

# concept

Ingri Bukkestein, Gro Holst Volden  
and Bjørn S. Andersen

## Management of project portfolios in the public sector

Concept report no. 65



**Ingri Bukkestein, Gro Holst Volden  
and Bjørn S. Andersen**

**Management of project  
portfolios in the public  
sector**

**Concept report no. 65**

Concept report no. 65

## **Management of project portfolios in the public sector**

Original title: Styring av prosjektporteføljer i offentlig sektor

Ingri Bukkestein

*Norwegian University of Science and Technology*

Gro Holst Volden

*Norwegian University of Science and Technology*

Bjørn S. Andersen

*Norwegian University of Science and Technology*

ISSN: 0803-9763 (paper version)

ISSN: 0804-5585 (web version)

ISBN: 978-82-8433-006-8 (paper version)

ISBN: 978-82-8433-007-5 (web version)

© Concept Research Programme. The publication may be quoted freely with attribution

DATE: May 2021

PUBLISHER: Ex ante academic press

Concept Research Programme

Norwegian University of Science and Technology

7491 NTNU – Trondheim

Norway

[www.ntnu.no/concept](http://www.ntnu.no/concept)

The responsibility for the information in the reports produced on behalf of the Concept Research Programme is on the commissioned party. Views and conclusions is on account of the authors and not necessarily identical to the views of the Concept Research Programme. All contributions are reviewed in a peer review process.

# English summary

## Management of project portfolios in the public sector

In recent years, several public agencies have introduced, or are in the process of introducing, portfolio management of their projects and other measures. However, the agencies indicate that portfolio management is challenging, and that there is a need for guidance and recommendations for good practice.

This report is meant to be a step in the right direction. The aim of the study has been to investigate how portfolio management of projects is practiced in the public sector. We wanted to identify good practice, but also challenges and barriers, based on international literature and experiences from Norwegian public agencies (including ministries, government agencies, public enterprises and municipalities). The study does, however, not provide a basis for defining “best practice”, nor does it offer the final answer on how to succeed with portfolio management, as all the agencies surveyed experience challenges and have potential for improvement in their portfolio management. But based on experiences from both the literature and Norwegian practice, we give some recommendations and point to a set of success factors, i.e. conditions that facilitate the successful introduction and use of portfolio management, which we hope will be useful. We also provide recommendations for further research and method development in the area.

## Portfolio management

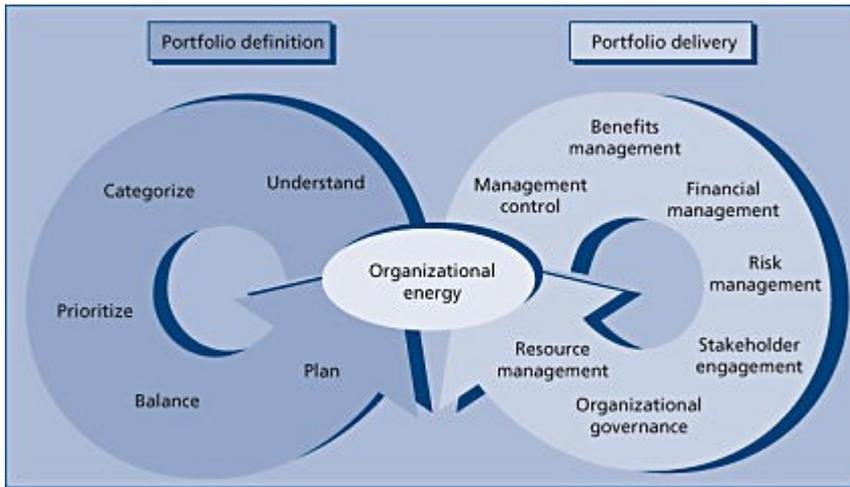
Portfolio management is what an organization does to define, balance, and manage its overall portfolio of projects and programs in such a way that strategic goals are achieved, and resources are utilized in the best possible way. A widely cited framework for portfolio management is Axelos' MoP (Management of Portfolios).

The figure shows the two cyclical sub-processes that together make up the MoP framework: the definition cycle and the delivery cycle. The first is about choosing the right projects for the portfolio and the second about managing the existing portfolio.

- The definition cycle consists of five steps: understanding, categorizing, prioritizing, balancing, and planning. The process

is intended to be repeated regularly, not least when new projects are considered for the portfolio.

- The delivery cycle consists of seven parallel activities that must be taken care of to ensure good implementation of the portfolio: management control, benefits management, financial management, risk management, stakeholder engagement, organizational governance, and resource management.



In contrast to the management of individual projects, portfolio management is an ongoing management activity that must be anchored in the permanent organization. There is also a connection between portfolio management and project governance, as both functions are typically performed at a strategic level. Project governance has been the topic of previous Concept studies, but only focusing on the governance of individual projects. It was therefore natural to take a closer look at portfolio management this time.

### **Methodological approach**

We chose a research design consisting of both qualitative and quantitative methods, to achieve triangulation. The study consists of three parts:

- Literature review: first, we performed a broad literature search to get an overview of the topic and international practice.
- Survey: then, we conducted a survey among public agencies in Norway to identify practices, and as basis for the selection of cases to examine more closely.
- Case studies: finally, we studied the practice in eight public agencies through document analysis and interviews. All eight

---

had some experience with portfolio management and were assumed to have obtained experiences that others can learn from.

The researchers also benefited from a project reference group that followed the study. The reference group consisted of both academics and practitioners with extensive knowledge of portfolio management.

### **Literature review**

Portfolio management as a concept has its origins in finance and has relatively recently been taken into use within the context of projects. There are several different definitions of the term within the context of projects. We note that “multi-project management”, “program management“ and “portfolio management” have occasionally been used interchangeably.

Most of the literature, including a wide range of theoretical selection models, has been developed in the context of private companies that freely manage their own funds. Not all these models are relevant for public agencies, although many of the learning points are generic.

In the literature, there is consensus that portfolio management has a strategic focus and is about selecting the right projects. Many studies (but not all) also define follow-up and management of ongoing projects (i.e. the delivery cycle in MoP) as an important element.

The purpose of portfolio management is often stated to be threefold: 1) Maximization of the portfolio's value, 2) Strategic alignment, and 3) Balancing. There are a number of methods and approaches for project selection, but no clear consensus about which ones perform the best. The models are often complex and require a lot of data, and it has been recommended to organize the selection process in stages and to only apply selected key parameters such as return on investment and risk. The literature also makes it clear that project selection does not happen once and for all, but that the portfolio should be re-evaluated and balanced regularly.

Some studies look at how the portfolio management function should be organized and find that the measures often go in the direction of centralization. It is recommended that a project or portfolio management office is given a central role in coordinating the work. It is also important to involve top management.

The literature finds that many companies struggle to practice portfolio management efficiently. They are often faced with the same challenges: lack of rationality in the selection process, a lack of willingness or ability to terminate

poor projects, unclear division of responsibility, and weak information flow. Some studies found that those who have implemented formalized methods and procedures for portfolio management are most successful. Others believe that an informal approach may also work well. More general advice from the literature is: to have a common stage-gate project model which is used for all projects, ensure high quality of decision-making information, and a focus on the early phase of the projects.

### **The survey**

We conducted a survey among participants in two active networks in the field of portfolio management. We received responses from 60 people in 51 organizations. A majority of these represented ordinary government agencies (26) or municipalities/county municipalities (21).

Among the results are the following:

- Portfolio management is still new to many. Half of the respondents answer that their organization has practiced it for four years or less.
- We asked the respondents to place their agency on a scale according to how actively they conduct portfolio management. The answers show that  $\frac{3}{4}$  of the companies are more or less active in portfolio management.
- Those who are most active are agencies that are highly project-based, as well as public enterprises (as opposed to traditional public sector agencies). These organizations are further characterized by having formalized guidelines and procedures, conducting portfolio management on all their projects (not just a selection), and that they have organized portfolio management as an integrated part of their management function.
- Many agencies have guidelines for portfolio management, but several of them state that these are only partially adhered to. Several also stated that the guidelines are still being developed and/or not communicated well in the organization.
- Regarding the purpose of portfolio management, most of the respondents answer that strategic goals are very important (choosing the right projects). However, to the extent that the companies have guidelines for portfolio management, these most often include data collection/reporting on the ongoing

portfolio. Project selection, on the other hand, is often more ad hoc.

- Furthermore, computer tools are rarely used for project initiation but are more common for reporting and monitoring the ongoing portfolio.
- Most agencies only conduct portfolio management for a selection of their projects, such as ICT projects or strategically important projects. A minority has organized their projects in more than one portfolio.
- As many as 70% answered that portfolio management is organized as an integrated part of the management function. The comments in free text, however, indicate that not all have fully succeeded in anchoring portfolio management in top management.
- Only 10% of the respondents experience that political restrictions are a challenge for portfolio management.

### **The case study**

We included eight agencies as cases in the study.

- Skatteetaten (the Tax Administration)
- Kartverket (the Norwegian Mapping Authority)
- Nye Veier AS
- Direktoratet for samfunnssikkerhet og beredskap (DSB) (the Norwegian Directorate for Civil Protection)
- Forsvarsdepartementet (the Ministry of Defence)
- Forsvarsmateriell (Norwegian Defence Material Agency)
- Asker Municipality
- Vestfold and Telemark County Municipality

Seven of the eight agencies are above average in terms of the level of active portfolio management, compared with the rest of the respondents from the survey. The eight cases also differ in terms of experience with portfolio management, and for some portfolio management is still fairly new. Several informants mention that the initiative to implement portfolio management came from the IT department, where there was a need to prioritize between good ideas due to overbooking of IT development resources.

Several of the agencies state that they base their portfolio management on the MoP framework, but in practice, they emphasize slightly different things.

Similar to the results from the survey, we see that the agencies have a more systematic approach to the delivery cycle. They typically demand extensive reporting on projects' performance in terms of time, cost, quality, etc. The focus is mainly on deviation from plan. Several are also concerned with resource management across the projects.

The process concerning prioritizing new projects is not as systematic and transparent in all the agencies. However, the Ministry of Defence has put in place a process for portfolio definition in line with the five steps in MoP's definition cycle. Nye Veier has established its own process where projects are developed, optimized, and re-evaluated in several rounds before final prioritization.

We also see that the level of ambition varies, from providing more value for money, to a more cautious goal of getting an overview of ongoing projects. These differences seem partly to be explained by the level of maturity in the organization.

Portfolio management in all the agencies is based on a standardized project stage-gate model. A project typically comes in for an assessment at the portfolio level at one of the first decision points in the model. Only the Norwegian Directorate for Civil Protection retains the projects in the portfolio after the formal delivery of the project to follow up benefits at the portfolio level.

All eight agencies have anchored portfolio management at the top management level. In addition, they often have a portfolio management office that collects, quality assures, and systematizes information from the projects to the portfolio level. Several of the informants emphasize the importance of quality assuring the information, as project managers *can* embellish the results.

There is agreement among the informants that portfolio management and the general management function must be closely linked. Cooperation between the portfolio management office and the unit responsible for financial and corporate governance is an important success factor. Several of the informants point out this as something they are satisfied to have achieved. At the same time, many acknowledge that it is demanding, and that portfolio management may end up "on the side" of the other organizational activities.

In practice, project selection is often influenced by political considerations, or governed by rules and regulations. The Tax Administration states that only 20 % of their projects are "prioritizable". The Norwegian Defence Material Agency is allocated its entire portfolio by the Ministry of Defence. However,

the informants do not see politics as an obstacle to achieving good portfolio management, but something one must adapt to. This explains why several of them are emphasizing the delivery cycle - this is where they can make an impact. At the same time, it can be mentioned that Nye Veier, which is assigned its projects from the Ministry of Transport, but are free to choose the development order, puts much effort into making this happen according to benefit-cost efficiency. In the defence sector, the ministry takes explicit responsibility for the definition cycle.

The reporting usually takes place monthly. Many use “traffic lights” to indicate the status of the projects in the portfolio, but several would prefer to move from subjective to more objective assessments. Projects with red lights are followed up more closely. However, few can point to concrete examples of low-performing projects being stopped.

Everyone uses some form of information system/portfolio management tools. Several point to functionality they lack, and some spend much time on manual processes when they need to aggregate information from projects to the portfolio level. The Tax Administration has created a (manual) system for visualizing dependencies between projects, which they believe works well. For others, data quality is a bigger problem than the tool.

The informants are generally satisfied with what they have accomplished and believe that portfolio management has led to improvements over time, both in terms of processes, methods, competence, and compliance. However, many acknowledge that it takes time, and point out several areas for improvement. These are related to measuring benefits, balancing the portfolio, linking the portfolio to overall strategy, and how to handle a future transition from project to product management.

## **Conclusions**

Our general impression is that there is still some way to go before we can say that active portfolio management is conducted in the public sector in Norway. Many of the challenges and barriers we see in the Norwegian context can also be found in the international literature. Even among our case organizations that are assumed to be more experienced than others, there are many challenges. There is still a lot to learn from those who are well under way.

Many Norwegian agencies already have good practice when it comes to follow-up activities and resource management for ongoing projects. Resource

management is important for efficient operation and should perhaps have been given more attention in the literature.

On the other hand, Norwegian practice indicates that there is a significant potential for more systematic prioritizing of projects and balancing of the portfolio. Effective priorities require clear goals and success criteria, both for individual projects and for the portfolio. Furthermore, there must be a real risk of being terminated if the project does not add value. Only when these incentives are in place will one be able to achieve the large benefits of portfolio management.

The authors' assessment is that the MoP framework, with its definitions of terms and two cycles, is a good starting point for portfolio management. Public agencies have different roles and work under different conditions. The emphasis placed on the two cycles and processes they involve may therefore vary. The most important thing is that both cycles are taken care of. For companies who are allocated the projects they are to conduct, it may be natural to focus only on the delivery cycle, but then the level above them (i.e. the ministry or directorate level) must have good processes for defining the portfolio.

Finally, in the concluding chapter, we present a set of recommendations for practitioners as well as a list of possible topics for further research and method development.

## Concept report series

Paper version: ISSN 0803-9763

Web version: ISSN 0804-5585

Norwegian version: <https://www.ntnu.no/concept/concept-rapportserie>

English version: <https://www.ntnu.edu/concept/concept-report-series>

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 prosjektledelse. 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 Projec</i></p>	<p>Kjell Sunnevåg (red.)</p>
No 18	<p>Flermålsanalyser i store statlige investeringsprosjekt</p>	<p>Ingemund Jordanger, Stein Malerud, Harald Minken and Arvid Strand</p>

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

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 investeringstiltakene som har vært gjennom ekstern kvalitetssikring	Knut Samset and Gro Holst Volden
No 36	Investing for Impact. Lessons with the Norwegian State Project Model and the First	Knut Samset and Gro Holst Volden

	Investment Projects that Have Been Subjected to External Quality Assurance	
No 37	<p>Bruk av karbonpriser i praktiske samfunnsøkonomiske analyser. En oversikt over praksis fra analyser av statlige investeringsprosjekter under KVU-/KS1-ordningen</p> <p><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></p>	Gro Holst Volden
No 38	<p>Ikke-prissatte virkninger i samfunnsøkonomisk analyse. Praksis og erfaringer i statlige investeringsprosjekter</p> <p><i>Non-Monetized Impacts in Economic Analysis. Practice and Lessons from Public Investment Projects</i></p>	Heidi Bull-Berg, Gro Holst Volden and Inger Lise Tyholt Grindvoll
No 39	<p>Lav prising – store valg. En studie av underestimering av kostnader i prosjekters tidligfase</p> <p><i>Low estimates – high stakes. A study of underestimation of costs in projects' earliest phase</i></p>	Morten Welde, Knut Samset, Bjørn Andersen and Kjell Austeng
No 40	<p>Mot sin hensikt. Perverse insentiver – om offentlige investerings-prosjekter som ikke forplikter</p> <p><i>Perverse incentives and counterproductive investments. Public funding without liabilities for the recipients</i></p>	Knut Samset, Gro Holst Volden, Morten Welde and Heidi Bull-Berg
No 41	<p>Transportmodeller på randen. En utforsking av NTM5-modellens anvendelsesområde</p> <p><i>Transport models and extreme scenarios. A test of the NTM5 model</i></p>	Christian Steinsland and Lasse Fridstrøm
No 42	<p>Brukeravgifter i veisektoren</p> <p><i>User fees in the road sector</i></p>	Kåre Petter Hagen and Karl Rolf Pedersen
No 43	<p>Norsk vegplanlegging: Hvilke hensyn styrer anbefalingene</p> <p><i>Road Planning in Norway: What governs the selection of projects?</i></p>	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>Morten Welde, Jostein Aksdal and Inger Lise Tyholt Grindvoll</p>
	<p><i>Municipal investment practices in Norway</i></p>	
No 46	<p>Styringsregimer for store offentlige prosjekter. En sammenliknende studie av prinsipper og praksis i seks land</p>	<p>Knut F. Samset, Gro Holst Volden, Nils Olsson and Eirik Vårdal Kvalheim</p>
	<p><i>Governance schemes for major public investment projects: A comparative study of principles and practices in six countries</i></p>	
No 47	<p>Governance Schemes for Major Public Investment Projects. A comparative study of principles and practices in six countries</p>	<p>Knut F. Samset, Gro Holst Volden, Nils Olsson and Eirik Vårdal Kvalheim</p>
No 48	<p>Investeringsprosjekter og miljøkonsekvenser. En antologi med bidrag fra 16 forskere</p>	<p>Kåre P. Hagen and Gro Holst Volden</p>
	<p><i>Environmental Impact of Large Investment Projects. An Anthology by 16 Norwegian Experts.</i></p>	
No 49	<p>Finansiering av vegprosjekter med bompenger. Behandling av og konsekvenser av bompenger i samfunnsøkonomiske analyser</p>	<p>Morten Welde, Svein Bråthen, Jens Rekdal and Wei Zhang</p>
	<p><i>Financing road projects with tolls. The treatment of and consequences of tolls in cost benefit analyses.</i></p>	
No 50	<p>Prosjektmodeller og prosjekteierstyring i statlige virksomheter.</p>	<p>Bjørn Andersen, Eirik Vårdal Kvalheim and Gro Holst Volden</p>
	<p><i>Project governance and the use of project models in public agencies and line ministries in Norway.</i></p>	
No 51	<p>Kostnadskontroll i store statlige investeringer underlagt ordningen med ekstern kvalitetssikring.</p>	<p>Morten Welde</p>
	<p><i>Cost performance in government investment projects that have been subjected to external quality assurance.</i></p>	
No 52	<p>Statlige investeringer under lupen. Erfaring med evaluering av de 20 første KS-prosjektene.</p>	<p>Gro Holst Volden and Knut Samset</p>
	<p><i>A Close-up on Public Investment Cases. Lessons from Ex-post Evaluations of 20 Major Norwegian Projects</i></p>	
No 53	<p>Fremsynsmetoder</p>	<p>Tore Sager</p>

*Foresight methods*

- |       |  |  |
|-------|--|--|
| No 54 | Neglected and underestimated impacts of transport investments  | Petter Næss, Gro Holst Volden, James Odeck and Tim Richardson                        |
| No 55 | Kostnadsstyring i entreprisekontrakter<br><i>Cost performance in construction contracts</i>  | Morten Welde, Roy Endre Dahl, Olav Torp and Torbjørn Aass                            |
| No 56 | Erfaringer fra styring og gjennomføring av store statlige IKT-prosjekter<br><i>Experiences from governance and implementation of major public ICT projects</i>   | Håkon Finne  |
| No 57 | Effektivitet og produktivitet i norsk veibygging 2007-2016<br><i>Efficiency and productivity in Norwegian road construction 2007-2016</i>  | Kenneth Løvold Rødseth, Rasmus Bøgh Holmen, Finn R. Førsum and Sverre A.C. Kittelsen |
| No 58 | Mandater for konseptvalgutredninger. En gjennomgang av praksis.<br><i>The Terms of Reference Document for Conceptual Appraisal. A Review of Current Practice.</i>  | Knut Samset and Morten Welde   |
| No 59 | Estimering av kostnader i store statlige prosjekter: Hvor gode er estimatene og usikkerhetsanalysene i KS2-rapportene?<br><i>Estimating costs in large government investment projects. How good are the estimates and uncertainty analyses in the QA2-reports?</i> | Morten Welde, Magne Jørgensen, Per Fridtjof Larsen and Torleif Halkjelsvik           |
| No 60 | Noen krevende tema i anvendte samfunnsøkonomiske analyser. En undersøkelse av praksis i Statens prosjektmodell<br><i>Salient topics in cost-benefit analyses of major public projects in Norway</i>  | Haakon Vennemo, Jens Furuholmen, Orvika Rosnes and Leonid Andreev                    |
| No 61 | Samspill i bygg- og anleggsbransjen<br><i>Partnering in construction projects</i>  | Svein Bråthen, Maria Laingen, Paul Torgersen and Merethe Kristin Woldseth            |
| No 62 | Vegprosjekter, verdiskaping og lokale mål<br><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<br><br><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                            |
| No 64 | Hvordan lykkes med digitalisering? En undersøkelse av nyttestyring av IT-prosjekter i offentlig sektor<br><br><i>How to succeed with digitalization? A study of benefit management in public IT projects</i> | Helene Berg, Kjetil Holgeid, Magne Jørgensen and Gro Holst Volden |
| No 65 | Styring av prosjektporteføljer i offentlig sektor<br><br><i>Management of project portfolios in the public sector</i>  | Ingri Bukkestein, Gro Holst Volden and Bjørn Andersen             |

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.

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.*

**Address:**

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

ISSN: 0803-9763 (paper version)

ISSN: 0804-5585 (web version)

ISBN: 978-82-8433-006-8 (paper version)

ISBN: 978-82-8433-007-5 (web version)

