

# PROGRAM DENMARK: Transforming Public Projects through Research—Insights from Denmark and Norway

Hilton Reykjavík Nordica, Thursday on the 20<sup>th</sup> February 2025 at 9-12

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# Agenda

### 1. PROGRAM DENMARK - A research network

- The purpose
- Who is involved?
- What do we do?
- The cooperation with Norway
- 2. Cost and Schedule Performance in Major Public Projects: A Cross-Country Comparison Between Denmark and Norway
  - Governance models in Denmark
  - IT Projects in detail
  - Initial data on roads and railway projects

### 3. The way forward







# PROGRAM DENMARK: A research network for learning and value creation in major public projects

### PURPOSE

- 1. To disseminate and provide knowledge and learning about major public projects, drawing on Danish and foreign experience
- 2. To ensure systematic collection of data from major public projects
- 3. To contribute to the political debate on major public projects to influence the choice of regulatory and governance mechanisms that can improve concept selection, planning, execution, and value creation from major public projects

The research network was officially kicked off in September 2023 and has been active for 1,5 years – all work is voluntary!







# Who is involved in PROGRAM DENMARK?

- > Six universities
- > Five associations





# What do we do?

- Evidence-based research about major public projects. This is a key activity and data to be presented next
- 2. Disseminate information about major public projects in Denmark at webinars, conferences, and international forums and working closely with Norway (Concept Symposium), IMaR 2024, Iceland
- 3. Dialogue and meetings with ministries, agencies, and other public organizations
  - Ministry of Finance, Ministry for the Interior and Health of Denmark, Ministry of Transport, Agency for Public Finance and Management, Danish National Auditors (Rigsrevisionen)
- 4. Working together with public organizations:
  - Report about major hospital buildings in Denmark ("Supersygehuse") "ordered by" Ministry for the Interior and Health of Denmark
  - Subject Matter Experts for Danish National Auditors (Rigsrevisionen)
- 5. Dialogue with the political level, e.g., The Committee for Digitization and IT (20th June 2024)





- 1. Excellent cooperation with Concept Research Programme and the Norwegian Ministry of Finance
- 2. Comparative study of major public projects in Norway and Denmark
- 3. Concept Symposium every second year a fantastic conference that brings together researchers from all over the world but also officials from primarily the Nordics and other practitioners
- **4. Governance of Public Investment Projects**: A comparative perspective from multiple countries. Book project edited by the Concept Research programme
- 5. Other minor tasks include helping with review, finding interviewees, etc.



### **Concept Research Programme**





### Cost and Schedule Performance in Major Public Projects: A Cross-Country Comparison Between Denmark and Norway

Svejvig, P., Welde, M., Pries-Heje, J., & Kaas Ollendorff, N. (2024). Cost Performance in Major Public IT Projects: A Cross-Country Comparison Between Denmark and Norway. Paper presented at IRNOP 2024 conference, Stockholm, Sverige, 11–14 June 2024

Svejvig, P., Welde, M., & Pries-Heje. Cost Performance in Major Public IT Projects: A Cross-Country Comparison Between Denmark and Norway [Manuscript being prepared for journal submission]

Data collection IT Projects: Per Svejvig and Jakob Schmidt Sejling

Data collection roads and rail projects: Christian Thuesen with PhD students and a master's student







### Project governance models Norway and Denmark

	Norway The State Project Model	Denmark New Construction Budgeting (NAB)	Denmark The State IT Project Model
Authority	Ministry of Finance	Ministry of Transport	Danish Agency for Public Finance
Coverage	Across sectors including roads, railways, buildings, defense and IT	Roads, railways and buildings	IT
Thresholds	NOK 1,000 million for infrastructure projects, but NOK 300 million for IT projects	A lower threshold has not been defined, but smaller projects are not included	DKK 15 million
Cost Estimation	Estimated cost and uncertainty (P50 and P85 percent probability of avoiding cost overrun)	Fixed uncertainty 50% at QA1 and 30% at QA2 (correction reserve) (QA2 15% for road projects)	Estimated cost and uncertainty (base estimate plus risk contingency)
Quality Assurance	External quality assurance where QA1 and QA2 are mandatory (with few exceptions)	All projects over DKK 250 million. DKK must have external at QA1 and QA2	The Danish IT Council reviews all projects over DKK 15 million. DKK (70 million for IT acquisition)
Launched	Introduced in 2000 and last revised in 2023	Introduced in 2007 and last revised in 2024	Introduced in 2011 and last revised in 2024





### Four data sets: One Norwegian and Three Danish

	Danish major public IT projects, non SIPM*	Danish major public IT projects, SIPM*	Danish public IT projects, SIPM*	Norwegian major public IT projects
Number of projects	8 projects	6 projects	62 projects	13 projects
Threshold cost	200 million DKK	200 million DKK	Less than 200 million DKK	300 million NOK (≈ 200 million DKK)
Actual cost	282 to 2800 million DKK, average about 993 million DKK	292 to 3566 million DKK, average about 1086 million DKK	11 to 124 million DKK Average about 40 million DKK	410 to 5873 million NOK Average about 1449 million NOK, (ca. 920 Million DKK)
Year started - completed	1996-2017	2018-2024	2018-2024	2001-2021
Sources			Finansministeriet DK letter to Danish Parliament 29.04.2024	

\*) SIPM means State IT Project Model launched at the beginning of 2011





	Denmark (non-SIPM)	Denmark (SIPM)	Denmark (18-24)	Norway
The period for projects	1996-2017	2017-2024	2018-2024	2006-2021
The mean cost for projects	€122 million	€137 million	€5 million	€126 million
Mean cost overrun	110%	80%	12% 2%	
Median	84%	26%	2%	-3%
Standard deviation	123%	160%	38%	27%
Maximum cost overrun	313%	402%	178%	84%
Share of projects with cost overrun	6 out of 8 projects (75%)	5 out of 6 projects (83%)	36 out of 62 projects (58%)	4 out of 13 projects (31%)

Cost performance distributions, Denmark and Norway



Note: SIPM = projects using State IT project model (DK only), non-SIPM and SIPM cost performance is calculated from fixed price cost performance



#### Draft data - Not peer-reviewed



# Schedule Performance [Months]

	Denmark (non-SIPM)	Denmark (SIPM)	Denmark (18-24)	Norway
The period for projects	1996-2017	2017-2024	2018-2024	2006-2021
Mean schedule overrun in months	25	31	4	29
Median	18	28	2	14
Standard deviation	27	12	5	35
Maximum schedule overrun	77	48	18	105
Share of projects with schedule overrun	6 out of 8 projects (75%)	6 out of 6 projects (100%)	16 out of 30 projects (55%)	9 out of 13 projects (69%)

Schedule performance distributions, Denmark and Norway



Note: SIPM = projects using State IT project model (DK only)



#### Draft data - Not peer-reviewed

### Major road projects Cost Performance

NAB is "New Construction Budgeting" a governance model introduced in 2006

	Traditional	NAB	DK	NO
No of projects	8	10	18	9
No of projects with cost overrun	4	0	4	
	1999	2009	1999	2001
Period for the projects (start)	- 2006	- 2014	- 2014	- 2014
Mean project cost (FID)	1.140	2.145	1.698	
Share of project with cost overrun	50%	0%	22%	33%
Mean overrun cost for the projects (MDKK)	4	- 1.042	- 577	
Mean cost overrun (%)	4%	-42%	-22%	-4,50%
Median (%)	-42%	-1%	-25%	
Standard deviation (%)	20%	12%	28%	
Minimum cost overrun (%)	-21%	-60%	-60%	
Maximum cost overrun (%)	36%	-18%	36%	



### Major railways projects Cost Performance



	Traditional	NAB	DK	NO
No of projects	6	12	18	9
No of projects with cost overrun	2	1	3	
	1998	2010	1998	2001
Period for the projects (start)	- 2007	- 2020	- 2020	- 1014
Mean project cost (FID)	3.216	2.935	3.029	
Share of project with cost overrun	33%	8%	17%	11%
Mean overrun cost for the projects (Million DKK)	608	- 942	- 426	
Mean cost overrun (%)	-8%	-24%	<b>-19%</b>	-5,40%
Median (%)	-27%	-15%	-23%	
Standard deviation (%)	22%	22%	22%	
Minimum cost overrun (%)	-33%	-64%	-64%	
Maximum cost overrun (%)	22%	31%	31%	





### Findings

- > Cost performance IT Projects: There is a significant difference in cost overruns, with Norwegian major public projects averaging a 2% overrun, compared to an 80%-110% average overrun for Danish major IT projects
- Schedule performance IT Projects: Norway and Denmark experience significant delays in major public IT projects of an average of 25-31 months. No big difference
- > IT projects smaller than 200 million DKK perform better: Both cost and schedule performance are much more acceptable for projects smaller than 200 million kroner
- > Road and railway projects: Denmark performs better than Norway for both road and railway projects, with the governance model "New Construction Budgeting" ( these are very early data and need much more quality assurance and triangulation)





The way forward







### Focus on data and quality assurance of data - the key issue to provide evidence-based research







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## Thank you, questions?







References





#### aarhus UNIVERSITY BUSINESS AND SOCIAL SCIENCES References & Further readings

- Alami, A., C. Østergaard Madsen and O. Krancher (2022). <u>Government IT Projects: Current Evidence of Cost and Schedule Overrun and</u> <u>Their Antecedents</u>, Cham, Springer International Publishing.
- > Finansministeriet (2010). Professionalisering af arbejdet med it-projekter i staten [Professionalisation of the work with IT projects in the state].
- > Finansministeriet (2023). Budgetredegørelse for udgiftspolitisk styring af it-området. Finansministeriet. København, Finansministeriet.
- > Flyvbjerg, B. (2006). "From Nobel Prize to Project Management: Getting Risks Right." Project Management Journal **37**(3): 5-15.
- > Gil, N. (2021). "Megaprojects: a meandering journey towards a theory of purpose, value creation and value distribution." <u>Construction</u> <u>Management and Economics</u> **40**(7-8): 562-584.
- Gil, N. A. (2023). "Cracking the megaproject puzzle: A stakeholder perspective?" <u>International Journal of Project Management</u> 41(3): 102455.
- > Gil, N. A. and Y. Fu (2022). "Megaproject Performance, Value Creation and Value Distribution: An Organizational Governance Perspective." <u>Academy of Management Discoveries</u> 8(2): 224-251.
- > Gjessing, M. (2022). UDIs milliardsatsing i spagat mellom smidig og fossefall. Digi.no, Teknisk Ukeblad Media.
- > Haraldsen, A. (2022). Akson et monument over en feilslått helsepolitikk. Digi.no, Teknisk Ukeblad Media.
- > Ika, L. A., P. E. D. Love and J. K. Pinto (2022). "Moving Beyond the Planning Fallacy: The Emergence of a New Principle of Project Behavior." <u>IEEE Transactions on Engineering Management</u> 69(6): 3310-3325.
- Jones, L. R. and K. J. Euske (1991). "Strategic Misrepresentation in Budgeting." Journal of Public Administration Research and Theory: J-PART 1(4): 437-460.
- > Jørgensen, M. (2024). "Smidigere oppstart av smidig IT-utvikling i offentlig sektor." <u>Magma</u> 27(1): 79-85.
- Lervåg, Lone-Eirin, Håkon Finne, Dag Bertelsen, and Janne Venæs. 2022. "Etterevaluering av prosjektet Autosys kjøretøy " In, edited by NTNU Concept, 74. Conceptprogrammet.

#### aarhus UNIVERSITY BUSINESS AND SOCIAL SCIENCES References & Further readings

- Love, P. E. D., J. K. Pinto and L. A. Ika (2022). "Hundreds of Years of Pain, With Minimal Gain: Capital Project Cost Overruns, the Past, Present, and Optimistic Future." <u>IEEE Engineering Management Review</u> 50(4): 56-70.
- Merrow, E. W., S. W. Chapel and C. Worthing (1979). <u>A Review of Cost Estimation in New Technologies: Implications for Energy Process</u> <u>Plants</u>. Santa Monica, CA, RAND Corporation.
- > Teknologirådet (2001). Erfaringer fra statslige IT-projekter hvordan gør man det bedre?. Rapport og anbefalinger fra en arbejdsgruppe under Teknologirådet. København, Teknologirådet.
- Wachs, M. (1989). "When Planners Lie With Numbers." <u>American Planning Association. Journal of the American Planning Association</u> 55(4): 476.
- Welde, M. and O. J. Klakegg (2024). "Avoiding Cost Overrun Through Stochastic Cost Estimation and External Quality Assurance." <u>IEEE</u> <u>Transactions on Engineering Management</u> 71: 1984-1997.
- Økonomistyrelsen (2011). Vejledning om den fællesstatslige statens it- projektmodel v1.0 [Guidance on the federal government's IT project model v1.0], Økonomistyrelsen.
- Økonomistyrelsen. (2024). "Tiltag til opfølgning på Finansministeriets budgetredegørelse for udgiftspolitisk styring af it-området [Initiatives for follow-up on the Ministry of Finance's budget statement for expenditure policy management of the IT area]." Retrieved 29th August, 2024, from https://oes.dk/it-og-oekonomistyring/budgetredegoerelse-for-udgiftspolitisk-styring-af-it-omraadet/.