

In search of success: Ex-post evaluation of a Norwegian motorway project

Morten Welde

NTNU – Norwegian University of Science and Technology, Department of Civil and Environmental Engineering, NO-7491 Trondheim, Norway

Abstract: Project success is a heterogeneous measure. Different stakeholders may have different definitions of successful project. Ex-post evaluation can and should be used to demonstrate whether a scheme has performed as promised and to assess its success from different perspectives. The paper demonstrates the use of a goal-oriented evaluation framework that is currently used on large Norwegian infrastructure projects. The framework includes traditional value for money measures, but more importantly it maps the results of schemes against the original objectives. The paper presents a recent evaluation of a motorway project. The evaluation suggests that the project has been successful and that the determinants for success were actions taken decades before implementation, namely during the appraisal and the construction.

Keywords: Evaluation; ex-post; appraisal; project success; Norway

1. Introduction

Most countries spend large resources on transport infrastructure, and the national agencies or administrations responsible for planning and implementing new road projects ensure that the technical and economic analyses of new schemes are thoroughly scrutinised before funds are allocated and construction work is allowed to proceed. Today, it is widely accepted that quality at entry is crucial for the success of project outcomes and the ex-ante tools for forecasting, cost estimation, economic appraisals, and so forth are continuously being improved. However, the resources used for ex-ante appraisal are rarely matched by those used on ex-post evaluation. In short, despite extensive efforts to predict how we think a scheme might perform, we know less about actual scheme performance. Ex-ante appraisal and ex-post evaluation tend to be carried out completely independently of each other and the links between the two activities are often weak or missing (Department for Transport, 2016). Furthermore, and as argued by Nicolaisen and Driscoll (2014), there is a lack of standardisation of evaluation methods, both between and within countries. This may inhibit learning and comparability.

Although evaluation can be carried out at different points in time, it is usually carried out some years after a policy or project has been delivered. The purpose could be to improve future policy through feedback of the lessons learned, to identify deviations from forecasts, to hold actors accountable, or to understand key relationships between inputs and outcomes. In short, ex-post evaluation is about measuring whether a project has been a success or failure.

However, project success is an aggregate measure, the definition of which may vary depending on different perspectives. This paper demonstrates the use of a goal-oriented framework for evaluating a Norwegian motorway project operating between the Oslo area and the Swedish border. The objective is to demonstrate that there may be different measures of success, but all such measures can be captured in a broad and goal-oriented evaluation framework that seeks to uncover whether the original objectives have been met. The paper proceeds as follows. Section 2 describes the project on which this case study is

based. Section 3 discusses different definitions of success, why evaluation needs to be broad, and the evaluation framework used in this study. Section 4 presents the results of a recent evaluation based on the framework. Section 5 provides some conclusions as to why the project has been considered successful.

2. The E6 through the county of Østfold

Death, destruction and endless congestion – from the late 1980s, the E6 through the county of Østfold (population 300,000) was a major cause of concern for transport planners, politicians, and all who that relied on road transport to make deliveries or to commute to work by road. The trunk road links Oslo (population 1.0 million), the capital of Norway and by far the most populated part of the country, to neighbouring Sweden and farther south to European markets. The former single carriageway was no longer able to cope with the traffic levels and with no central reservation, traffic accidents were frequent and often fatal. During 14 days in September 1989 alone, there were 13 fatal accidents along the 63 km long road (Berntzrød, 2017). Sunday services in adjoining towns finished with prayers that no one would be killed that day, neighbouring farmers painted ‘slow-down’ on their barn walls, and demonstrations against road deaths and in favour of dualling the road were frequent, often with the use of macabre measures such as burning crosses. The could no longer be ignored. What was once a local or at best a regional issue, had turned into a national trauma. Figure 1 shows the area through which the E6 passes today (Google maps, 2018).

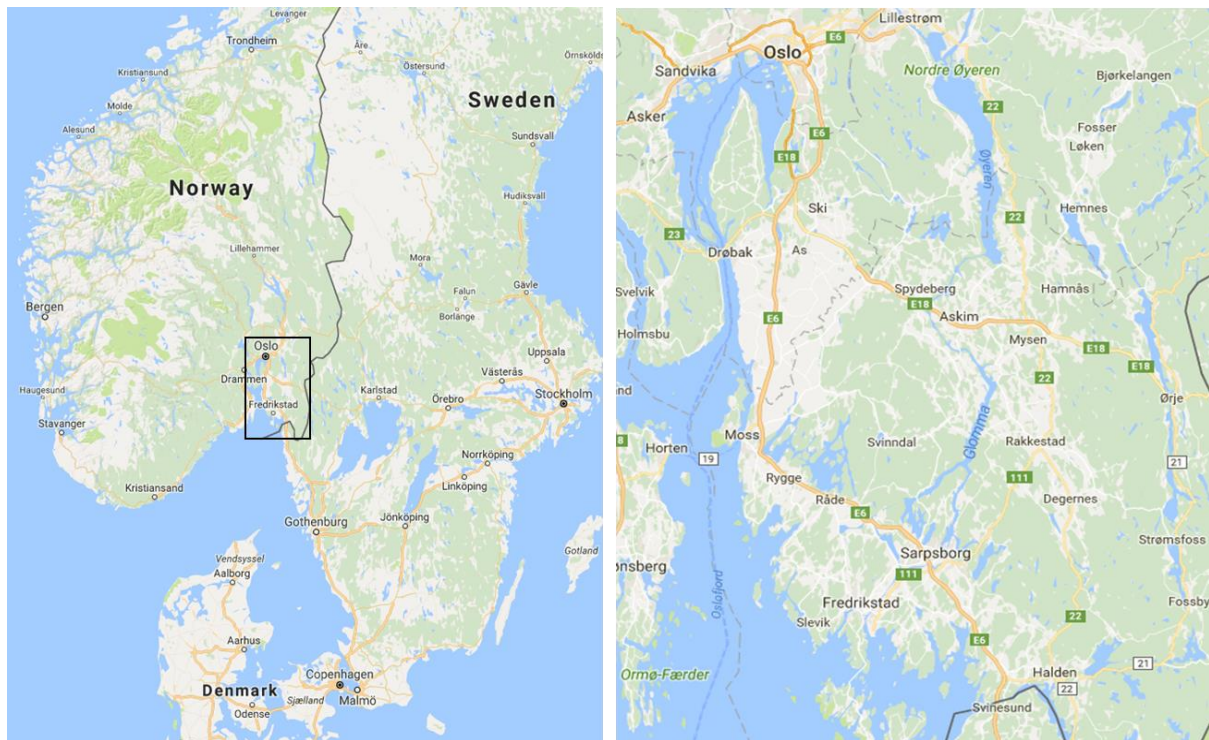


Figure 1: The location of the county of Østfold and the E6

Fortunately, the basis for expansion of the road was favourable. In the 1930s, the regional manager for the national road administration (Norwegian Public Roads Administration, NPRA) was inspired by what was happening in Germany at the time and proposed the building of a new road in ‘autobahn style’. However, he received little support. The government had higher priorities than to spend its limited funds on improved roads for the 50,000 motorists in the country at the time. By contrast, the regional road authorities had the foresight to align the road outside all towns and villages. Later, when the road was modernised to a single-lane carriageway in the 1960s, the basis for dualling was favourable since the road could be widened instead of completely realigned. Throughout the 1970s and early 1980s, the road functioned well, but with economic growth and increasing traffic it soon became outdated and hazardous for road users.

Government funds were not forthcoming, and despite favourable public finances, the annual state budget for road construction during the 1990s was equivalent to EUR 700 million in today's price. However, local authorities along the coast and in the largest cities had topped up government funds through road tolls for many years, and by the 1990s road tolls accounted for some 30% of the total funds available for road construction. Despite being a relatively widespread practice, the use of tolls to finance the strategic road network in the most densely populated parts of the country was still considered a radical and controversial policy. While most local councillors in the county of Østfold wanted improved roads, they were unwilling to approve road tolls on behalf of their constituents. Furthermore, while the political tug of war between the Ministry of Transport (MoT), which made it clear that road tolls were an absolute condition for project approval – and the local and regional authorities continued, the situation on the case road worsened.

The breakthrough came after the county mayor and the regional manager of the NPRA managed to convince all local authorities that road tolling was necessary. The legal framework for road tolling in Norway requires that both local and regional authorities must enter into binding agreements with the NPRA to allow tolling to commence. The Ministry of Transport agreed to top up the local contributions and after a period of planning and appraisal, the construction started in 2001 (Ulstein et al., 2017). Seven years later the road project was completed, two years ahead of schedule. It comprises 63 km of motorway, including one 900 metre long tunnel and bridges totalling 2.2 km, among them the spectacular Svinesund Bridge (Svinesundsbrua) across the Iddefjord at Svinesund, which marks the border with Sweden.

While most motorists probably would class the road as a massive improvement due to improved traffic flow, reduced travel times and, above all, the almost complete elimination of fatal traffic accidents, there are more elements to project success than the opinions of motorists. Hence, the Ministry of Finance commissioned the Concept Research Programme, located at NTNU in Trondheim, to carry out an ex-post evaluation of the road in 2016.

3. Assessing project success through ex-post evaluation

Transport infrastructure projects may have multiple objectives and the ex-post assessment of success through evaluation needs to be sufficiently broad to capture the range of outcomes that the project was intended to achieve. However, the definition of success has often had a narrow focus. Whereas project managers may focus on the project's direct outcome – its time cost and quality, users tend to consider the results in terms of their perception of them, and political decision-makers may have ambitions such as economic growth or regeneration of specific areas. Thus, different stakeholders may have different objectives and may be at odds with each other in this respect. The definition of success may vary throughout the project life cycle and according to different stakeholders' perspectives (Morris and Hough, 1987; Müller and Jugdev, 2012).

In many cases, project objectives may not be defined in the project business case. This means that ex-post evaluation must establish a benchmark against which the project results should be gauged. Samset (2003) suggests applying three levels of success in project evaluation: operation, tactical, and strategic. *Operational* success is determined by the project's ability to deliver its agreed outputs according to the agreed time, cost, and quality. Traditionally, these are the most commonly applied measures of success. There are many examples of projects that have proven extremely useful to users and society despite considerable cost overruns and vice versa, and therefore a broader interpretation of success must include the *tactical* perspective, which focuses on the extent to which the project has achieved its formal goals and whether the impacts are predominantly positive. These measures are more ambitious and thus more uncertain than the direct project outputs. Whereas operational success can be measured immediately after the project is completed, tactical success can only be measured after the effects have had time to materialise. The broadest interpretation of success is related to the *strategic* perspective, which is based on the long-term effects and whether the effects can be sustained in the long term; it also includes the future needs of users and is thus the society's perspective. Figure 2 shows different measures of success and that the assessment of success depends on what time in the project cycle that evaluation takes place.

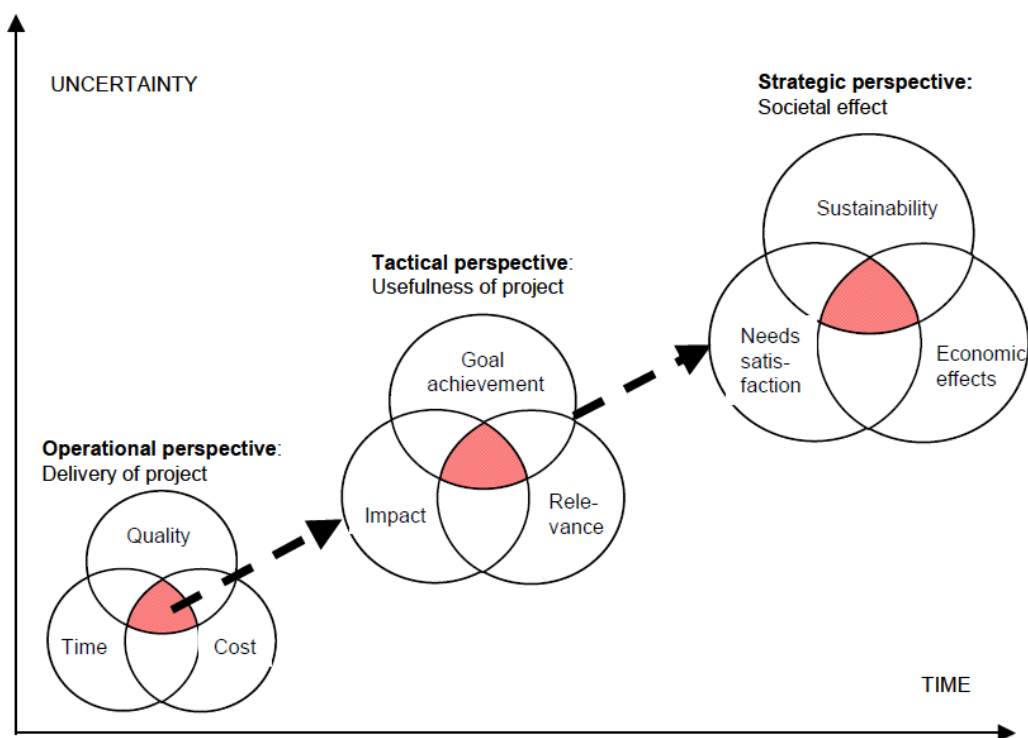


Figure 2: Different measures of success (Samset, 2003, p. 26)

The Concept Research Programme is a permanent research programme financed by the Norwegian Ministry of Finance. An important part of our research activities is annual evaluations of completed projects. We use a goal-oriented evaluation framework based on the ‘OECD’s model for evaluation’ (OECD Development Assistance Committee, 1991) and the levels of success suggested by Samset (2003). The evaluations are performed with the use of a logical framework (logframe) approach that assumes a logical link between inputs, activities, and results. The logframe approach was developed in 1969 for the U.S. Agency for International Development (USAID) and can be used both ex-ante for planning and designing new projects, and ex-post for monitoring and evaluating existing ones. It is widely used by multilateral donor organisations to evaluate the success of development aid programmes, but only to a limited extent to evaluate transport projects (Chianca, 2008).

Although a number of studies have documented that crucial input parameters in ex-ante appraisals have been inaccurate and that projects have failed to deliver their intended impacts, comprehensive ex-post evaluation of transport projects have rarely been performed (International Transport Forum, 2017). The few countries that have implemented frameworks for evaluations have focused their efforts on the monetised impacts included in the cost–benefit analysis (CBA) (Nicolaisen and Driscoll, 2016). However, the increasingly broad strategic scope of transport investments suggests that ex-post evaluations should adopt a wider perspective than can be summarised in an economic assessment.

The evaluation framework used by the Concept Research Programme is generic and based on both quantitative and qualitative sources. Table 1 lists the evaluation criteria used in the evaluations. Together, the criteria cover both traditional value for money, as measured by CBA, and other measures of success that may be important to decision-makers, users, and other stakeholders.

Table 1: Goal-oriented framework for ex-post evaluation

Criterion	Focus
Efficiency	Measures operational success: To what degree have the outputs achieved derived from efficient use of financial, human and material resources?
Effectiveness	Measures tactical success: Have the stated goals been achieved and to what extent has the project contributed to the goal achievement?
Impact	Measures strategic success: Has the project had any other positive or negative consequences other than those planned?
Relevance	Measures strategic success: Has the project been in line with the needs and priorities of the owners, the intended users, and other affected parties?
Sustainability	Measures strategic success: Are the positive effects derived from the project likely to continue after the project has been completed?
Value for money	Has the project delivered a positive net present value?

To strengthen the appraisal and to enable ex-post evaluation, all large Norwegian public investment projects must outline their intended output, outcome, and long-term strategic purpose in their business cases. The formulated objectives follow a logical framework whereby a hierarchy of objectives support each other in a causal-effect line.

The evaluation process is identical for all evaluations and proceeds as follows:

- 1) A project is selected. Projects eligible for ex-post evaluation will have been subject to the Ministry of Finance's Quality Assurance (QA) regime, implying external scrutiny of business cases. They must have an estimated cost above EUR 55 million and the resulting infrastructure must have been in operation for at least three years.
- 2) A multidisciplinary evaluation team is established to carry out each evaluation. The budgets usually allow for approximately three person-months in total.
- 3) The team reviews and, if necessary, adjusts the goal structure of the project so that results can be compared with the project goals, and then breaks down the evaluation criteria into more specific evaluation questions and indicators.
- 4) The team collects and analyses data that can provide answers to the evaluation questions and indicators.
- 5) The team summarises its assessment for each of the criteria on a scale ranging from 1 to 6. Score-setting is based on common guidelines for the evaluators (Concept, 2017).
- 6) The result is a report of usually 60–100 pages plus appendices.

The evaluations are based on both quantitative and qualitative data. The NPRA collects detailed data on traffic levels, traffic accidents, construction and maintenance costs, and so forth. Quantitative data are always supplemented with interviews and observations.

For a more detailed presentation of the evaluation framework and a discussion of the motivation for applying it to public infrastructure projects in high-income countries such as Norway, see Volden (2017) and Volden and Samset (2017).

The above-described approach may be unfamiliar to countries where CBA is the dominant ex-ante appraisal methodology and where the implementation of projects with a negative net present value may be unthinkable. Norway has a long tradition in the use of CBA and all large transport projects must be subjected to a full economic impact assessment, but a number of studies have documented that the use of the CBA results have been limited. The most recent study revealed that projects with positive BCRs were not more likely to be selected for implementation than projects with negative BCRs (Eliasson et al., 2014). That means that Norwegian decision-makers have emphasised other criteria than value for money when selecting projects for implementation. In order to be relevant, ex-post evaluation thus needs to capture all of the ambitions of decision-makers, regardless of whether they might be included in the CBA.

One of the biggest challenges in evaluation relates to isolating the effects of the intervention – that is, determining what would have happened if a particular scheme had not been implemented. Identifying causality is a particularly important part of evaluation. Estimates of positive outcomes and impacts are of limited use for decision-makers and future projects if they cannot be attributed to the project with a reasonable degree of certainty. In many cases, areas where transport investment takes place differ from other areas in that there is already an increasing level of economic activity. At other times, there may be several simultaneous interventions, which may make it difficult to isolate the effects of a particular scheme (WWC, 2015).

The quality of evaluations can be measured on the basis of the robustness of the methods applied. Sherman et al. (1998) developed a five-point scale called the Maryland Scientific Methods Scale (SMS) to evaluate the methodological quality of studies. The SMS levels range from simple before-and-after studies, at the lowest level, to randomised treatment and control groups. Although the SMS scale clearly has merit, it is best suited for evaluations that rely on mainly quantitative data. In reality, evaluations often rely on conflicting information, controversial issues, and respondents with differing interests. In cases when an evaluation relies on a combination of data sources, all data should be examined from different theoretical perspectives. Triangulation combines information from different sources and may overcome issues with bias and inaccuracies.

4. Evaluation of the E6 project

The evaluation of the E6 project (i.e. the section through Østfold) was carried out in 2016, five years after the final section of the road opened for traffic. The core evaluation team comprised four evaluators with a budget of approximately EUR 100,000. The evaluation was based on the six criteria outlined in Table 1 and included a large number of documents, in-depth interviews with 14 representatives from the NPRA, local and regional authorities, and the business community, and shorter data-collection interviews with a further eight representatives from government agencies, public transport operators, and other stakeholders. A summary of the evaluation results is presented in the following (see Ulstein et al., 2017 for the full report). Meunier and Welde (2017) provided results from other evaluations of Norwegian transport projects.

4.1 Efficiency

Throughout the 1980s and 1990s, cost overruns were common in Norwegian public investment projects. Although the NPRA had a well-developed methodology for cost estimation based on quantitative risk analysis and Monte Carlo simulation, large road projects were routinely underestimated and had to apply for supplementary grants from the Norwegian parliament. However, since the start of the new millennium, the plans for large projects have been thoroughly scrutinised through external quality assurance and are required to have a high level of maturity before any significant funds are allowed to flow (see Samset, 2017, for details on the governance scheme). According to Odeck et al. (2015), the majority of Norwegian road projects have come in under budget.

In 1999, when the Norwegian parliament took the decision to implement the E6 by approving tolling and committing the necessary state funds, the E6 development was considered a large road project. It was therefore an attractive project both within the NPRA and for local, regional, and, to some extent, regional contractors. The NPRA managed to recruit competent personnel and maintain good staff continuity throughout the development. The market responded well to the calls for tenders and the project came in just below the P50 estimate, as shown in Table 2.

Table 2: Final costs of the five subprojects in the E6 project (in million NOK, 2015¹)

Section	P50	Final cost	Deviation
Riksgrensen (border with Sweden)–Svingenskogen	1185	1188	0%
Svingenskogen–Åsgård	2944	3034	3%
Åsgård–Halmstad	858	526	-39%
Halmstad–Patterød	464	460	-1%
Patterød–Akershus border	448	452	1%
SUM	5898	5660	-4%

Four of the subprojects came in around the expected value, but one experienced a significant cost underrun. Interestingly, when the external consultants reviewed the NPRA's estimate they suggested that the estimate should be increased. This demonstrates that cost estimates will always be uncertain, even if they are scrutinised by an independent third party. Fortunately, in the case project the outcome of the uncertainty was positive. The soil conditions turned out to be more favourable than expected and the market response enabled more efficient solutions than foreseen. The construction was separated into several subcontracts. This was attractive to medium-sized local contractors. Furthermore, the client organisation managed to recruit and retain competent personnel. The same organisation was responsible for all subprojects and valuable skills were built along the way.

The encouraging results of the cost performance of the E6 project are not incidental. Other studies of cost performance of Norwegian government projects have shown similar results. The majority of large government investment projects subjected to external quality assurance have final costs below budgets (Odeck et al., 2015; Meunier and Welde, 2017; Welde, 2017).

4.2 Effectiveness

As outlined in the business case for the project, the primary objective for the E6 project was to reduce the number of accidents. Today, traffic levels have more than doubled compared with those prior to the project, yet the number of accidents and, more importantly, the number of fatal accidents has almost been eliminated. Figure 3 shows the reduction in deaths and severe injuries on the E6 in the period 1996–2016, which covers the years before the new road opened (1996–2000), during construction (2001–2008), and after full completion (2009–2016). Although the number of traffic accidents has been reduced nationally due to improved vehicle technology, Figure 3 clearly illustrates that the risk of death or serious injury has been reduced.

¹ As of April 2018, 1 NOK is equivalent to c.0.11 EUR.

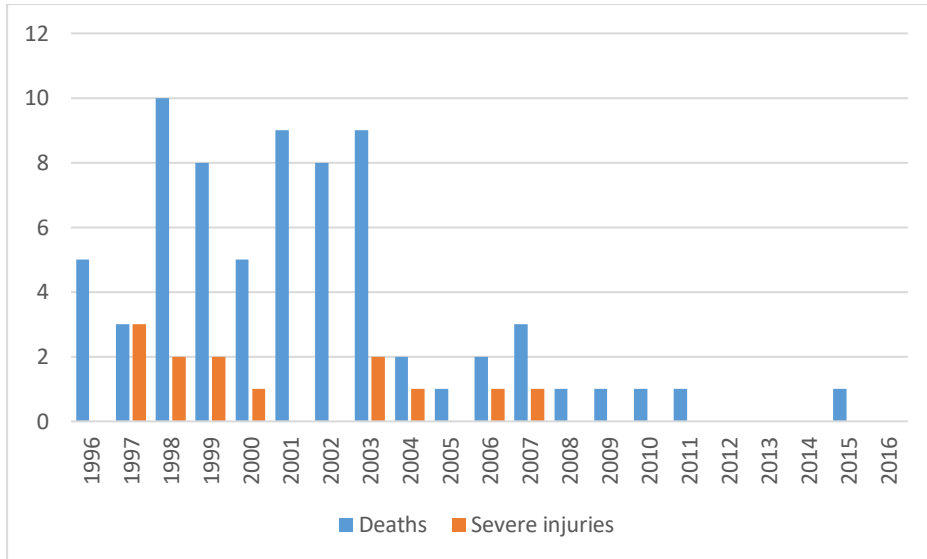


Figure 3: Deaths and severe accidents on the E6 from 1996 to 2016

Elvik et al. (2017) used the data collected in the evaluation and controlled for potentially confounding factors, such as regression to the mean, long-term trends and exogenous changes in traffic volume. They found that when controlling for these factors, there was a 75% reduction in the numbers of persons killed or seriously injured (statistically significant at the 5% level). Neither the change in injury accidents nor the change in slightly injured road users was found to be statistically significant.

Congestion has been reduced along the E6 through Østfold. Measured by the speed limit, travel time has been reduced by 20%, but before the road was dualled, vehicles would struggle to reach the allowed speed limit due to regular congestion. However, the local road network has not been improved and consequently some motorists use the E6 for very short journeys, which causes congestion around towns and junctions during peak periods.

The improved road was also expected to increase interaction between the towns in the region and with national and international markets. Interviews with representatives from local authorities and the business community indicated that the road was no longer seen as a barrier to movement. Between the towns along the E6 in Østfold, the numbers of commuters have increased by 30%, as shown in Figure 4.

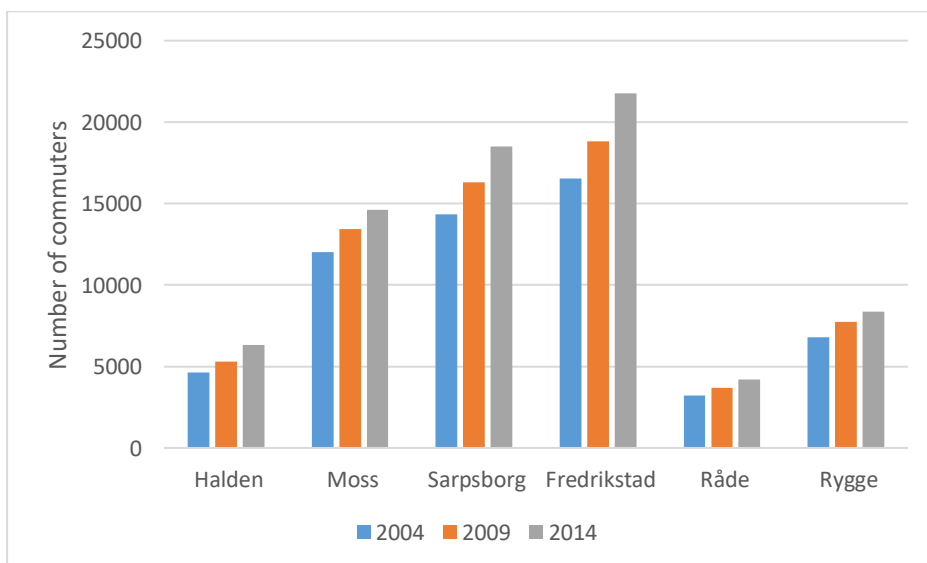


Figure 4: Number of commuters between the towns along the E6 in the county of Østfold

4.3 Other impacts

An ex-post evaluation should identify all impacts, regardless of whether they were planned or not planned. In the 1960s, the route of the E6 in Østfold was located outside all towns and most built-up areas, and that reduced the need for compulsory purchase of farmland when the road was dualled 40 years later. However, the loss of farmland in this fertile part of the country was still significant.

A motorway through forests and countryside can never be an environmental measure and will inevitably act as a barrier to animals and birds, and potentially to fish. However, in the case of the E6 in Østfold, major negative effects on the natural environment have been avoided by the incorporation of fauna passages and fish-friendly culverts.

A clearly negative effect of the new road is increased emissions due to increased traffic. Increased road capacity leads to more traffic and hence to greenhouse gas emissions. However, through agreements with the Ministry of Transport, the towns along the E6 have since the completion of the project committed to zero-growth in car transport. The increased road capacity and increases in other types of traffic than cars may be at odds with this objective.

Road investments are often motivated by a desire to improve economic growth. Although the Norwegian road authorities traditionally have been reluctant to include 'wider economic impacts' in their ex-ante appraisals, an increasing number of studies have tried to estimate potential impacts ex-ante or ex-post (e.g. Hansen and Johansen, 2017). The new E6 has reduced commuter distances and the road is no longer considered a barrier to growth in the county of Østfold. However, and as Figure 5 shows, the value creation (defined as wage costs plus operating result before depreciation) in companies located in municipalities along the E6 have been largely similar to the companies located in municipalities elsewhere in the county.

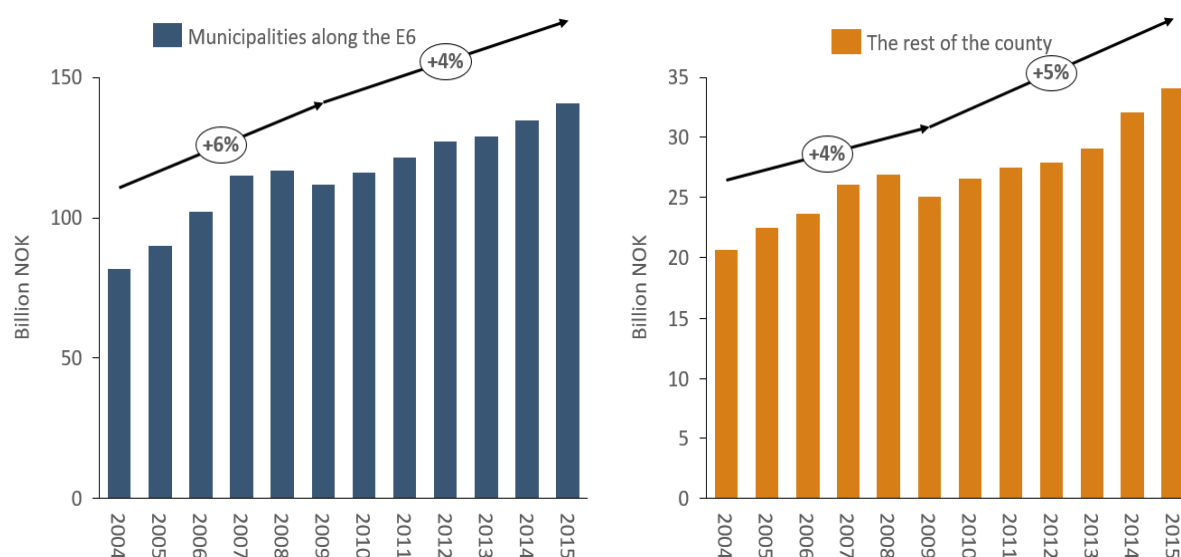


Figure 5: The E6 project's value creation in different parts of Østfold County

4.4 Relevance

A road project's relevance must be assessed against the needs of the users, but also the long-term strategic objectives of the road sector.

The strategic case for the project was based on continuous traffic growth, which had resulted in many traffic accidents. Prior to the project, the annual average daily traffic (AADT) was in the range of 14,000–23,000 vehicles per day; today, the corresponding range is 15,000–40,000. The annual traffic increase since opening has been much higher than the national and regional average. This is an indication that

there was a large reservoir of suppressed demand due to insufficient road capacity. All informants in the evaluation pointed to the poor traffic safety record prior to the dualling of the E6 and that the road improvements were highly appreciated. Thus, this was a beneficial outcome, in addition to the reduction in traffic accidents.

In a broader and more strategic perspective, road projects should support the overall strategic objectives as set out in the National Transport Plan² (NTP) for 2018–2029. The main objectives of the NTP are to improve accessibility, reduce the number of traffic accidents, and to reduce the negative environmental effects of transport. The new E6 was clearly a relevant measure for the first two objectives, but not the third, thus exemplifying a conflict between objectives, which can occur frequently in the transport sector.

Conflicting objectives is a well-known issue in transport planning. This, it is important that the conceptual appraisal in the front-end of projects adequately discusses a project's objectives from a strategic perspective. When the E6 project was planned, the extent of intermodal appraisal was limited. If the same road project were to be planned today, it is more likely that additional public transport measures would be considered.

4.5 Sustainability

Although the planned user benefits of the road have been realised, an evaluation must assess whether these benefits will continue in the future. The obvious threat to continuing benefits from the road is the increasing traffic levels. Given current levels of growth, congestion will start to become a problem in 10–15 years, especially if the tolls are removed. However, a series of measures such as dualling the railway, improving the quality of and increasing the capacity of the ports, and city transport packages that include both cordon tolls and improved public transport may help sustain the current benefits.

4.6 Value for money

Although the above-mentioned criteria measure the different short-term and long-term objectives of projects, the economic appraisal seeks to calculate the value for money of a project based on summary measures, such as the net present value or the benefit–cost ratio (BCR). Norwegian road projects are rarely selected on the basis of their economic merits, yet regardless of the limited use of CBA, the NPRA spends a lot of time and other resources on the ex-ante appraisal. Odeck (2010) studied the impact of the CBA results on project selection and found that while the CBA per se did not matter in the decision-making process, its components (e.g. the impacts on travel time, safety, and emissions) played a significant role in the selection of projects.

The marginal use of CBA may have resulted in an unusual result, namely pessimism bias in the ex-ante appraisals. The Ministry of Transport has instructed the NPRA to carry out ex-post assessment of 3–5 road projects annually. The purpose is to verify whether the estimated costs and benefits in the CBA deviate from real outcomes. Thus far, results indicate that the original CBAs were based on conservative estimates, as 20 out of 25 projects have shown improvements in net present values compared with the original analyses. The main reason for higher benefits has been that the rate of traffic growth has been higher than forecasted and that the frequency of accidents had been lower (Kjerkreit and Odeck, 2015). The evaluation of the E6 project found the same results, as all of the subprojects delivered positive value for money and BCRs between 1.5 and 7.4. These results are in contrast to the ex-ante appraisals, which estimated that all subprojects would deliver negative to poor value for money.

Overestimation of benefits, in some cases deliberately, may bias the decision-making process and lead to poor resource allocation. In the case project, and in a lot of other Norwegian road projects, the estimated

² The National Transport Plan outlines how the Government intends to prioritise resources within the transport sector. It is a 12-year plan (extended from an earlier 102-year plan) that is revised every fourth year. The plan provides a comprehensive basis on which to make decisions, in addition to addressing other important policy issues. It seeks to ensure the efficient use of resources and to strengthen the interaction between the various modes of transport (Avinor et al., 2017).

net benefits ex-ante were lower than the realised benefits ex-post. Underestimation may be considered preferable to overestimation, but considerable underestimation of benefits may also imply that projects that deliver value for money are not selected for implementation. Increased use of CBA and more accurate estimation of benefits may deliver higher benefits to society. If the benefits of the project had been demonstrated at an earlier stage, more lives could have been saved.

4.7 Summary

The assessment of the individual evaluation criteria suggests that the E6 project through the county of Østfold has been a success. The project was implemented efficiently and largely achieved its goals. The environmental impacts were acceptable and the project fits well within the overall strategy for the transport sector. The project's value for money is good and considerably better than estimated ex-ante. The evaluation's assessment for each of the criteria, on a scale from 1 to 6, is shown in Figure 6.

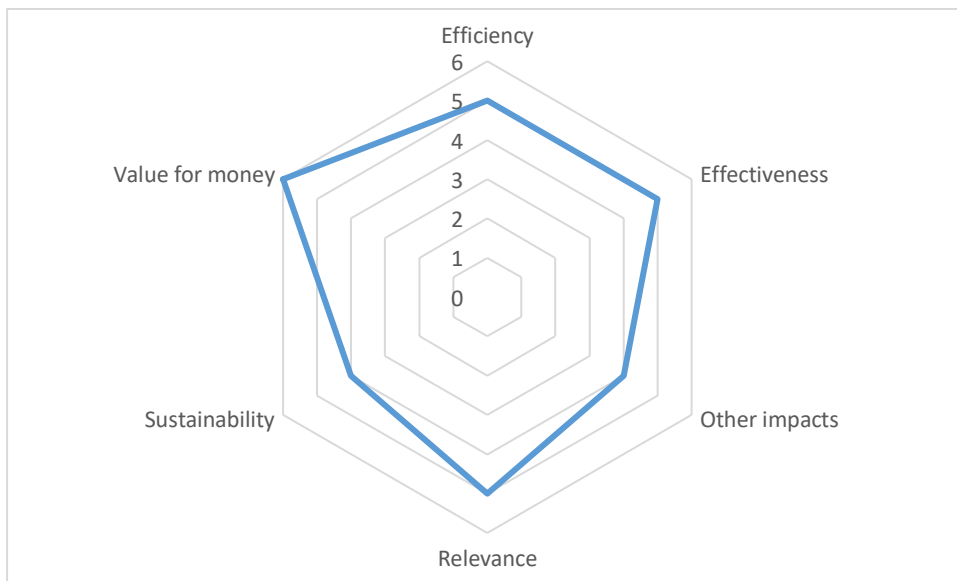


Figure 6: Summary of results of the evaluation of the E6 through Østfold project

It could be argued that it should be relatively straightforward to relieve congestion and reduce traffic accidents by widening a congested trunk road, and to do so without going over budget. However, the international literature on underestimation of costs, overestimation of benefits, and on poor project performance in general suggests that project success can be challenging to achieve (Flyvbjerg, 2009; Odeck, 2017). The case project may thus provide some useful lessons for similar projects elsewhere.

5. Concluding remarks

Like most countries, Norway uses large resources on the ex-ante appraisal of road projects, and the expectations of the results that the projects may deliver are generally high among most stakeholders. Despite this, ex-post evaluation of transport projects aimed at determining how schemes have actually performed continues to be relatively uncommon. In most cases, evaluation is carried out by means of CBA. Although the use of economic appraisal is widespread in most countries, its use in practical decision-making varies. In most cases, value for money is only a partial criterion for decision-making. Strategic policy considerations related to economic growth, sustainability, and regeneration have become increasingly important in many countries. As a result, both ex-ante appraisal and ex-post evaluation should include the range of impacts that decision-makers care about.

This paper has presented an evaluation framework that is being used to assess the success of Norwegian transport projects. The paper has argued that success is a heterogeneous concept and that evaluation should be sufficiently broad to map the results of a scheme against the objectives set out in the original

business case. Therefore, there should be a two-way link between appraisal and evaluation to allow for learning and accountability.

The paper has illustrated the use of the evaluation framework on the E6 motorway project in the county of Østfold, which has linked the Oslo region to Sweden and to international markets. The reported evaluation concluded that the project has been successful measured against most criteria ex-post.

The evaluation concluded that the success of the project could be attributed to a number of factors. First, the severity ex-ante with respect to traffic accidents and congestion indicated that the potential for improvements was substantial. Second, the road was planned and aligned as a motorway decades ago, when traffic levels were negligible. This reduced the negative impacts that the road could have had. Third, the project would not have been realised if local authorities had not agreed to toll financing. This controversial issue was overcome by the relentless and combined work of the county mayor and the regional road manager. Fourth, the cost estimation methodology employed by the NPRA combined with the mandatory QA regime of the Ministry of Finance resulted in good cost compliance. Fifth, the NPRA recruited and maintained a stable and competent client organisation that managed to utilise economies of scale throughout the construction period. Sixth, and finally, improving longer stretches of the motorway has delivered larger benefits than if only partial sections had been delivered. The practice of toll financing long-distance motorways has since become the model for other parts of the Norwegian trunk road network.

Ex-post evaluation is important for analysing the effectiveness of transport projects in order to improve the performance of future interventions and to enhance transparency and accountability. This paper has demonstrated that a broad evaluation framework widely used elsewhere could also be used to evaluate the success of transport projects. However, past project success is no guarantee for future success. The results of evaluations such as the one presented in this paper should therefore be used actively to improve future project selection and implementation.

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