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Ole Henning Nyhus

The importance of value
for money when choosing
a road route in the
municipal sub-plan process

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The importance of value for money when choosing a road route in the municipal sub-plan process

Betydningen av lønnsomhet ved valg av vegtrasé i kommunedelplanprosessen

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English summary

The use of cost-benefit analyses has a long tradition in the road sector. In Norway, all road projects of a certain size must undergo an economic analysis at least once in the planning process. However, previous studies show no or little association between profitability and project prioritization in the National Transport Plan.

In contrast to analyses of projects in the National Transport Plan, we investigate the relationship between profitability and investment recommendation in prioritizing different road alignments within the same project. This process is scheduled at an earlier stage than the project's cost-benefit analyses in the National Transport. Few earlier studies have looked into this topic earlier.

The choice of road alignment is usually decided in local government sector plans based on an impact assessment. The impact assessment includes a cost-benefit analysis of both the monetized and non-monetized effects of alternative road routes. The analysis clarifies the costs and benefits of the various road alternatives and evaluates the various solutions against each other. The Norwegian Public Roads Administration (Statens vegvesen) is responsible for preparing the assessment. The final report will include a recommendation of which route the Roads Administration believes should be implemented. However, it is the affected municipalities that have the decision-making authority to adopt the plans.

Our study's point of departure is a dataset consisting of 97 Norwegian road projects with 684 different road alignments. The dataset's information is collected through reports addressing each project impact assessment. Our main goal was to examine if monetized and non-monetized effects are emphasized in the Norwegian Public Roads Administration's route recommendation. We also examine if the different monetized and non-monetized effects are prioritized differently, e.g., if NOK 1 in road user utility affects the recommendation equal to NOK 1 of another type of utility. Furthermore, we investigate whether the municipal decision complies with the Roads Administration's recommendation in a sample of 46 projects and what may explain potential differences in prioritization.

Key figures from the impact assessment

Monetized effects are always evaluated relative to a scenario where no new significant investments are made. This scenario might cause some investments, for example, by necessary maintenance or upgrading of an existing road. The net benefits for all alternatives are calculated relative to this scenario, where monetized effects always are normalized to zero for this reference scenario. Net benefit, net benefit–investment cost ratio, and the road alignment’s ranking according to non-monetized effects are the three key variables from the cost-benefit analysis. The first two provide two different ways to make an overall assessment of the monetized effects:

- The net benefit is the difference between the estimated monetized benefits and the investment costs of an alternative
- Net benefit–investment cost ratio is a relative measure of profitability and describes how much benefit you get for monetized unit invested.

The ranking of alternatives according to non-monetized effects is made after an overall assessment of non-monetized effects.

The Norwegian Public Roads Administration emphasizes the results of the impact assessment in its recommendation

We find that net benefit is important when it comes to prioritizing between alternative roads within the same project:

- If the net benefit increases by NOK 1 billion, all other things being equal, the probability that an alternative is recommended will increase by approximately 16 percent.

The same is the case for the alternative’s ranking according to non-monetized effects and net benefit-investment cost ratio:

- If an alternative is ranked one unit higher according to non-monetized effects, the probability for recommendation increases by approximately 20 percent.
- Suppose the net benefit-investment cost ratio is doubled, which indicates that the alternative’s benefit is doubled compared to the cost.

In that case, the road alternative has a 145 times higher probability of being recommended.

However, the significance of the latter two findings depends on us taking into account that the reference scenario (for example, necessary maintenance of existing road), i.e., the scenario with net benefit equals zero, (almost) never is recommended. This is probably due to that it is not looked upon as a real alternative in the process. For many projects, all the studied alternatives have negative monetized and non-monetized effects, often causing the reference scenario to be the most profitable alternative.

In short, our results show that the Roads Administration (Statens vegvesen) emphasizes both net benefit, net benefit-investment cost ratio, and the alternative's ranking according to non-monetized effects. This result contrasts studies evaluating profitability and prioritization between different road projects, where no such associations are found.

The different monetized effects are emphasized equally

Furthermore, we have investigated whether the Roads Administration assesses various monetized effects differently. We do not find evidence for this.

The different non-monetized effects are emphasized differently

Regarding different non-monetized effects, we find that the ranking according to the local environment and outdoor life, as well as ranking regarding natural resources, affects prioritization. Ranking according to other non-monetized effects are not associated with prioritization.

A robustness check of the estimated effects gives qualitatively the same results

The proven relationships described above are analyzed using a logistical choice model. We have investigated these associations in a linear probability model with fixed road project effects as a robustness check. Qualitatively, we find precisely the same effects as we did when analyzing the associations with a logistic choice model.

Does the Roads Administration's recommendation correspond with the municipal decision?

Finally, we examine the correspondence between the Roads Administration's recommendation and the political decision in the local governments. Several reasons mean that it is not unreasonable to assume a large degree of agreement between municipal decisions and the Norwegian Public Roads Administration's recommendation:

- The Roads Administration knows that the council in the local governments usually have the final decision. This might provide incentives to recommend an alternative they know that the local government might accept.
- The Norwegian Public Roads Administration may object to specific alternatives, for example, if the cost is unreasonably high. This can limit how the municipality perceives the real number of alternatives and provide incentives to adopt the Roads Administration's recommendation. In our data set, we have registered objections for 138 of the 684 possible alternatives.

Among the 46 municipal decisions we have obtained information about, 14 decisions differ from the recommendation. By evaluating the probability for recommendation and local government council decision for these 46 projects, respectively, we find that:

- Local politicians also value profitability, but the association is somewhat weaker than that for the Roads Administration's recommendation.
- According to what we find for the Roads Administration's recommendation, ranking according to non-monetized effects seems somewhat more important for the local councils.

Furthermore, we have investigated if the discrepancy between the local authorities and the Roads Administration can be explained. The findings are the following:

- The proportion of politicians on the socialist side and the proportion of women in the municipal council do not seem to affect whether the political decision is in accordance with the Roads Administration's recommendation.

- The local council's decision seems to be less in accordance with the Roads Administration's recommendation when the project involves several municipalities and when political fragmentation is high. However, since we only have 46 observations, the estimated correlations are too imprecisely estimated for these correlations to be statistically significant.

The degree of agreement and what can explain differences between the Roads Administration's proposed road alignment and local government preference are interesting issues that may be the subject of further research.

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Report	Title	Author (-s)
No 1	Styring av prosjektporteføljer i staten. Usikkerhetsavsetning på porteføljenivå <i>Project Portfolio Management. Estimating Provisions for Uncertainty at Portfolio Level.</i>	Stein Berntsen and Thorleif Sunde
No 2	Statlig styring av prosjektleidelse. Empiri og økonomiske prinsipper. <i>Economic Incentives in Public Project Management</i>	Dag Morten Dalen, Ola Lædre and Christian Riis
No 3	Beslutningsunderlag og beslutninger i store statlige investeringsprosjekt <i>Decisions and the Basis for Decisions in Major Public Investment Projects</i>	Stein V. Larsen, Eilif Holte and Sverre Haanæs
No 4	Konseptutvikling og evaluering i store statlige investeringsprosjekt <i>Concept Development and Evaluation in Major Public Investment Projects</i>	Hege Gry Solheim, Erik Dammen, Håvard O. Skaldebø, Eystein Myking, Elisabeth K. Svendsen and Paul Torgersen
No 5	Bedre behovsanalyser. Erfaringer og anbefalinger om behovsanalyser i store offentlige investeringsprosjekt <i>Needs Analysis in Major Public Investment Projects. Lessons and Recommendations</i>	Petter Næss
No 6	Målformulering i store statlige investeringsprosjekt <i>Alignment of Objectives in Major Public Investment Projects</i>	Ole Jonny Klakegg
No 7	Hvordan tror vi at det blir? Effektvurderinger av store offentlige prosjekter <i>Up-front Conjecture of Anticipated Effects of Major Public Investment Projects</i>	Nils Olsson
No 8	Realopsjoner og fleksibilitet i store offentlige investeringsprosjekt <i>Real Options and Flexibility in Major Public Investment Projects</i>	Kjell Arne Brekke

No 9	<p>Bedre utforming av store offentlige investeringsprosjekter. Vurdering av behov, mål og effekt i tidligfasen</p> <p><i>Improved Design of Public Investment Projects. Up-front Appraisal of Needs, Objectives and Effects</i></p>	<p>Petter Næss med bidrag fra Kjell Arne Brekke, Nils Olsson and Ole Jonny Klakegg</p>
No 10	<p>Usikkerhetsanalyse – Kontekst og grunnlag</p> <p><i>Uncertainty Analysis – Context and Foundations</i></p>	<p>Kjell Austeng, Olav Torp, Jon Terje Midtbø, Ingemund Jordanger, and Ole M Magnussen</p>
No 11	<p>Usikkerhetsanalyse – Modellering, estimering og beregning</p> <p><i>Uncertainty Analysis – Modeling, Estimation and Calculation</i></p>	<p>Frode Drevland, Kjell Austeng and Olav Torp</p>
No 12	<p>Metoder for usikkerhetsanalyse</p> <p><i>Uncertainty Analysis – Methodology</i></p>	<p>Kjell Austeng, Jon Terje Midtbø, Vidar Helland, Olav Torp and Ingemund Jordanger</p>
No 13	<p>Usikkerhetsanalyse – Feilkilder i metode og beregning</p> <p><i>Uncertainty Analysis – Methodological Errors in Data and Analysis</i></p>	<p>Kjell Austeng, Vibeke Binz and Frode Drevland</p>
No 14	<p>Positiv usikkerhet og økt verdiskaping</p> <p><i>Positive Uncertainty and Increasing Return on Investments</i></p>	<p>Ingemund Jordanger</p>
No 15	<p>Kostnadsusikkerhet i store statlige investeringsprosjekter; Empiriske studier basert på KS2</p> <p><i>Cost Uncertainty in Large Public Investment Projects. Empirical Studies</i></p>	<p>Olav Torp (red.), Ole M Magnussen, Nils Olsson and Ole Jonny Klakegg</p>
No 16	<p>Kontrahering i prosjektets tidligfase. Forsvarets anskaffelser.</p> <p><i>Procurement in a Project's Early Phases. Defense Aquisitions</i></p>	<p>Erik N. Warberg</p>
No 17	<p>Beslutninger på svakt informasjonsgrunnlag. Tilnærminger og utfordringer i prosjekters tidlige fase</p> <p><i>Decisions Based on Scant Information. Challenges and Tools During the Front-end Phases of Projects</i></p>	<p>Kjell Sunnevåg (red.)</p>

No 18	<p>Flermålsanalyser i store statlige investeringsprosjekt</p> <p><i>Multi-Criteria Decision Analysis In Major Public Investment Projects</i></p>	<p>Ingemund Jordanger, Stein Malerud, Harald Minken and Arvid Strand</p>
No 19	<p>Effektvurdering av store statlige investeringsprosjekter</p> <p><i>Impact Assessment of Major Public Investment Projects</i></p>	<p>Bjørn Andersen, Svein Bråthen, Tom Fagerhaug, Ola Nafstad, Petter Næss and Nils Olsson</p>
No 20	<p>Investorers vurdering av prosjekters godhet</p> <p><i>Investors' Appraisal of Project Feasibility</i></p>	<p>Nils Olsson, Stein Frydenberg, Erik W. Jakobsen, Svein Jessen, Roger Sørheim og Lillian Waagø</p>
No 21	<p>Logisk minimalisme, rasjonalitet - og de avgjørende valg</p> <p><i>Major Projects: Logical Minimalism, Rationality and Grand Choices</i></p>	<p>Knut Samset, Arvid Strand and Vincent F. Hendricks</p>
No 22	<p>Miljøøkonomi og samfunnsøkonomisk lønnsomhet</p> <p><i>Environmental Economics and Economic Viability</i></p>	<p>Kåre P. Hagen</p>
No 23	<p>The Norwegian Front-End Governance Regime of Major Public Projects – A Theoretically Based Analysis and Evaluation</p>	<p>Tom Christensen</p>
No 24	<p>Markedsorienterte styringsmetoder i miljøpolitikken</p> <p><i>Market oriented approaches to environmental policy</i></p>	<p>Kåre P. Hagen</p>
No 25	<p>Regime for planlegging og beslutning i sykehusprosjekter</p> <p><i>Planning and Decision Making in Hospital Projects. Lessons with the Norwegian Governance Scheme.</i></p>	<p>Asmund Myrbostad, Tarald Rohde, Pål Martinussen and Marte Lauvsnes</p>
No 26	<p>Politisk styring, lokal rasjonalitet og komplekse koalisjoner. Tidligfaseprosessen i store offentlige investeringsprosjekter</p> <p><i>Political Control, Local Rationality and Complex Coalitions. Focus on the Front-End of Large Public Investment Projects</i></p>	<p>Erik Whist and Tom Christensen</p>
No 27	<p>Verdsetting av fremtiden. Tidshorisont og diskonteringsrenter</p>	<p>Kåre P. Hagen</p>

Valuing the future. Time Horizon and Discount Rates

- | | | |
|-------|--|---|
| No 28 | Fjorden, byen og operaen. En evaluering av Bjørvikautbyggingen i et beslutningsteoretisk perspektiv <i>The Fjord, the City and the Opera. An Evaluation of Bjørvika Urban Development</i> | Erik Whist and Tom Christensen |
| No 29 | Levedyktighet og investeringstiltak. Erfaringer fra kvalitetssikring av statlige investeringsprosjekter

<i>Sustainability and Public Investments. Lessons from Major Public Investment Projects</i> | Ola Lædre, Gro Holst Volden and Tore Haavaldsen |
| No 30 | Etterevaluering av statlige investeringsprosjekter. Konklusjoner, erfaringer og råd basert på pilotevaluering av fire prosjekter

<i>Evaluating Public Investment Projects. Lessons and Advice from a Meta-Evaluation of Four Projects</i> | Gro Holst Volden and Knut Samset |
| No 31 | Store statlige investeringers betydning for konkurranse- og markedsutviklingen. Håndtering av konkurransemessige problemstillinger i utredningsfasen

<i>Major Public Investments' Impact on Competition. How to Deal with Competition Issues as Part of the Project Appraisal</i> | Asbjørn Englund, Harald Bergh, Aleksander Møll and Ove Skaug Halsos |
| No 32 | Analyse av systematisk usikkerhet i norsk økonomi.

<i>Analysis of Systematic Uncertainty in the Norwegian Economy.</i> | Haakon Vennemo, Michael Hoel and Henning Wahlquist |
| No 33 | Planprosesser, beregningsverktøy og bruk av nytte-kostnadsanalyser i vegsektoren. En sammenlikning av praksis i Norge og Sverige.

<i>Planning, Analytic Tools and the Use of Cost-Benefit Analysis in the Transport Sector in Norway and Sweden.</i> | Morten Welde, Jonas Eliasson, James Odeck and Maria Börjesson |
| No 34 | Mulighetsrommet. En studie om konseptutredninger og konseptvalg

<i>The Opportunity Space. A Study of Conceptual Appraisals and the Choice of Conceptual Solutions.</i> | Knut Samset, Bjørn Andersen and Kjell Austeng |
| No 35 | Statens prosjektmodell. Bedre kostnadsstyring. Erfaringer med de første | Knut Samset and Gro Holst Volden |

	investeringstiltakene som har vært gjennom ekstern kvalitetssikring	
No 36	Investing for Impact. Lessons with the Norwegian State Project Model and the First Investment Projects that Have Been Subjected to External Quality Assurance	Knut Samset and Gro Holst Volden
No 37	Bruk av karbonpriser i praktiske samfunnsøkonomiske analyser. En oversikt over praksis fra analyser av statlige investeringsprosjekter under KVV-/KS1-ordningen. <i>Use of Carbon Prices in Cost-Benefit Analysis. Practices in Project Appraisals of Major Public Investment Projects under the Norwegian State Project Model</i>	Gro Holst Volden
No 38	Ikke-prissatte virkninger i samfunnsøkonomisk analyse. Praksis og erfaringer i statlige investeringsprosjekter <i>Non-Monetized Impacts in Economic Analysis. Practice and Lessons from Public Investment Projects</i>	Heidi Bull-Berg, Gro Holst Volden and Inger Lise Tyholt Grindvoll
No 39	Lav prising – store valg. En studie av underestimering av kostnader i prosjekters tidligfase <i>Low estimates – high stakes. A study of underestimation of costs in projects' earliest phase</i>	Morten Welde, Knut Samset, Bjørn Andersen and Kjell Austeng
No 40	Mot sin hensikt. Perverse insentiver – om offentlige investerings-prosjekter som ikke forplikter <i>Perverse incentives and counterproductive investments. Public funding without liabilities for the recipients</i>	Knut Samset, Gro Holst Volden, Morten Welde and Heidi Bull-Berg
No 41	Transportmodeller på randen. En utforsking av NTM5-modellens anvendelsesområde <i>Transport models and extreme scenarios. A test of the NTM5 model</i>	Christian Steinsland and Lasse Fridstrøm
No 42	Brukeravgifter i veisektoren <i>User fees in the road sector</i>	Kåre Petter Hagen and Karl Rolf Pedersen
No 43	Norsk vegplanlegging: Hvilke hensyn styrer anbefalingene <i>Road Planning in Norway: What governs the selection of projects?</i>	Arvid Strand, Silvia Olsen, Merethe Dotterud Leiren and Askill Harkjerr Halse

No 44	<p>Ressursbruk i transportsektoren – noen mulige forbedringer</p> <p><i>Resource allocation in the transport sector – some potential improvements</i></p>	James Odeck (ed.) and Morten Welde (ed.)
No 45	<p>Kommunale investeringsprosjekter. Prosjektmodeller og krav til beslutningsunderlag.</p> <p><i>Municipal investment practices in Norway</i></p>	Morten Welde, Jostein Aksdal and Inger Lise Tyholt Grindvoll
No 46	<p>Styringsregimer for store offentlige prosjekter. En sammenliknende studie av prinsipper og praksis i seks land.</p> <p><i>Governance schemes for major public investment projects: A comparative study of principles and practices in six countries</i></p>	Knut F. Samset, Gro Holst Volden, Nils Olsson and Eirik Vårdal Kvalheim
No 47	<p>Governance Schemes for Major Public Investment Projects. A comparative study of principles and practices in six countries.</p>	Knut F. Samset, Gro Holst Volden, Nils Olsson and Eirik Vårdal Kvalheim
No 48	<p>Investeringsprosjekter og miljøkonsekvenser. En antologi med bidrag fra 16 forskere.</p> <p><i>Environmental Impact of Large Investment Projects. An Anthology by 16 Norwegian Experts.</i></p>	Kåre P. Hagen and Gro Holst Volden
No 49	<p>Finansiering av vegprosjekter med bompenger. Behandling av og konsekvenser av bompenger i samfunnsøkonomiske analyser.</p> <p><i>Financing road projects with tolls. The treatment of and consequences of tolls in cost benefit analyses.</i></p>	Morten Welde, Svein Bråthen, Jens Rekdal and Wei Zhang
No 50	<p>Prosjektmodeller og prosjekteierstyring i statlige virksomheter.</p> <p><i>Project governance and the use of project models in public agencies and line ministries in Norway.</i></p>	Bjørn Andersen, Eirik Vårdal Kvalheim and Gro Holst Volden
No 51	<p>Kostnadskontroll i store statlige investeringer underlagt ordningen med ekstern kvalitetssikring.</p> <p><i>Cost performance in government investment projects that have been subjected to external quality assurance.</i></p>	Morten Welde
No 52	<p>Statlige investeringer under lupen. Erfaring med evaluering av de 20 første KS-prosjektene.</p>	Gro Holst Volden and Knut Samset

	<i>A Close-up on Public Investment Cases. Lessons from Ex-post Evaluations of 20 Major Norwegian Projects</i>	
No 53	<p>Fremsynsmetoder</p> <p><i>Foresight methods</i></p>	Tore Sager
No 54	<p>Neglected and underestimated impacts of transport investments</p>	Petter Næss, Gro Holst Volden, James Odeck and Tim Richardson
No 55	<p>Kostnadsstyring i entreprisekontrakter</p> <p><i>Cost performance in construction contracts</i></p>	Morten Welde, Roy Endre Dahl, Olav Torp and Torbjørn Aass
No 56	<p>Erfaringer fra styring og gjennomføring av store statlige IKT-prosjekter</p> <p><i>Experiences from governance and implementation of major public ICT projects</i></p>	Håkon Finne
No 57	<p>Effektivitet og produktivitet i norsk veibygging 2007-2016</p> <p><i>Efficiency and productivity in Norwegian road construction 2007-2016</i></p>	Kenneth Løvold Rødseth, Rasmus Bøgh Holmen, Finn R. Førstund and Sverre A.C. Kittelsen
No 58	<p>Mandater for konseptvalgutredninger. En gjennomgang av praksis.</p> <p><i>The Terms of Reference Document for Conceptual Appraisal. A Review of Current Practice.</i></p>	Knut Samset and Morten Welde
No 59	<p>Estimering av kostnader i store statlige prosjekter: Hvor gode er estimatene og usikkerhetsanalysene i KS2-rapportene?</p> <p><i>Estimating costs in large government investment projects. How good are the estimates and uncertainty analyses in the QA2-reports?</i></p>	Morten Welde, Magne Jørgensen, Per Fridtjof Larsen and Torleif Halkjelsvik
No 60	<p>Noen krevende tema i anvendte samfunnsøkonomiske analyser. En undersøkelse av praksis i Statens prosjektmodell</p> <p><i>Salient topics in cost-benefit analyses of major public projects in Norway</i></p>	Haakon Vennemo, Jens Furuholmen, Orvika Rosnes and Leonid Andreev
No 61	<p>Samspill i bygg- og anleggsbransjen</p> <p><i>Partnering in construction projects</i></p>	Svein Bråthen, Maria Laingen, Paul Torgersen and Merethe Kristin Woldseth

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|--------|--|--|
| No 62 | Vegprosjekter, verdiskaping og lokale mål
<i>Road projects and local economic impacts</i> | Morten Welde, Eivind
Tveter and Anne Gudrun
Mork |
| No. 63 | Betydningen av lønnsomhet ved valg av
vegtrasé i kommunedelplanprosessen
<i>The importance of value for money when
choosing a road route in the municipal
sub-plan process</i> | Ingri Bukkestein and Ole
Henning Nyhus |

Forskningsprogrammet Concept skal utvikle kunnskap som sikrer bedre ressursutnyttning 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.

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