of Kramfors and Umeå. The railway makes possible greatly reduced travel times for work commuting by public transport between the places it connects. Travel time by train will be shorter than travel time by car between certain places. Practically all work journeys between the municipalities where the Botniabanan is being constructed now take place by car. When Botniabanan has been completed, the total work commuting will increase and practically the whole of this increase consists of train journeys. According to our model calculations, in a section north of Örnsköldsvik, over 1.3 million journeys per year will be made by train when the Botniabanan has been completed. Only approximately seven per cent of these or just over a hundred thousand journeys are work journeys.

According to the model, work journeys over municipal boundaries will increase most from Örnsköldsvik, Nordmaling, Umeå and Kramfors, the municipalities with stations on the Botniabanan. The increase is largest for Örnsköldsvik at 21 per cent, which corresponds to 138 journeys per day. This can be compared with the total number of work journeys starting in Örnsköldsvik totalling over 17 000 journeys per day. The proportion of outbound commuting of the total work travel is in other words not changed particularly much by the opening of the Botniabanan. It will increase on average from 8.2 per cent to 8.4 per cent in the municipalities we have studied. The conclusion of our analysis is that the Botniabanan is of small importance for work commuting between the municipalities.

The motorway construction between Uppsala and Mehedeby consists of a 78-kilometre long section used by between 7 000 and 18 000 vehicles per 24-hour period. The existing road is 8–13 metres wide with a low road safety standard, poor accessibility and traffic creates environmental disturbances along the route. When the section has been completed, the E4 will be motorway standard all the way from Stockholm to Gävle.

Just as in the case with the Botniabanan, the model calculations show that work commuting over municipal boundaries from the municipalities affected by the motorway construction will increase. However, the increases are also small in this case. In the majority of the municipalities affected, the change is 1 per cent or less.

Tierp is exactly along the route of the motorway and will have a shorter driving time both in the direction of Uppsala and towards Gävle. According to the model calculations, there will be an increase of outbound work commuting from Tierp and a shift in the destinations for work journeys. The increase will mainly be to places with higher accessibility due to the new motorway. The improvement in accessibility to urban Uppsala, combined with this municipality's relatively high attractiveness as a destination, seems as if it may lead to work journeys that were previously made to smaller places transferring to Uppsala. This means that a number of smaller places will have less work commuting from Tierp, despite the improvement in accessibility to these places as well. The result can serve as an illustration that regional enlargement does not necessarily lead to a strengthening of the existing structure of population centres.

We have also studied how work commuting is affected by access to a car and compared this influence with the effect of the investments. Our calculations show that changes in car ownership in general are of much greater importance for work commuting in a region than individual infrastructure investments. It is then close at hand to assume that changes in car ownership and many other factors that affect the transport system are of much greater importance for growth, regional development and regional enlargement than individual structural investments.

Long term plans provide insignificant location effects

Commuting studies are based on the assumption that the pattern of population and the supply of workplaces are not directly affected by the infrastructure investments and the changed accessibility that these entail. In reality, infrastructure investments can also have such a direct effect on the choice of place of residence and location of different activities that provide employment. In order to provide a picture of the effects of long term planning on location of residence and employment opportunities, SIKA has commissioned a model calculation of the location effects of the long term plans of the Swedish National Rail Authority, the National Road Authority and the counties.

The model used for the calculations is based on municipalities where accessibility is improved to workplaces and the workforce becoming more attractive for residence and industry, which is eventually expected to give rise to location

effects in the form of more inhabitants and employed. The location effects for both residence and employment are calculated on the basis of a period of adaptation of approximately five years being required from the time the investments are made. This account can therefore be said to reflect a hypothetical situation around 2020. It should be emphasised that these effects are partial in the sense that they only take into consideration to a limited extent the fact that changes in access occurring at different places in the country interact and compete with one another. This means that the location effects of individual infrastructure investments and access improvements are overestimated.

The model calculations show that the location effects in the form of more residents at municipal level of the changes in accessibility achieved by infrastructure investments in the period 2004–2015 are generally small. Only five municipalities reach an increase in population of more than 1 per cent as a result of infrastructure investments in the municipality making residence in the municipality more attractive. In 269 municipalities, the population increases by 0.3 per cent or less.

The effects of location on employment opportunities are also expected to be small. According to the model calculations, infrastructure investments entail an increase in employment of more than one per cent in 17 municipalities. In 229 municipalities, the increase in employment arising from projects in the long term planning remains at 0.3 per cent or less. The greatest location effects are expected to occur in the County of Stockholm and in other counties in Mälardalen.

The report also contains a presentation of calculations of the location effects that may arise for a particular given development of population and employment. The location effects will then be even more limited. Population and employment decreases may also occur in this case in the municipalities, whose relative accessibility deteriorates due to the combined effect of the whole measures package.

THE SWEDISH INSTITUTE FOR

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- To carry out studies for the Government
- To develop forecasts and planning methods
- To be the responsible authority for official statistics

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ISSN 1401-3460