

Concept

Front-end Definition of Major Public Projects

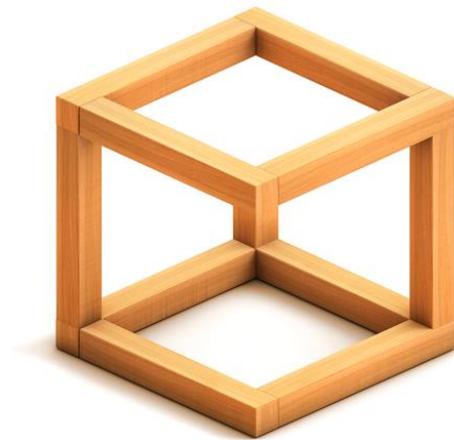
Theoretical insights and
conflicting practices

A selection of findings from studies
conducted by the Concept
Research Program



Front-end Definition of Major Public Projects

Theoretical insights
and conflicting practices



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Title:

Front-end Definition of Major Public Projects. Theoretical insight and conflicting practices

Summary:

This booklet presents some findings from studies undertaken by the Concept research program, and discusses the implications for theory on project governance today. It explores the processes of analysis vs. decision-making during the front-end phase, highlights some frequent deficiencies in these processes, and concludes that the potential for improvements is huge. A main concern is to ensure that investments are *relevant* and *effective* in responding to needs and priorities in society. It presents ten paradoxes¹⁾, all of which have implications for the theory of project management and project governance

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¹⁾ A paradox is a statement that seems contradictory or absurd, but in some sense is nevertheless true

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Foreword

Project governance emerged as a convenient term at the turn of the century, to signify the management framework within which project decisions are made. It is used increasingly over the years. There is considerable research going on, and sixteen years into the century it is time to stop for a moment and ask what we have achieved in terms of theory and lessons learned. There is a variety of governance schemes being implemented in different countries and considerable efforts invested.

The Ministry of Finance, Norway, introduced its governance scheme, now known as the State Project Model, as early as year 2000. The Norwegian University of Science and Technology established the Concept Research Program in 2002, as an ongoing endeavor to study their inception and performance over a series of years. Many studies have been carried out, scientific papers produced, books published and conferences/seminars organized and undertaken to this end. A bibliography of material available in English is included as an annex to this booklet, including the list of completed research reports. Although most of these are written in Norwegian, they all have a summary in English.

More than 200 major public investment projects have so far been subjected to external quality assurance under the Norwegian governance scheme. Quite a few of these are finalized. The amount of knowledge generated from the research material is considerable. This has resulted in textbooks and curricula at MSc and PhD level, and hundreds of students have been trained over the years.

This booklet was produced to the seventh International Symposium on Project Governance 2016, based on a more extensive paper published in the International Journal of Project Management, 2015. Some findings from our research are presented in terms of 10 paradoxes. It suggests that some practices from real life appear to conflict with theoretical insight or what we like to call best practice.

You are welcome to have a look into our researchers' mirror glass.

Peder Berg,
Deputy Director General, the Ministry of Finance
and chairman of the Concept Research Program

Introduction

Public investment projects do not always meet the expectations of different stakeholders. Many are delivered too late, at a higher cost, and do not meet the agreed quality standards. In most cases, however, the long-term effects of such problems are minor. The more serious type of problem is when they are not able to produce the anticipated effect.

This booklet presents some findings from the work of the Concept research program, which aims to explore front-end management and governance of major public investment projects in Norway. It offers some findings from the research, and discusses the implications for theory in project management today. The point of departure is the contention that projects evolve

during their conceptual phase as the result of two interacting processes, i.e. of analysis and decision-making. The main concern is to ensure that investments are *relevant* and *effective* in responding to needs and priorities in society. Evidence suggests that there are frequent deficiencies in these processes, and that the potential for improvements is huge.

The booklet presents ten paradoxes, all of which have implications for the theory of project management and project governance. The term “paradox” is used to describe situations with a counter-intuitive result, some of which are based on fallacious reasoning or incomplete or faulty analysis. These are paradoxes associated with:

1. How success is understood
2. The significance of front-end management
3. Early information overflow
4. The exploration of the opportunity space
5. Strategic alignment
6. The significance of cost estimates
7. Disregarded analyses of costs and benefits
8. “Predict and provide” practices
9. Perverse incentives
10. Myopic decisions

Their common denominator is that they all focus on the choice of conceptual solution. Each paradox

is rooted in one or more studies in the program, but also inspired by research findings presented in our

previous biannual international symposia on project governance. The three first paradoxes are not rooted in empirical research, but in desk studies and literature reviews. The remaining seven (number 4–10) are based on case studies involving 5–40 cases, most of them are major public projects that have been subjected to external quality assurance under the Norwegian QA scheme.

Professor Peter Morris (1994) noted that in the earlier years, project management had an extremely narrow focus, and that as long as we only focus on the life cycle itself, we are missing the critical front-end and institutional elements that more accurately typify the responsibilities of the project owner and the project manager. This booklet is a modest attempt to alter the focus.

No. 1. The success paradox

Success is measured in terms of tactical performance rather than strategic performance.

Success as a generic term means to gain advantage, superiority, accomplishment, achievement or added value. Measuring success will have to look beyond the immediate outputs of the project to assert the anticipated and wider impact in a longer-term perspective. A hospital will ultimately have to be assessed in terms of its health benefits. An industrial project might be judged essentially in financial terms, and an infrastructure project in terms of

its utility for the users.

The media tend to give unsuccessful projects more publicity than successful ones. However, their perspective is highly restricted. The number one criterion of failure in the media is cost overrun; number two delay in time. Truly, a much wider view needs to be taken. It is necessary to distinguish between the projects' *tactical* and *strategic* performance.

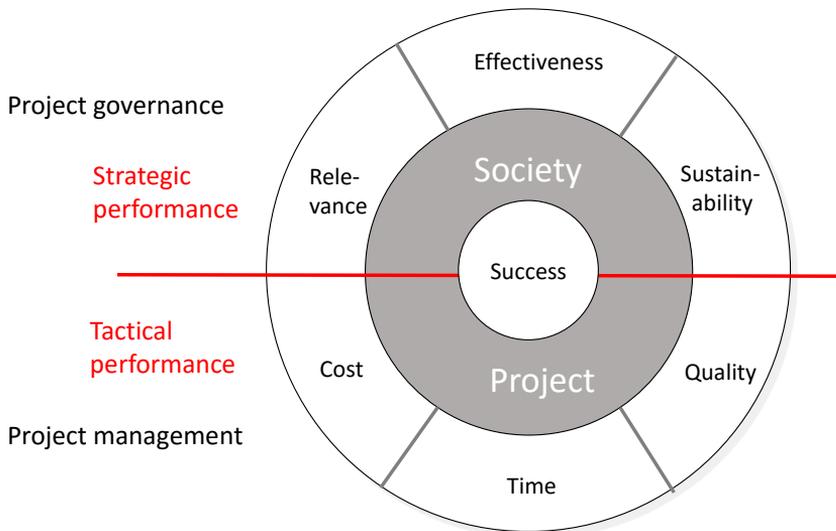


Figure 1 Successful projects. Tactical performance is a question of delivering the project outputs as planned, while strategic performance is the worth or benefit of the project as seen in a long-term perspective. Source: Samset (2014)

Success in tactical terms typically means meeting short-term performance targets, such as producing agreed outputs within budget and on time. These are essentially project management issues. Strategic performance however, includes the broader and longer-term considerations of whether the project would have a sustainable impact and remain relevant and effective in its operational phase, throughout its lifespan. This is essentially a question of getting the business case right, or, in short, of choosing the most viable project concept.

This is illustrated in Figure 1. Clearly, a successful project is one that delivers its outputs and significantly contributes to the fulfillment of agreed objectives. Moreover, it should have only minor negative effects, its objectives should be consistent with needs and priorities in society, and it should be viable in the sense that the intended long term benefits resulting from the project are produced.

One example of tactically inefficient projects but viable in strategic terms could be the University Hospital in Oslo, Norway. Due to emerging new technologies and added responsibilities, captured during the engineering phase after the budget was decided, it was completed a year behind schedule and with considerable cost overrun. Adverse newspaper reports and a public inquiry followed.

No doubt that cost overrun was considerable in absolute terms, but in relative terms, it was equivalent to only a few months' operational costs for the hospital, and therefore insignificant in a lifetime perspective. The overall conclusion after a few years of operation was that the University Hospital was highly successful in strategic terms, in producing specialized health services for patients in many parts of the country, conducting advanced medical research and providing educational opportunities for medical students. It would therefore be unfair to suggest otherwise.

No. 2. The paradox of managing uncertainty and risk

Most resources are used to improve tactical performance during implementation (project management), and much less up-front to identify the best conceptual solution and ensure strategic performance (project governance).

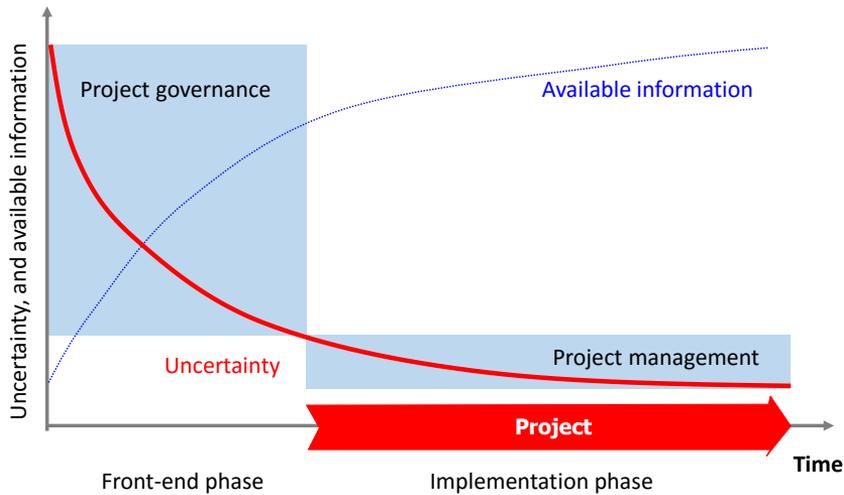


Figure 2 The project life cycle. Uncertainty is greatest in the front-end phase and diminishes as more and better information is acquired for making decisions. Source: Samset (2010)

What project management is all about is to reduce uncertainty associated with planning and implementation of projects. One interpretation of the term uncertainty is that it reflects the extent of the lack of information required to reach a decision that ensures that the anticipated project outputs are realized. Consequently, if all relevant information is at hand, there is no uncertainty, and when the

information base is poor, uncertainty is great. The principle is illustrated in Figure 2, in which uncertainty and the compilation of information vary with elapsed time in a project. Uncertainty is greatest at the starting point and thereafter diminishes as a consequence of gradual acquisition of more information.

The graph suggests that the potential to reduce uncertainty and risk is largest up-front, and decreases substantially when the project is implemented. It is a paradox therefore that most of a project's management resources may be spent on detailed planning, engineering, etc. during the implementation phase, where the potential is restricted - while too little is usually spent up-front where the potential to reduce uncertainty is the largest, in order to choose the best conceptual solution.

Recent literature suggests (see for example Merrow, 2011 and Morris, 2013) that where projects fail strategically, it is likely that the problem can be traced back to decisions in the earliest phases, when the initial idea was conceived and developed. One study based on a review of some 1125 projects concluded that 80% of the projects with satisfactory "quality-at-entry" were successful, while only 35% of those with an unsatisfactory quality-at-entry achieved success. (World Bank, 1996)¹. One way of improving

quality-at-entry is by challenging initial ideas and applying simple analyses, extracting and making use of previous experience from similar undertakings, and consulting with stakeholders. Jordan et al. (1988) argued that 15 % of the time and resources in projects should be spent on front-end work, whereas Miller and Lessard (2000) suggested up to 35 %.

In most cases the key issue at the earliest stage is to shed sufficient light on the underlying problem that provides the justification for the project, and the needs that the project is meant to satisfy. *Detailed* information about possible alternative solutions is less relevant. This illustrates what seems to be a major dilemma, since most projects originate as one specific solution to a problem, while the problem itself may not be analysed sufficiently, and alternative solutions may not have been considered at all. Most of the information generated is associated only with the initially identified solution (Whist and Christensen, 2011).

¹ Quality-at-entry was used as an indicator to characterize the identification, preparation and

appraisal process that the projects had been subjected to up-front.

No. 3. The paradox of information overkill up-front

Decisions are locked-in up-front by masses of detailed and quantitative information, instead of carefully selected facts and judgmental information relevant to highlight the essential issues.

It follows from the above that the front-end phase is when (1) fundamental choices are made, (2) uncertainty is at its highest, (2) freedom to choose is at its optimum, and (3) available information is most restricted. Adding information, therefore, makes sense.

But contrary to the idea depicted in Figure 2, the sheer *amount* of available information upfront might not be the issue, but the *type* of information. The priority concern at this early stage is to establish the overall perspective, and to analyse the underlying problem in its context, considering

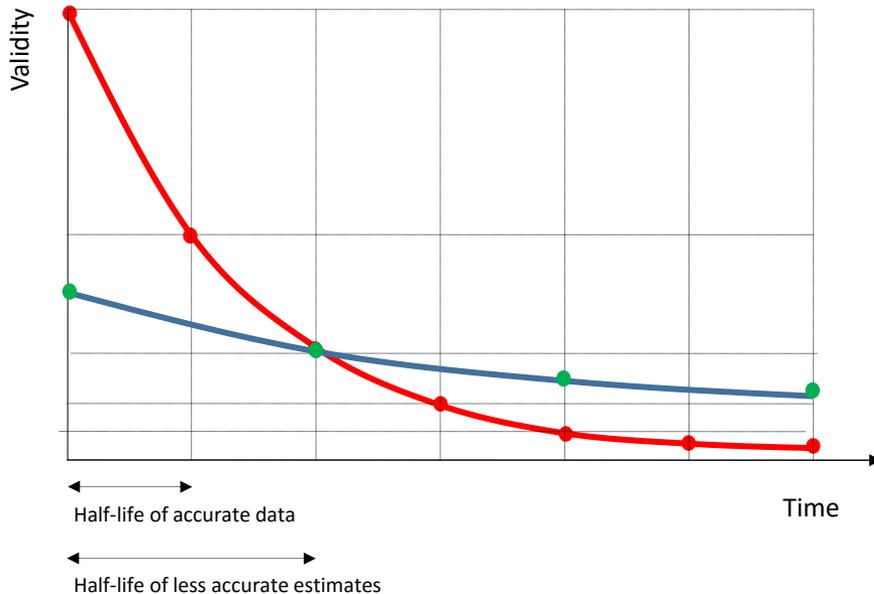


Figure 3 Half-life of information. Validity tends to decrease over time during the front-end phase. More rapidly for accurate data than for less accurate estimates. Source: Samset (2010)

the needs and priorities of stakeholders, users and affected parties, in order to come up with a sensible strategy. Opportunities and risks should be considered. Experience suggests that creativity, imagination and intuition can be more valuable at this stage than large amounts of quantitative data.

One salient aspect is that exact quantitative information tends to be more affected by time than the choice of concept. On the one hand it is obvious that the higher the precision, the more rapidly information is outdated. It is tempting to speak of the “half-life of information”, see Figure 3. For instance, exact information about the demand in a fast-developing market will have limited value after months, or even weeks. On the other hand, there are many examples to suggest that qualitative assessments tend to remain valid for much longer. Consider the assessment of users’ fundamental preferences within a market segment. While it might not be possible to make a valid prediction of the actual demand three years into the future, it may be reasonable to assume that demand will continue for a long time and can therefore be relied upon in strategic planning up-front.

This suggests that lack of exact information upfront may not be a major problem. This is required later, as the time for detailed planning approaches. Also, the utility of exact information tends to reduce with the time-span. When decision-makers are confronted with an abundance of detailed information at an early point in time it may result in what is referred to as “analysis paralysis” as discussed by Williams (2008). And besides, the cost of collecting information on a specific topic usually increases progressively with the amount of information collected. This is because more information requires more in-depth studies or more wide-ranging information searches. On the other hand, the gain in utility of additional information tends to decrease (Jessen, 2012).

This emphasizes the need to invest in *relevant* information at the earliest stage of a project, while at the same time limit the search to what is useful for decision-making at that stage. A targeted search for information regarding the main uncertainties likely to affect the project is more cost-effective than an unguided search, since it makes it possible to increase the share of relevant information and reduce the total amount.

No. 4. The paradox of the unexplored opportunity space

The choice of conceptual solution is made up-front without systematically defining and scrutinizing the opportunity space

Every project is initiated to solve some problem or meet some needs. And each case depends upon a choice of sensible conceptual solution to solve the problem. Consequently, a key task in the early phase of a project would be to identify possible concepts by setting up an opportunity space, furthermore to evaluate alternative concepts within the opportunity space, and decide on the one best suited. There is much evidence to suggest that this is not always how things are done.

One problem is that planners are discipline experts with an inherent tendency to emphasize some aspects of the matter and downplaying others. The same may apply to organizations where employees are loyal to its rules, traditions, procedures, etc. This is the reason for path dependency (Margolis and Liebowitz, 2000; Dosi, G. 1997), i.e. systematically choosing some solutions while avoiding others, even if these conflict with rational choices.

The situation become even more complex since these decisions are made at the intersection between the professional and political, in other words in-between what is rationally sound and politically possible. While

the analytical process is largely within the realm of the professional constituency where the intention is to expand the opportunity space to allow identifying the best alternatives, the decision still remains with the political level. And the processes and decisions at this level are not always rational.

A case study of 23 major public investment projects (Whist and Christensen, 2011), went deeply into how the analytical and political processes interacted during the front-end phase, in order to understand how this affected the outcome of the projects. It was found that the majority of projects started out with a predetermined solution. In about half the cases an unambiguous problem analysis was nevertheless carried out, and in one third of the cases new problems were introduced during the front-end phase, see Figure 4. The result was that two thirds of the projects were initiated with the same conceptual solution as the initial one, while in the remaining cases it was different or substantially changed. Only ten of the projects were considered relevant in relation to needs in society.

This illustrates that in a mature democracy, a well-founded, rational

decision basis is no guarantee for a rational choice of concept. Clearly, a bad initial idea might be modified or corrected through a successful decision-making process. However, in many cases this is not what happens.

The study demonstrated that there are many hurdles for any project. Democratic decision-making processes, particularly those which take long time, are complex and difficult to predict, and many will claim that this is a necessary part of democracy. If this is taken as a premise, then the biggest potential

for improvement lies in strengthening the analytical process. What would seem to be a reasonable approach in front-end analysis would be that the first step should be to identify and eliminate the *worst* alternatives. These are low hanging fruits and proper action can give a high reward with little effort. The next step should be to seek for good alternative concepts, but within reasonable limits, and not necessarily crave for the best, since the case will nevertheless be handed over to decision makers to conclude.

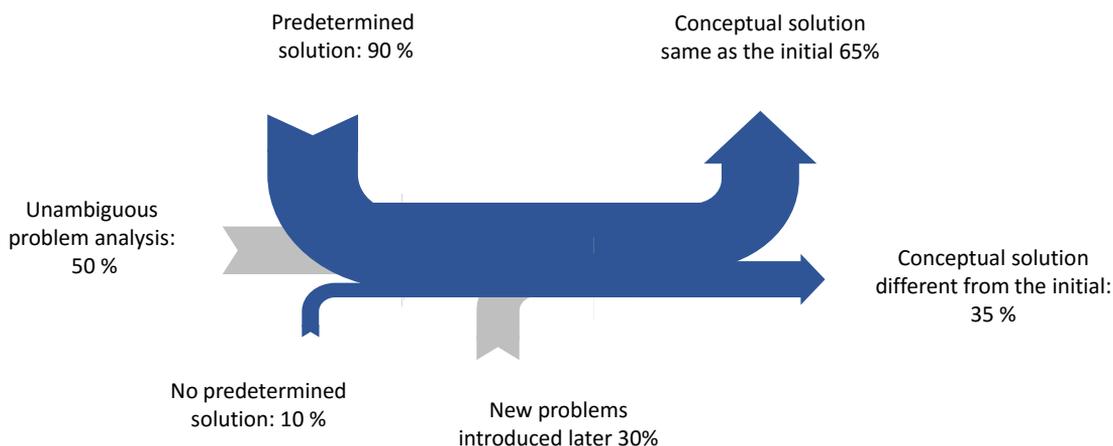


Figure 4 Path dependency in defining and agreeing on conceptual solutions up-front.

No. 5. The paradox of strategic alignment

Strategy and alignment of objectives are highlighted as essential concerns, but in most cases the internal logic of causalities and estimated probabilities of realization are erroneous in the finally approved strategy.

A project strategy comprises a hierarchy of goals that are interlinked in cause-and-effect chains that illustrate the ambition levels for a project, as well as their realism. Alignment of objectives implies to define the project's basic logical structure by following the causal link from the basic needs of users and society, through defined goals to the delivery of project results (outputs), their outcome (effects) and long-term benefits after the project is terminated (purpose). This needs to be done before starting significant work on a project. Unfortunately, this is not always done and can result in significant underperformance compared to expectations (Cook-Davies, 2011).

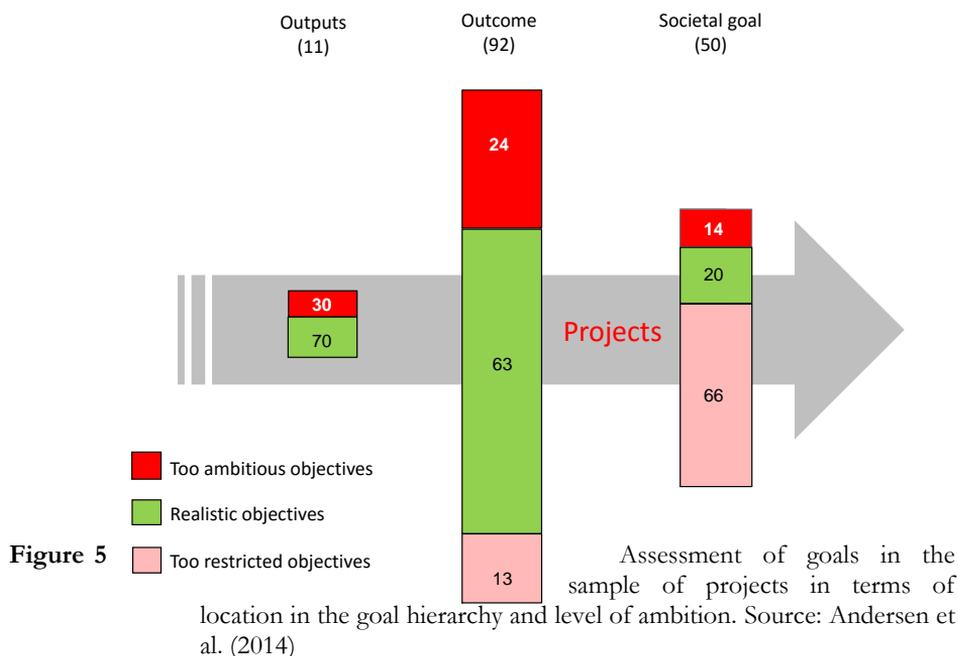
Many authors have studied success factors and predictors of failure, notably Morris and Hough (1987), Pinto and Slevin (1988), Miller and Lessard (2000); Flyvbjerg et al. (2003), and Hopkinson (2007). One observation is that strategic failure can often be traced back to the early phases of the project and at the governance level (the owner perspective).

Some studies on international development projects have provided insight in this area. A study of

alignment of objectives concluded that most of the projects had design faults at all levels, and no projects were without faults. Typical problems were insufficient resources and too many and unrealistically ambitious goals (Samset, 2006). The same analysis was repeated on a sample of 17 large public investment projects in Norway, (Andersen et. al, 2014). Objectives were analysed in terms of their internal causality, and ambition (probability of realisation). Complex statements were broken down in several single objectives.

The study found severe shortcomings when it comes to defining reasonable levels of ambition. For instance, when a project to acquire defence equipment presents "*stability within the international legal system*" as a societal goal, and a minor road construction project expects to result in "*increased settlement*", we intuitively understand that the distance between cause and effect is too large and that the goals are too ambitious.

Figure 5 compiles the findings. There were too many goals in total (153), most were defined as project outcomes and the remaining mostly societal goals.



Half of the goals were assigned to the wrong ambition level. In total, none avoided erroneous definitions of goals, five projects had in reality no societal goals whatsoever, while others had too many. In conclusion, the designs were so extensively flawed that none of the steering documents were suited to management and decision-making. Surprisingly, most flaws were trivial even though all projects had been designed using a proven method that aimed to avoid precisely these type of problems.

Multiple objectives may confuse if they point in different directions, and more so if they conflict with

each other. The purpose of formulating strategies is principally to clarify the direction for that which is sought. Objectives should give rise to common understanding and motivation among of all parties involved in or affected by a project. Therefore, they should be unambiguous and realistic. In order to motivate, they also have to be well founded, to the degree that they are accepted. Moreover, the objectives should set the limit of the strategy. In looking at customary practice in planning projects, the threshold for improvement seemingly is very low and the possibilities of marked improvement accordingly are great.

No. 6. The paradox of cost estimation

The focus is on the final cost estimate (the budget) to promote tactical success, while the earliest cost estimates that might determine strategic success are overlooked.

Planners devote less attention to identifying the best conceptual solution than to improving tactical project success. Clearly, it is easier to relate to tangible and quantified success criteria such as cost and time, than to multidimensional and qualitative assessments of societal benefits. However, the earliest cost estimates are equally tangible although more uncertain, and should be given more attention since they are often the defining factor regarding the choice of concept and implicitly the project's strategic success (Austeng et al., 2005). To establish a realistic cost estimate in the early phase, for comparison with expected project benefits, is essential.

Figure 6 depicts a series of estimates (red dots) in the front-end phase. Estimates are typically low initially. With time, the information basis improves, the first surprises come to light and estimates rise steeply. In turn, that triggers greater focus on the effort, demands for greater

openness and realistic estimates, and estimates rises to the level at which it should have been at the outset. Thereafter, there are minor modifications until the final budget is approved. The dashed line uppermost illustrates the development of cost in the front-end phase as it should have been had the process started with an estimate at a realistic level. The difference between the dashed and solid lines is termed strategic underestimation, which suggests that a deliberately low budget is often submitted so a project proposal may be considered.

The Concept research program conducted a case study of cost estimates in projects' initial phase in a sample of 12 large public projects (Welde et al., 2014). The increase in cost estimates ranged from +70% to almost +1300%, with an average of +650%. By comparison, the cost increase during the implementation phase was much less, and some projects were even completed below budget.

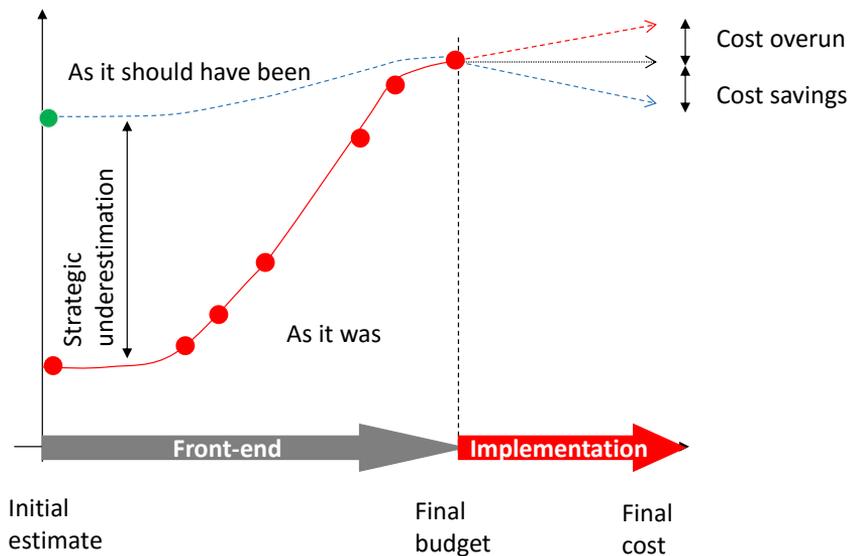


Figure 6 Underestimation relative to the approved budget often is far greater than the cost overrun. More realistic estimates up-front conceivably lead to fewer poor projects being chosen and thereby to increasing the overall benefit of investments. Source: Samset (2008)

The study indicates that initial underestimation may be significant and can result in the approval of projects that otherwise should have been rejected in the early stages. The authors deemed it likely that at least 5 of the 12 projects would have been screened out at an early stage had the first estimate been realistic as compared to the final cost.

What causes substantial underestimation is the next issue. An often used distinction is made between political, technical, and cognitive reasons (e.g. Flyvbjerg, 2005). It may be hard to prove but in several of the projects above there were clear indications that the first estimate was deliberately low in order to increase the chance of the project idea being considered.

No. 7. The paradox of decision makers' disregard of benefits/cost

Systematic and detailed estimation of cost and benefits is commonly done up-front, but disregarded by decision makers, who tend to emphasize other aspects.

Despite of considerable efforts and sophisticated analyses to establish a solid decision basis for major public investments, Norwegian decision-makers seem to have little confidence in Cost-benefit analyses.

The transport sector is a special case. A recent study by the Concept research program, (Welde et al. 2014) studied the significance of Cost-Benefit Analysis in the final prioritization of road projects in Norway and Sweden, where the approaches to such analyses are quite similar and unit prices are of the same magnitudes. In Norway, the Cost-Benefit ratio had no significant impact on the selection of projects, on the contrary, many unprofitable projects were realized, such as expensive tunnels and bridges in sparsely populated areas. In Sweden, by contrast, the results of Cost-Benefit Analyses were more adhered to by decision makers. Clearly, in the case of Norway there must have been other factors that were more important but that were not included in the analyses.

Explanations could be weaknesses and shortcomings in the methodology, (Næss, 2006 and 2012), problems in communicating

the results, but also strategic use of analyses by decision maker to promote specific projects. One study, (Kvalheim, 2015), examined a special case where nine Cost-Benefit Analyses had been made of one project, a proposed shipping tunnel, over a period of 22 years. In this remarkable case the project was not rejected being deemed unprofitable over and over again, see Figure 7. It also demonstrates a notable lack of consistency between analyses. This of course underscores the credibility of such studies. By 2016, the tunnel project has still not been approved for funding or finally rejected.

The Concept program also reviewed current practice regarding non-monetized impacts in more than 100 economic analyses in Norway (Bull-Berg et al. 2014). With a few important exceptions, the section presenting non-monetized impacts in these analyses. was characteristically brief, and not based on transparent methodology and well-documented processes. The study concluded that there is substantial potential for improvement and a need for guidance.

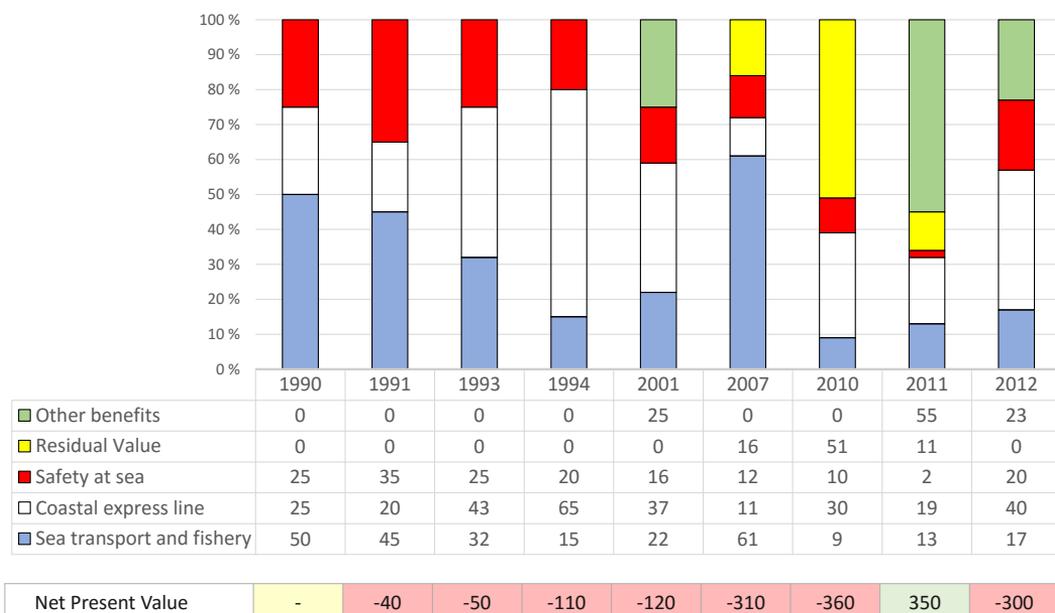


Figure 7 Percentage of the total monetized benefits in nine different cost-benefit analyses of the Stad shipping tunnel, showing how much weight was placed on the various components. Source: Kvalheim (2014)

The above situation is mirrored in the World Bank, which made wide use of Cost-benefit analyses for decades to demonstrate its reputation and commitment to measuring results and ensuring accountability to taxpayers. However, the percentage of projects justified by Cost-benefit analyses has been declining, and the cost-benefit ratio is now rarely mentioned in policy documents (the World Bank, 2010). These results are explained by

a decline in adherence to standards as well as increased difficulty in applying Cost-benefit analyses in new sectors where traditionally it has not been applied and where benefits can hardly be quantified. The World Bank concludes that there is a need to recognize the difficulties in quantifying benefits, but at the same time quality, rigour, and objectivity must be ensured because poor data and poor analyses are misinforming and do not lead to improved results.

No. 8. The paradox of “predict and provide”

The tendency is to choose a “predict-and-provide” strategy rather than explore alternative solutions.

Different perspectives can be taken when evaluating the need for an investment project. Public planners tend to use a predict-and-provide approach (Næss, 2005). When confronted with capacity problems, planners, who are often engineers, are most likely to recommend increased capacity based on estimates of future demand. However, unsurprisingly, there is often a mismatch between needs and demands when it comes to public services and infrastructure offered free-of-charge to citizens. Needs should not be defined narrowly as what is necessary to increase capacity, but rather as what is needed *to solve one specific or several problems*. The latter allows for a variety of measures. In a road project it could include demand regulation, congestion pricing, and legal and informative measures, most of which are far cheaper than a construction project to expand capacity.

One study (Odhage, 2012), of early project planning in Swedish road projects, found that planners were not truly interested in finding and developing measures that would

reduce the need for transport. The issue here is path dependency, and the author framed a timely question ‘Can one expect anything different from a process that is run by the transport administration and concerns transport issues?’

But the planning perspective could also be prescriptive, for instance in adhering to political goals, as illustrated in Figure 8. This is quite the opposite of a predict-and-provide strategy. Næss, (2005) distinguishes between (1) needs defined by national-level political objectives, (2) market-based needs as measured by demand or willingness-to-pay, and (3) the needs of different stakeholder groups. As noted, public planners tend to narrow down the identification of needs to the second demand, while ignoring both the broader scope of needs, and political goals to reverse the demand trend.²

² In a separate study, Hagen (2010) discusses economic measures as

accounting for external effects on the environment.

In a country with high ambitions to reduce the emission of greenhouse gases, for example, planners are in conflict with politicians who consider increased traffic (i.e. growing demands for roads) a problem. Similarly, in the university system, a purely demand-based approach to recruitment probably would not result in a distribution of graduates in line with society’s need for expertise in different disciplines.

The paradox in this case is that needs and benefits assessments in public infrastructure projects may often be decoupled from overriding political

priorities and goals, possibly because these are conflicting and multidimensional. The result is that issues such as scaling and capacity of infrastructure projects, which are highly political decisions, are left to planners, who (i) have a tendency to define the problem narrowly as a technical one, and (ii) use readily available estimates of demand as a reference for adjusting capacity. There is obviously a need for project owners (the government) to clarify what needs should be the point of departure for planners, expressed in terms of clear objectives for the project.

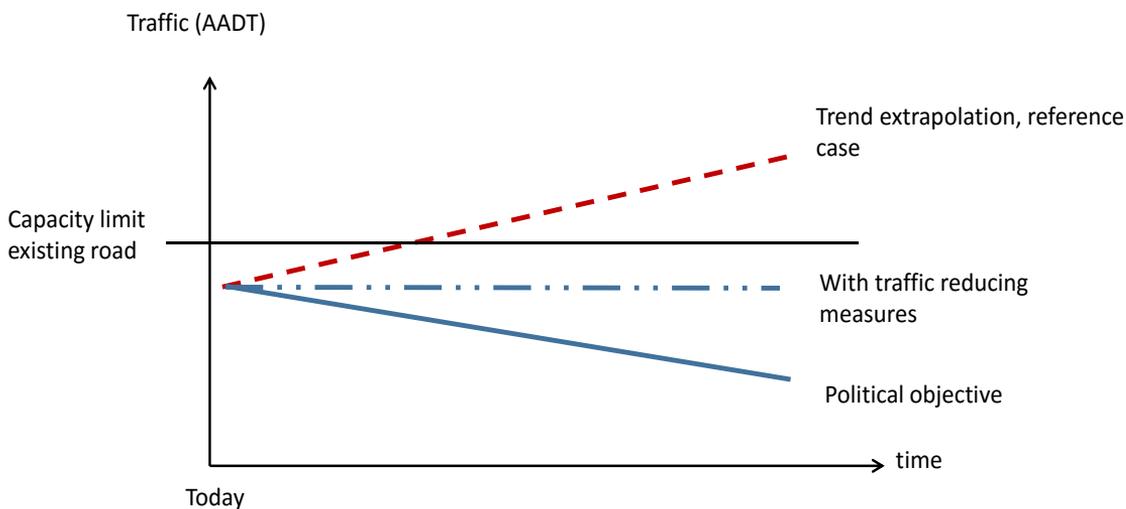


Figure 8 Traffic development in different scenarios, illustrating that the need for an infrastructure project follows from the assumption that capacity should adapt to demand.

No. 9. The paradox of perverse incentives

Public investments with no financial obligations for the target group may cause perverse incentives and result in counterproductive projects

Governments often appear as generous donor on behalf of taxpayers when financing projects that benefit specific groups or geographical regions. Such projects may be initiated either by the beneficiaries themselves or by the donor out of pure altruism. Experience suggests that many such projects fail in strategic terms, which should not come as a surprise: without financial commitments for recipients, there may be no incentive to opt for the most socially beneficial or cost-effective alternative.

The term *perverse incentives* refers to situations of this kind where the resulting project turns out to be a failure seen in retrospect. The theoretical basis is the principal-agent theory (e.g. Jensen and Meckling, 1976; Laffont and Martimort, 2002). There is an extensive literature on incentive problems in general, but less so in relation to state-funded investment projects. A pivotal study in the field is Ostrom et al. (2001), which demonstrates serious problems with perverse incentives in Swedish-funded aid projects that

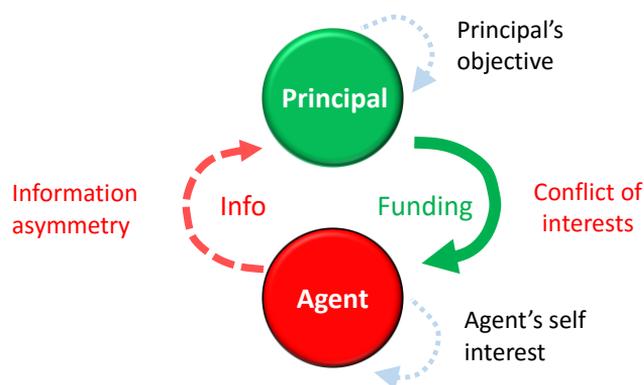


Figure 9 A simple model to illustrate how perverse incentives may occur. Source: Samset et al. (2014)

resulted in the waste of public funds and adverse side effects such as corruption.

Norway, with its large fiscal surplus from exploitation of petroleum resources is prone to this phenomenon in cases where the government invests in infrastructure in local and financially weak communities. Whist and Christensen (2011) demonstrate how the early phase of state-funded investment projects is often characterized by 'local rationality' and complex coalitions. A separate study explored the phenomenon of perverse incentives in nine such state-funded projects, to illustrate how perverse incentives might occur, what the causes and consequences might be, and what could be done to avoid them. Half of the projects scored poorly in strategic terms, of which some clearly would not have been

prioritized had the recipient been required to contribute financially. Several projects were considered as oversized and not cost effective because they came 'free-of-charge' (Samset et al., 2014). In all cases, costs were underestimated and benefits overestimated up-front.

The problem of perverse incentives is double sided: (1) there is an inherent and often undisclosed conflict of interests between the parties, and (2) there is considerable information asymmetry, see Figure 9. Measures to avoid or mitigate the problem would typically involve (1) aligning recipients' objectives with national objectives, and enforcement of requirements such as co-financing and local risk taking, and (2) reducing the information asymmetry by introducing, for example, by external appraisals, information control, evaluation, and public hearings.

No. 10. The paradox of myopic decisions

Long-term viability is the intention but the planning horizon is commonly too short, resulting in sub-optimal choices that will prove inferior in the long run.

Probably the most crucial strategic success criterion for investment projects is that they are viable and sustainable, i.e. that project net benefits are likely to continue in the long run (OECD, 2002). Viability can only be verified in an extended time perspective. A case study of historical projects (Samset, 2012) found that some were still considered economically viable more than 100 years after completion, whereas others had been closed down after a short time. Needs and priorities in society may change over the years, and therefore a project's viability is contingent upon its ability to adapt to changing needs. Ironically, one of the most viable projects in the study was the Eiffel Tower, which was built for no purpose other than as an exhibition object to showcase France's excellence in science and technology.

The assessment of viability *ex ante* must apply a long-term perspective and planners need to consider several possible future scenarios. A case study of 24 appraisal reports of major public projects from the period 2005-2011 (Lædre et al., 2012) found that the analyses were mostly inadequate, i.e. needs and

benefits were most often assessed in a short-sighted and static perspective; trends were extrapolated without discussing alternative scenarios; most attention was devoted to tangible effects, ignoring non-monetized impacts; and significant risk factors, such as political risk, were not identified and discussed. Such practice may lead to myopic decisions, and unsatisfactory outcome in the future, as illustrated in figure 10.

No single analytical tool is able to identify all aspects of a project's viability *ex ante*. This also goes for Cost-Benefit Analyses, although they intend to capture *all* economic impacts of a project. Therefore, in order to assess long-term viability, several complementary tools combining quantitative and qualitative approaches are necessary. A separate study looked specifically into the problem of how Cost-Benefit Analyses, through the use of discount rates, result in myopic planning and neglect of the effects for future generations (Hagen, 2011). The author demonstrated that it may be appropriate to use a *decreasing* discount rate over time. This would increase the real

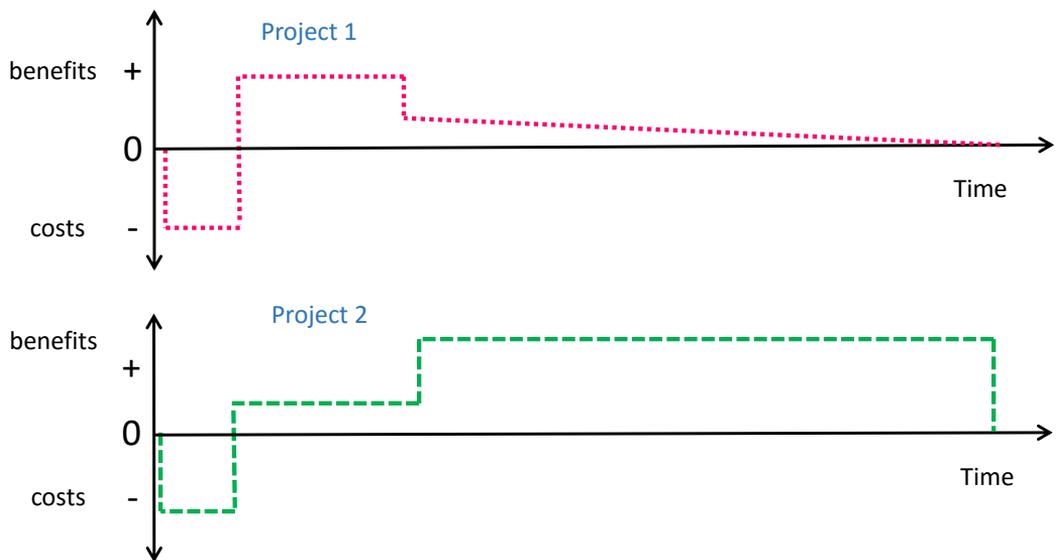


Figure 10 Myopic decisions. Two projects with the same investment cost have different benefit flows throughout their lifetime. In a long-term perspective it is clear that project 2 is more viable, but myopic planners would emphasize short-term effects and choose project 1.

planning horizon and thus mitigate the problem.

The paradox in this case is that the emphasis on viability as a success criterion is far from reflected in project appraisals. Projects that are meant to last for decades and sometimes centuries may have significant long-term impact on economic, environmental, and social

development, yet they are still assessed in a myopic and static perspective. The answer would be to apply a broader and more long-term perspective in project appraisals, and shifting the analysts' attention away from detailed estimations of investment cost to estimating future benefit flows and corresponding risk (Lædre et al., 2012).

Discussion

Governance regimes for major investment projects comprise the processes and systems that need to be in place on behalf of the financing party to ensure successful investments. What happens during the front-end phase is essential.

In order to move forward in this field we have to find answers to what would be the optimal mix of regulations, economic means and information in improved governance regimes. The project management community needs to

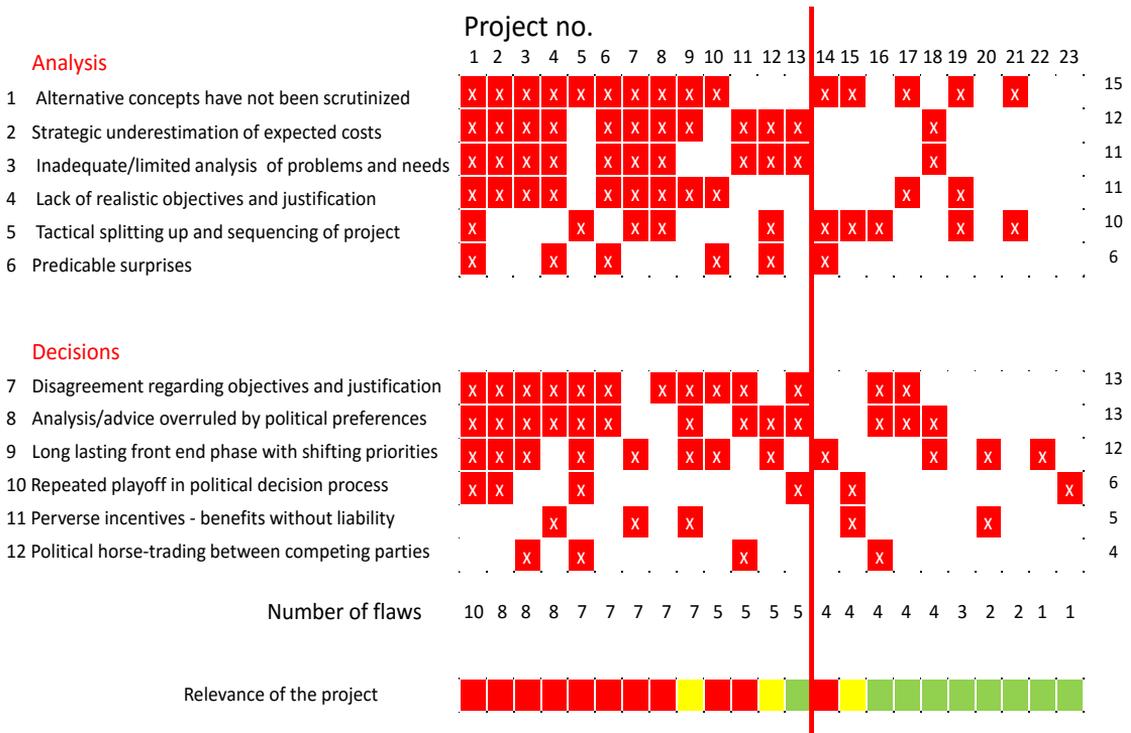


Figure 11 There is a consistent tendency that projects that are considered relevant have less flaws in the analysis and decision-making processes up-front. Source: Samset (2008)

lift the perspective beyond the delivery of the project itself and onto the broader issues of the projects' utility and effects. It is not only about the quality of analyses up-front, but also about decision processes. To arrive at the optimal conceptual solution based on rational analysis is of little worth if it is not the one chosen.

The Concept program did a pilot project on a sample of cases to illustrate this (Samset, 2008), which was followed up with a more in depth study to explore the quality and interaction between analysis and decisions during the front-end phase (Whist and Christensen, 2011) and a broader follow-up of the pilot (Samset and Volden, 2013). The result is displayed in Figure 11, where the flaws for the individual projects are marked with "X". The summary row at the bottom are marked with colors to signify whether the projects are considered relevant as seen in relation to needs and priorities in society or not. Each project is represented with one column. The columns are sorted from left to right according to the observed number of flaws. The resulting pattern suggests that the

least relevant projects have lots of flaws in their analytic and decision-making processes (between five and ten). The ones that are regarded relevant on the other hand have much less flaws (between one and four).

The above studies concluded that there is a strong tendency to choose the initial concept and stick to it, almost regardless of how bad it is. Also, there is an overwhelming inertia. Once the train has been set in motion – it is almost impossible to stop. This goes a long way to explain the red projects on the left hand side. Further there is a third common tendency, i.e. that incremental improvements of an inferior solution are preferred rather than fundamental change.

But experience also suggests that the opportunity space is usually larger than envisioned – and it is often largely unexplored. What was evident, in the projects, was that the green projects seemed to have been exposed to more vigorous analyses and decision processes that were less affected by disagreements, political preferences, lengthy processes and repeated playoffs in the political decision processes.

Final words

This booklet reports from several in-depth case studies of major public projects, and identifies a number of paradoxes that could guide further research. In various ways the paradoxes point to two types of problems, i) problems of efficiency in terms of delays and cost overrun, and ii) more fundamental problems that have to do with the projects' strategic success (choosing the wrong concept). Project management as a discipline should be concerned with both problems. To quote Peter Morris: "The discipline needs to be less inward looking; more relevant, not just to the sponsors' needs but to society's challenges in general. We can foresee several changes in the years ahead in the ways projects and programs will be managed, but the obvious immediate needs are to focus more on improving sponsor value and on shaping the context in which projects and programs are formed and implemented" (Morris, 2013:23).

Many of the problems facing major public investment projects can be interpreted in terms of deficiencies

in the analytic or the political processes preceding the final decision to go ahead, and the complexity and uncertainties affecting these processes. In particular, the fundamental problems with strategic success could typically be traced back to deficiencies in the earliest preparatory phases of the project. The role of the front-end phase in ensuring project success is therefore crucial, as highlighted in the literature (Merrow, 2011, Morris, 2013).

But equally essential is that projects may fail even when formal rules for planning and decision-making have been adhered to. Democratic decision-making processes, particularly the long lasting ones, are complex and the outcome difficult to predict. Many will agree that this is a fundamental positive feature in democracies. If this is taken as a premise, one could conclude that the main potential for improvement lies in strengthening the analytical process, but also to make decision processes transparent.

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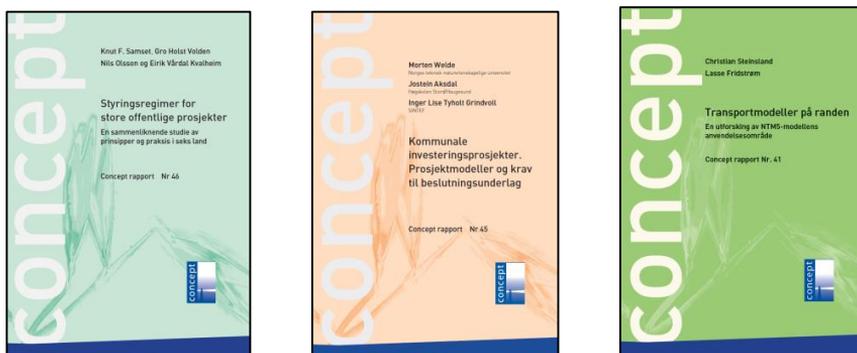
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No. Title

1 **Public project portfolio management. Estimating provisions for uncertainty at portfolio level** (Stein Berntsen and Thorleif Sunde)

Ministries and government departments are responsible for managing significant portfolios of projects, which often include very large ones. There is a need for improved portfolio management, not only cost and cost efficiency of individual cases. Projects may end with cost overrun or savings. In a portfolio of independent projects of the same size, the uncertainty provisions should theoretically even out. In practice, however, the projects in a portfolio are neither of the same size or independent. This report describes theory and practice concerning portfolio management in public projects. Literature studies and interviews with key professionals provide a background for understanding how portfolios can best be handled in the public sector and industry. The report gives a comprehensive overview of principles and practices that can be applied by government agencies in their effort to implement portfolio management.

2 **Economic incentives in public project management** (Dag Morten Dalen, Ola Lædre and Christian Riis)

This study investigates the use of economic incentives in public project management. Economic incentives affect effort and decisions of project managers. It becomes crucial to link payment and bonuses to the relevant aspects of project management performance. In most cases, important aspects of project management will be hard to observe and monitor. The use of economic incentives has an important selection effect as well – the type of project manager (good or bad) attracted to large public projects is affected. The pros and cons of out-sourcing of project management are discussed.

3 Decisions and basis for decisions in major public investment projects

(Stein V. Larsen, Eilif Holte and Sverre Haanæs)

Decisions and analysis need to be well coordinated so that the right type of analysis is done when it is needed. This study describes a selection decision models from private and public sectors and discusses current practices in order to draw lessons from these. The intention has been to help improve guidelines for decision-making in large public investment projects

Many examples from large public projects show insufficient focus on the toll gates in the early phases of the projects. Based on this type of experience, and “best practise” from research literature, the authors presents a generic toll-gate project model for large public projects.

4 Concept development and evaluation in major investment projects

(Hege Gry Solheim, Erik Dammen, Håvard O. Skaldebø, Eystein Myking, Elisabeth K. Svendsen and Paul Torgersen)

This report discusses the problem of developing and evaluating conceptual alternatives for public investment projects. The researchers describe the context for such endeavours, the interpretation of terms used in this type of work, and some common problems involved. Current practice is discussed based on a review of literature. The report defines a framework for systematic development and evaluation of concepts. It also gives recommendations for improving current practice.

5 Needs analysis in major public investment projects. Lessons and recommendations.

(Petter Næss)

This report discusses and gives advice about need analyses in connection with large-scale governmental investment projects. The study is based on society’s view on needs, not the view of the project owner or the project organization. Experience from a number of large-scale investment projects has shown that the need analyses on which decisions to implement the projects were based,

have often been insufficient and sometimes misleading. In many cases there is a more or less conscious distortion of the analysis, making proposed projects look more advantageous than is reasonable to expect. Based on a survey of analysis methods and the experience of inadequate and misleading needs analysis in major investment projects, the report recommends new guidelines for the scope and limitations of needs analysis, responsibility and timing of execution, documentation and connection to goal formulation and impact evaluations.

6 Formulation of objectives in major public investment projects

(Ole Jonny Klakegg)

Objectives (goals and targets) are proven to work as a performance enhancing tool, when used right. This report covers the theoretical foundation and the empirical findings needed to understand and evaluate the use of goals and targets in big public investment projects. Advice is given as to how goals and targets should be defined and used. In the empirical part, 23 projects are studied. They have all gone through the Norwegian Quality Assurance Scheme during the period 2000 – 2004. The projects cover a representative selection of all major Norwegian projects financed by the state in the period. Current and documented practice, show a significant improvement during the studied period, but some issues still remains.

7 An estimated guess. Up-front assessment of anticipated effects of major public investment projects

(Nils O.E. Olsson)

This report discuss the effect - or impact of major investment projects. It contains a description and discussion of methods for ex-ante evaluation of effect (up-front), and an overview over experience from some ex-post effect evaluations (after the project is finished). Evaluations show that the result of major investment projects is not always as promised by the planners and decision makers. The report discusses how to improve planning in the early phase in order to increase the probability of good estimates of future effects. An increased effort and focus on effect evaluations is recommended. It is important to build experience (especially data) to use in future analysis of major public investment projects

8 Real options and flexibility in major public investment projects

(Kjell Arne Brekke)

This report discusses how the theory of real options can be used to quantify the value of flexibility in major public investment projects. Flexibility can be connected to choice of start-up timing, dimensions, loosely coupled projects and flexibility in operation. The report also discuss empirical studies of how new information is used in decision-making. Several studies indicate that information about benefits and cost has little influence on priority among alternative projects. Different explanations to these observations are presented. The author concludes there is great potential for value in utilizing real options in public investment projects. However, in most cases there is little reason to believe that these values can be realized. The value of real options always depends on new information being used in decision-making.

9 Improved design of public investment projects. Making up-front appraisals of needs, objectives and effects

(Petter Næss with contribution from Kjell Arne Brekke, Nils Olsson and Ole Jonny Klakegg)

This report covers needs analysis, formulation of goals and targets and impact assessments in the front-end phase of major public investment projects. The study discusses the connections between these measures, gives definitions and advice on best practice based on existing research and experience. The purpose of the study is to contribute to a high quality basis for decision securing that the concept chosen is the one that, under given circumstances, will give the best deployment of resources, value for money and benefit for society.

10 Uncertainty analysis - Context and foundations

(Kjell Austeng, Jon Terje Midtbø, Ingemund Jordanger, Ole Morten Magnussen and Olav Torp)

This report is concentrated on uncertainty as a phenomenon, sources of uncertainty and decisions under uncertainty. The context around these issues; the project management regime and economic analysis is also brought to attention. The report discusses different main sources of uncertainty in projects. These are defined as: conceptual uncertainty, operational uncertainty, contextual uncertainty and scenario uncertainty. The uncertainty analysis' place in planning and execution of public projects is shown through a survey on the government need for uncertainty analysis. This survey show needs in five main areas. These areas are needs, benefits, cost, progress or

time, and the procedures around the choice of alternatives. The report looks at the connection between needs and benefits in an economic perspective, and discusses some sides of prognosis, needs assessments and future demands.

11 Uncertainty analysis - Modelling, estimation and calculation

(Frode Drevland, Kjell Austeng and Olav Torp)

The report offers a short description of statistical theory and some common probability distributions. This is followed by a description of common methods for estimation and calculation used in uncertainty analyses. Both analytical models and simulation is discussed. We perform a set of calculations of the formulas for mathematical/statistical calculation of the estimated basis figures for the analysis. One conclusion from these calculations is that Successive calculation and similar analytical methods are very robust in relation to deviations from the true probability distribution for the individual cost elements. One chapter is looking at how sensitive the results of analysis are for errors in the estimated input data. The conclusion is that the possibility for, and consequences of serious error is much larger when it comes to estimation of input-data than for assumptions of skewness in the probability function, and also a lot larger than the errors that are made in the calculation model itself. This is regardless of whether one uses an analytical model or simulation. Errors that occur due to inaccuracies in the formulas also are significantly smaller than errors caused by faulty estimates.

12 Uncertainty analysis - Methodology

(Kjell Austeng, Olav Torp, Jon Terje Midtbø, Vidar Helland and Ingemund Jordanger)

This report includes a collection of different methods for uncertainty analysis with a subsequent collocation. The report is divided into three main parts: (1) Description of methods from literature, (2) description of methods used by project owners, consultants and others directly involved in Norwegian projects, and (3) collocation of methods and evaluations and comparisons, according to a set of corresponding success criteria. The descriptions of the different methods should give the reader ideas for improvement of their own method. This will hopefully give synergy effects leading to development of improved practice. The material analyzed show that the similarities in different methods are evident. There is a lack of explicit systematic analysis of the upside potential. This may indicate a 'risk culture' in analyzing uncertainty. Further work is needed to balance the culture with more 'opportunity thinking'.

13 Uncertainty analysis - Sources of error in data and analysis (Kjell Austeng, Vibeke Binz and Frode Drevland)

The report seeks to find out whether, and to what degree, three assumed sources of error in cost analyses really contribute to errors in the final result from an analysis. These possible sources of error include (1) failing to consider correlations, (2) the assumption that the central limit theorem applies, and (3) inappropriate partitioning. The report investigates these issues through theory and empirical examples and gives advice on how to handle these issues in practical uncertainty analysis.

14 Positive uncertainty and increasing utility (Ingemund Jordanger)

The main theme of this report is opportunity management. Risk-neutral approach to management of uncertainties is an essential basis. This implies that the opposite of risk is not 'no risk' but the positive potentials of uncertainties - the opportunities. Both risk exposure and opportunities are seen relative to expectations. The report concludes better performance by improved opportunity management is one of the most important challenges of the future within project management. Dynamic management processes, proactive management of opportunities, step-wise optimization of value creation and benefits, require further competence lift and cultural change, both among project and portfolio owners and project planning and execution actors.

15 Cost Uncertainty in large Public Investment Projects; Empirical studies based on QA2

(Olav Torp (editor), Ole Morten Magnussen, Nils Olsson and Ole Jonny Klakegg)

This report discusses different aspects of uncertainty in the early phase of major public investment projects. The study is based on empirical data from external quality assurance (QA2) of the basis for control and cost estimates of investment projects with a cost exceeding 500 MNOK. The purpose of the study has been establishing a basis for understanding of the empirical basis found in QA-reports from these projects, related to uncertainty analysis, and to address interesting issues for further research in different areas.

16 Acquisitions in early phases of a project; Defence procurement (Erik N. Warberg)

This report discusses how the public may achieve good and efficient projects while still operate within the public framework and legislation. The starting

point is the Norwegian Defence procurements and their need to equip their forces. The main question is how close cooperation between the different parties is achieved, especially in the early phases of a project, while the Norwegian Defence still maintains the correct distance to suppliers in order to secure fair treatment and transparency. This report questions the restrictions to use the negotiated procedure within the EC Directive 2004/18 and discusses how advisers may participate in the later competition without breaking the directive. The report focus especially on the flexibility allowed for in the Defence procurement regulations. In addition it takes a closer look into the governing law. The report also investigates the impact of the defence market with a close focus of the current development in the EU.

**17 Up-front decisions based on scant information;
Approaches and challenges in the early phases of projects**
(Kjell J. Sunnevåg (editor), 10 different contributors)

This study is based on the recognition that it is necessary to have thorough evaluations during the front-end phase of projects, and that this is useful even if the basis of information is weak. The study gives advice on how we should approach the earliest phase, in order to secure and utilize information in evaluations of different basic concepts or choice of project, and not least how to assure good quality of the information and evaluations. The study operates in the border area between research, testing and demonstrating and popularization of approaches to utilize and assure the quality of information with a low level of precision.

**18 Multi-Criteria Decision Analysis (MCDA) of major
governmental investment projects**

(Ingemund Jordanger, Stein Malerud, Harald Minken, and Arvid Strand)

Multi-Criteria Decision Analysis (MCDA) is a discipline aimed at supporting decision makers who are faced with making decision among alternatives. MCDA aims at deriving a way to come to a compromise between conflicting objectives in a transparent process. The primary focus in the report is applied MCDA. The method's relation to decision theory is presented. Uncertainty in the basis for MCDA is discussed. The report recommends two MCDA methods: Even Swap and a Utility Function based method. The choice of which method that is most appropriate depends on the problem at hand and may be to some extent depending on which model the decision maker is most familiar with. An important part of the project has been to identify improvement potentials through the analysis of four relevant real life projects.

19 Impact evaluation of large governmental investments

(Bjørn Andersen, Svein Bråthen, Tom Fagerhaug, Ola Nafstad, Petter Næss and Nils Olsson)

This report reviews existing impact assessment methods and practices for governmental projects, with an emphasis on methods for after-the fact evaluation (ex post impact assessment). Based on the review of existing methods and practices, methods for ex post evaluation of large-scale Norwegian governmental investment projects are proposed. The focus of the report is directed toward impacts of the projects at a societal level, i.e., what has been termed the external effectiveness of the projects. This is distinct from an assessment of the efficiency of the resource use within the project itself (internal effectiveness). The recommended method is illustrated by several examples of its possible use in the assessment of different types of projects.

20 Investors' evaluation of potential projects

(Nils Olsson, Stein Frydenberg, Erik W. Jakobsen, Svein A. Jessen, Roger Sørheim and Lillian Waagø)

This report studies private investor's assessment of non-financial features of projects. The study focuses on non-financial analysis of projects. Non-financial aspects of projects can be described as the substance or quality of a project. The report also discusses to what extent some of the experiences from private investors are applicable to large governmental investments. In particular, we have been in search of experiences that are relevant to the large governmental investments that are subject to mandatory quality assurance in Norway. We study the behaviour of private investors because they operate in a partly different context than what is the case for governmental investments. A state-of-the art analysis has been carried out for four areas related to project evaluation. The four areas are termed as; private ownership, venture capital investments, corporate finance, and project management and strategy.

21 Major Projects: Logical Minimalism, Rationality and Grand Choices

(Knut Samset, Arvid Strand and Vincent F. Hendricks)

This study takes as its point of departure the paradoxical difference between the inherent and the emerging in many large investment projects: with the focus on what is here termed the project's *logic*. *Logical minimalism* would imply a type of analysis that cuts to the core of an issue in order to lay out the essence. The term has a positive connotation, as opposed to the opposite expression: *minimalistic logic*, which would suggest an inappropriate flawed type of analysis incompatible with expressed needs and priorities.

We assume that logical consistency and alignment of objectives with preferences are necessary but insufficient conditions for a *rational* choice. In addition, the logic needs to survive complex and unpredictable processes of subsequent analyses and negotiations, under influence of stakeholders with differing priorities, as well as different political regimes, in order to end up as the final choice – preferably what could be labeled the *grand* choice – i.e. one that would answer to initial expectations. This study looks at three large investment projects, case by case, to explore the features described above, the quality, consistency, the interplay and alterations that result during the journey from the initial idea until the assumed or final effect. The intention is not to evaluate but to focus on the *ex ante* situation. The aim of the study is to provide advice that would be relevant in the process of selecting and designing projects, and make decision-making more predictable – or at least more transparent.

22 Environmental Economics and Economic Viability

(Kåre P. Hagen)

This report discusses the possibilities and limitations of the market economy in dealing efficiently with the environmental problems that economic activity is creating for society. The market system needs a stable institutional framework protected by law in order to function efficiently. In that respect the existence of exclusive property rights to goods and resources is crucial for the functioning of markets. Pure public goods cannot be individualized and subjected to private ownership. The allocation of such goods must therefore be subjected to governance at the government level in order to secure that all interests involved are served in an optimal manner. Environmental goods are prime examples of public goods, the allocation of which should therefore be a governmental responsibility. The report discusses how market based activities that entail qualitative degradation of the environment should be regulated in order to take care of the interests of the general public in an optimal way. The choice between tax-based solutions and bargaining where the government in the latter case acts on behalf of the public interests in order to reach efficient outcomes is discussed. It is concluded that tax-based solutions are normally more efficient. This is the theoretical underpinning for the so-called polluter-pay-principle.

23 The Norwegian Front-End Governance Regime of Major Public Projects- a Theoretically Based Analysis

(Tom Christensen)

This report presents a theoretically based analysis of the Norwegian Quality Assurance Scheme (QA1 and QA2) for Major Public Projects, drawing on a number of different perspectives from organization theory and decision-

making theory. It starts by presenting the perspectives and using them to characterize, analyze and evaluate the quality assurance system. As a second step the report outlines the main features of New Public Management and post-NPM reforms in public sector organizations, and places Norway in the comparative reform picture. Third, the report discusses how the system might be elaborated or improved.

24 Market oriented approaches to environmental policy

(Kåre P. Hagen)

This report deals with the possibilities and overall efficiency of market based methods in environmental policy. The discussion is mainly based on a comparative analysis of emission taxes and tradable emission quotas and under what circumstances one type of instrument is preferable to the other and whether they possibly can be combined. The discussion is mainly focusing on emission of greenhouse gases and greenhouse effects as a global problem.

25 Planning and Decision-making in Hospital Projects. Lessons with the Norwegian Governance Scheme

(Asmund Myrbostad, Tarald Rohde, Pål Martinussen and Marte Lauvsnes)

The report summarizes lessons learned from five years of planning during the front-end phase in Norwegian hospital projects. The 10 projects being analyzed have all adopted “The Planning Guide for Front-end Planning in Hospital Projects” issued by the Norwegian Directorate of Health in 2006. This study outlines the possible effects of the guidelines, and gives some recommendations for further improvements in the execution of the planning process and the contents of the guidelines. For example, more focus should be on the goals, content of each phase and the interface between these, and development of a Business Plan as the basis for final approval of the investment at the end of the front-end planning process.

26 Political Control, Local Rationality and Complex Coalitions

(Erik Whist and Tom Christensen)

This report is based on a detailed review by two political scientists of 23 large Norwegian public investment projects. The focus is on the processes of analysis and decision-making that eventually result in the final decision to finance and implement these projects. The study provides interesting insight into the complexity and outcome of these processes, sometimes surprising. It concludes that in terms of analytic craftsmanship much is to be desired, while decision-making, in terms of involvement and control of stakeholders, by and large is as could be expected in an advanced democratic society. Also, that the quality assurance scheme that applies to such investment projects

has a relatively high legitimacy and is regarded by stakeholders to have some trait of professional and technical “objectivity”. A 500 page appendix documents the processes of analysis and decision-making in each of the 23 projects.

27 Valuing the future. Time horizon and discount rates

(Kåre P. Hagen)

When performing a Cost-Benefit analysis of an investment project, it is necessary to compare and evaluate the consequences that occur at different points in time. The normal procedure is to transform estimated future values to present values by using a discount rate. This however implies that costs and benefits that occur far into the future will have little impact today. For example, environmental efforts and railway infrastructure projects, where benefits only occur in the long run, will inevitably experience difficulties in achieving a positive net present value. This has been seen as problematic. This study examines different theoretical models that explain the optimal time profile for the discount rate. The two main approaches are (i) consumption/saving models and (ii) models that explain the rate of return in the financial market. It is shown that in both approaches, increasing uncertainty with respect to future growth, leads to a decreasing optimal discount rate over time. This implies that the impact today of future costs and benefits is still smaller the more distant they are, but the effect is decreasing.

28 The Fjord, the City and the Opera. An Evaluation of Bjørvika Urban Development

(Erik Whist and Tom Christensen)

This report gives an evaluation of the two projects E18 Bjørvika and the New Opera House in Oslo. Both are parts of what is referred to as Bjørvika Urban Development. The decision-making process for these projects was characterized by complex coalitions. These are projects where central government investments trigger large benefits for Oslo City and property owners. Parliament was a champion together with local interests. A set of binding agreements was put in place by the involved parties. As of 2011 it looks as if Bjørvika Urban Development will be a successful project. The construction of the New Opera House was according to plans, and its’ cultural objectives will most likely be attained. Moreover, the opera house is a monumental building and has become one of the most important tourist attractions in Oslo. The E18 Bjørvika project is still in progress, and new areas are continuously opened for urban development. Questions may however be posed about the benefits to society at large, relative to the costs, and about alternative use of the funds.

29 Sustainability and Public Investments. Lessons from Major Public Investment Projects

(Ola Lædre, Gro Holst Volden and Tore Haavaldsen)

The report starts with a discussion of the concept 'sustainability' and argues that the most important aspects in an assessment of a project's sustainability are; a broad and holistic perspective on impacts, a sufficiently long time horizon, and consideration of risks and flexibility. Several complementary tools, quantitative as well as qualitative, are necessary in order to grasp all these aspects and assess sustainability properly. The report examines the degree to which the Norwegian quality assurance scheme (QA1) attends to the sustainability of major public investment projects. A review of 24 QA1s shows that there is a potential of improvement. For example; The assessment of society's needs is often too short sighted and static; Impacts that are not easily quantifiable are often overlooked; The choice of temporal horizon in the analysis often lacks discussion and justification. A general challenge is that sustainability cannot be regarded as an 'objective' criterion. It depends on considerations of different aspects of both time and space, and will by definition involve morally charged elements. However, the authors think that it is possible to establish a better and more common practice for the assessment of sustainability of major projects.

30 Evaluating Public Investment Projects. Lessons and Advice from a Meta-Evaluation of Four Projects

(Gro Holst Volden and Knut Samset)

Annual investments in public projects in Norway amount to billions. It is important that these investments are evaluated after some years, to assess their degree of success. This study reports on the lessons from a pilot evaluation of four projects. The same methodology is used in all four evaluations, the OECD-DAC model with five overall evaluation criteria (efficiency, effectiveness, impacts, relevance and sustainability), supplemented by a social cost-benefit analysis. Findings and conclusions are summarized, and lessons learned from the exercise are discussed. The overall conclusion is that the chosen evaluation model is generic, flexible and well suited for many types of projects. 26 specific recommendations for future evaluations are highlighted. The more detailed evaluations can be found in four separate reports.

31 Major Public Investments' Impact on Competition. How to Deal with Competition Issues as Part of the Project Appraisal

(Asbjørn Englund, Harald Bergh, Aleksander Møll and Ove Skaug Halsos)

Competitive markets are crucial to ensure efficient use of society's resources. Public investments may have direct and/or indirect effect on competition – in the supplier markets as well as the markets where the investment will be used. For example, if a public investment leads to one or a few operators getting better access to infrastructure, these operators may drive competitors out of the market in the long run. Such adverse effects can be avoided by designing the infrastructure for several operators. An example of a positive effect on competition is transport infrastructure that leads to an expansion of other markets' geographical dimension (often referred to as Wider Economic Benefits). The purpose of this report is to raise awareness of possible competition effects of public investments in the concept development phase. The report is divided in two parts, a theoretical section and a case section.

32 Analysis of Systematic Uncertainty in the Norwegian Economy

(Haakon Vennemo, Michael Hoel and Henning Wahlquist)

Public investment projects are subject to uncertainty. Many uncertainties are unsystematic and can be disregarded in a large portfolio of public investments. By contrast, systematic uncertainties affect the total return on society's investments. In Cost-Benefit Analysis (CBA) systematic uncertainty is often captured by a risk premium of the discount rate, assuming that all elements in the CBA have the same risk level. A more flexible but also more complex way to model systematic risk would be to use Certainty Equivalents associated with each cost and benefit element. This study uses an economic equilibrium model for the economy to investigate whether different components in a CBA are uncertain to the same degree. The overall conclusion is that they are very similar, and thus the "simple" use of a discount rate is after all an appropriate way to adjust for systematic risk.

33 Planning, Analytic Tools and the Use of Cost-Benefit Analysis in the Transport Sector in Norway and Sweden

(Morten Welde, Jonas Eliasson, James Odeck and Maria Börjesson)

In this study we compare the use of Cost-Benefit Analysis (CBA) in prioritizing road projects in Norway and Sweden. Differences in the planning process are explored, and a quantitative analysis of more than 600 project proposals is performed. The main findings are: both countries make extensive use of CBA, and the methodology and national guidelines are based on similar principles. However, in Sweden the CBA is a determining factor in the selection of road projects whereas in Norway the CBA has no significant impact on the selection of projects. It is therefore clear that there are other factors that may explain how projects are prioritized in Norway.

The report recommends that these other factors should be identified and documented as much as the results of the CBA.

34 The Opportunity Space. A Study of Conceptual Appraisals and the Choice of Conceptual Solutions

(Knut Samset, Bjørn Andersen and Kjell Austeng)

The Norwegian Quality Assurance scheme for major public investment projects requires that a Conceptual Appraisal (CA) document is produced as input to the Cabinet's choice of concept. The CA must identify and review at least three alternative conceptual solutions to the problem or societal need in question. This study takes a closer look at the CA reports and the accompanying quality assurance report of 17 projects, and performs a number of interviews with actors involved in the processes. It concludes that the opportunity space is defined too narrowly in many CAs. The conceptual solutions studied are often variants of one solution, which in turn represents only a continuation of the present solution. In some cases the conceptual solution is chosen already before the CA report is produced. Among the explanations are political demands and detailed requirements imposed on analysts. The report gives some recommendations on how to widen the opportunity space in the analysis to allow for different conceptual solution to be identified and considered.

35/ 36 Investing for Impact. Lessons with the Norwegian State Project Model and the First Investment Projects that have been Subject to External Quality Assurance

(Knut Samset and Gro Holst Volden)

The report provides a description of the Norwegian State Project Model, also referred to as the Quality Assurance scheme for major public investment projects. The scheme was introduced year 2000 (QA2) and extended in 2005 (QA1). The report presents the first results from this scheme, mostly in the area of cost estimation and cost management (QA2). The results show that 80% of projects now remain within or on the cost frame approved by Parliament. This is a vast improvement compared with what might be expected earlier. Evidence indicates that the QA2 scheme and the methodology used for cost estimation have had a positive effect. Some preliminary experience with quality assurance of the choice of concept (QA1) is also presented in the report. Report 36 is an English translation of preceding report (No. 35), which is in Norwegian.

37 Use of Carbon Prices in Cost-Benefit Analysis

(Gro Holst Volden)

Global warming inflicts heavy costs on society, and it is therefore essential that greenhouse gas emissions are handled in a consistent and comparable

manner in economic analyses. In the absence of a global agreement on emissions cuts that commits all countries and leads to a single global carbon price, it is not readily apparent how greenhouse gas emissions should be handled. This report presents the results of a review of 111 CBAs of public projects, focusing on how greenhouse gas emissions are dealt with. We find that the carbon price used is in most cases low and that greenhouse gas emissions do not affect the calculated net present value of the projects. In some cases, however, considerations about greenhouse gas emissions constrain the analysis in other ways. This implies that the derived carbon price per ton can be random and highly variable. The report recommends instead to use a common carbon price that is sufficiently high to reflect Norway's ambitions in this area.

38 Non-Monetized Impacts in Economic Analysis. Practice and Lessons from Public Investment Projects

(Heidi Bull-Berg, Gro Holst Volden and Inger Lise Tyholt Grindvoll)

In an economic analysis, not all impacts can be assessed in monetary terms, but they may still be crucial to the decision maker's choice. It is therefore important to identify, describe and assess non-monetized impacts in a systematic and transparent way. This study includes a survey of current practice in the analysis of non-monetized impacts of major public investment projects. We find that 90% of the analyzes include such impacts, but the assessment is often inadequately documented. Non-monetized economic impacts are often misinterpreted for goal achievement. The aspects of time and uncertainty are usually not presented at all. The role of regional impacts is particularly unclear. Many of the analysts wish there was better guidance in this area.

39 Low Estimates – High Stakes. A Study of Underestimation of Costs in Projects' Earliest Phase

(Morten Welde, Knut Samset, Bjørn Andersen and Kjell Austeng)

This study explores a phenomenon hardly discussed in the project management literature, the underestimation of costs in projects' early phases, from the first initiative and until the project is approved for implementation. A sample of 12 projects with exceptionally high cost increase during the front-end phase is explored. The size and causes of the increase is discussed, and the researchers conclude that five of the 12 projects most likely would not have been approved if the first estimate had been realistic. The report provides recommendations on how to get more precise cost estimates in a project's initial phase.

40 Perverse Incentives and Counterproductive Investments. Public Funding without Liabilities for the Recipients

(Knut Samset, Gro Holst Volden, Morten Welde and Heidi Bull-Berg)

This study takes a closer look at a phenomenon referred to as perverse incentives, within the framework of public investment projects. The State often appears as generous donor on behalf of taxpayers to finance projects that will benefit only a limited group or geographical region, without any financial commitments for the recipients. Perverse incentives can result in unsuccessful projects, waste of public funds, and adverse side effects of the investments, such as corruption. One development aid project and eight Norwegian investment projects are used to illustrate how perverse incentives might occur, what the causes and consequences may be - and what can be done to avoid the problem.

41 Transport Models and Extreme Scenarios. A Test of the NTM5 Model

(Christian Steinsland and Lasse Fridstrøm)

Transport models are used to calculate future traffic growth and to evaluate the effects of public regulations and other measures. But are the models able to deal with large shock on the supply or demand side? In this study, the Norwegian model for long distance travel has been subjected to various stress tests. We explore the predicted effects of a € 12 fuel price, a 100 kilometers per liter fuel efficiency, and of a drastically improved road infrastructure between major cities. The model appears to handle fairly large changes in input rather well. However, the most extreme scenarios do not yield credible results.

42 User Fees in the Transport Sector

(Kare P. Hagen and Karl R. Pedersen)

All activities in the transport sector require infrastructure, i.e. a network of roads, airports, railways, ports etc. The investment cost, together with the costs of operation and maintenance, must be financed in one way or another, by tax payers or by users.

Based on economic welfare theory, which arguments can be used to impose a fee on the motorists for the use of the infrastructure? In the report, researchers discuss the *financing argument* (Part I) when the alternative is tax funding, and taxation leads to an efficiency loss; and the *congestion argument* (Part II) when traffic exceeds capacity. As an introduction they also look at more traditional arguments - in a situation where it is possible to finance infrastructure through non-distortionary taxation, and traffic is within the limits of capacity so that there is no congestion.

43 Norwegian Road Planning: Which Considerations Govern the Recommendations?

(Arvid Strand, Silvia Olsen, Merethe Dotterud Leiren, Askill Harkjerr Halse)

Drawing on two sources of data, the study explores different factors that affect the project portfolio of road projects in Norwegian national transport planning. The analyses of ten individual road projects indicate that net economic benefits do not play an important role in the prioritisation of road projects in the regions. More important is the aim of achieving a certain level of road standard, i.e. to reach a certain level of road quality nationwide – even in areas where there is not much traffic, major timesaving nor gains in the form of the reduction of the number of accidents. However, according to the informants, net economic benefits have considerable impact within individual projects, when the stakeholders make decisions of which road trace to go for, comparing trace alternatives.

44 Resource allocation in the transport sector – some potential improvements. An anthology by 12 experts

(James Odeck and Morten Welde (eds.))

The overall objective of transport policy is to provide an efficient, safe and environmentally friendly transport system that meets society's need for transport and promotes regional development. Achieving such objectives is not only possible, but also necessary to further economic development, improve living conditions and preserve the environment for future generations. However, it will require huge resources in terms of investments, maintenance, and research and development.

This book is an anthology on current issues in the transport sector. It contains contributions from 14 of Norway and Sweden's leading transport researchers. It aims to address issues which may impede efficient resource allocation in the transport sector.

45 Municipal investment practices in Norway

(Morten Welde, Jostein Aksdal, Inger Lise Tyholt Grindvoll)

A project model is a standard classification of project phases from the idea phase, through planning and implementation, to operation – often defined as the front-end phase of projects. The model defines roles, requirements for decision-making, and the decision points between the different phases.

This study of municipal investment practices examines five municipal investment projects that have had varying degrees of success, as well as the extent to which project models are in use in the 10 largest municipalities in the country. The focus is on the project owners' perspective and on how projects are used as instruments for achieving long-term, strategic objectives.

This implies the need to choose the right concept, to implement it efficiently, and to achieve viable long-term effects.

A significant finding from this study is that there is a growing recognition of the need for adequate studies of the projects' front-end phase and political support for these phases. Through better front-end appraisal, municipalities may be able to reject projects that are not part of long-term strategies, which do not meet real needs or that represent an undue financial risk

**46/ Governance schemes for major public investment projects:
47 A comparative study of principles and practices in six
countries**

(Knut F. Samset, Gro Holst Volden, Nils Olsson, Eirik Vårdal Kvalheim)

This study concerns governance schemes for major public investment projects and how they are organized and practiced at state level today. The Norwegian scheme, often referred to as the State Project Model is compared with similar schemes in five other countries: the Netherlands, the UK, Sweden, Denmark and Canada (Quebec). There are many similarities between these, for example, the respective governments have a central role, not least in making the choice of project concept. The number of project phases and decision points in the stage-gate models varies somewhat between the countries. All schemes are of a fairly recent date, and it is useful to discuss their strengths and weaknesses, but it is yet too early to explore their effects and degree of success, which would have to be the topic of future studies.

Report 47 is an English translation of the preceding report (No. 46), which is in Norwegian.

**48 Investment projects and their environmental
consequences**

An anthology by 14 experts

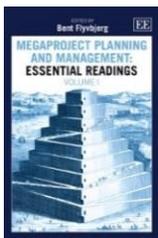
(Kåre P. Hagen and Gro Holst Volden (eds.))

Large public investment projects can affect the environment in different ways, negative or positive. It is essential to identify and estimate such effects up-front, before the project is decided and implemented. This is not always done, and in some cases they are underestimated or ignored. It may also be difficult to predict how human activity affects nature, let alone quantifying and possibly pricing such effects.

The Concept research program has discussed environmental issues related to investment projects in previous reports, i.e. no. 22 on environment and economic benefits, no. 24 on market-oriented management methods in environmental policy, no. 27 on the discount rate in the long term perspective, no. 29 of investments' sustainability, no. 37 on the use of carbon

prices, and no. 38 on the handling of non-monetized impacts in socio-economic analyses. This time, we present a broad collection of scientific contributions on the topic of investment projects and environmental impacts in one book, in order to provide an overview of the field, its various methods and recommendations, and with examples from several sectors. The chapters are written by 16 of the country's foremost experts on environmental impact assessment and project analysis.

Publications in English



Megaproject Planning and Management: Essential Readings

Bent Flyvbjerg (editor)
Edward Elgar Publishing, Inc., 2014
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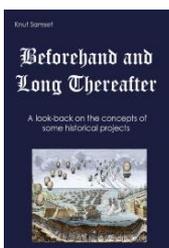
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Hugo Priemus and Bert van Wee (eds.)
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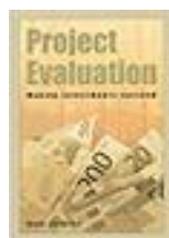
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Terry Williams and Knut Samset (eds)
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ISBN 978 0 230 36348 9 (hardback)



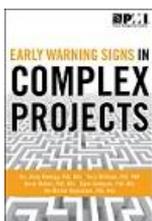
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Knut Samset
Ex Ante Academic publisher, May 2012
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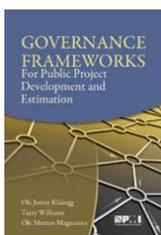
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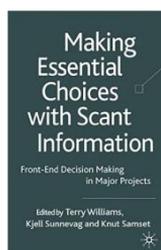
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 Project Management Institute, Newton Square,
 USA, November 2010
 ISBN 978 1 935589 18 1 (paperback)



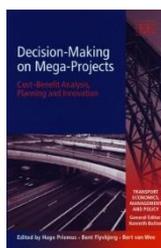
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 Knut Samset
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 Ole Jonny Klakegg, Terry Williams, Ole Morten Magnussen
 Project Management Institute, Newton Square, Juli. 2009
 ISBN 978 1 933890 78 4 (paperback)



Making Essential Choices with Scant Information
 Terry Williams, Knut Samset and Kjell Sunnevag (eds.),
 Palgrave Macmillan, Jan. 2009
 ISBN 13 978 0 230 20586 4 (hardback)



Decision-Making On Mega-Projects, Cost-benefit Analysis, Planning and Innovation
 Hugo Priemus, Bent Flyvbjerg and Bert van Wee (eds.)
 Edward Elgar Publishing, Feb. 2008
 ISBN 978 1 84542 37 5 (hardback)

Project governance emerged as a convenient term at the turn of the century, to signify the management framework within which project decisions are made. There is considerable research going on, and sixteen years into the century it is time to stop for a moment and ask what we have achieved in terms of theory and lessons learned.

This booklet presents some findings from research, presented in terms of 10 paradoxes. It suggests that some practices from real life appear to conflict with theoretical insight or what we like to call best practice.

