ANSKAFFELSES AKADEMIET 1 2025

Public Procurement Pathways

Sustainability Edition

Marius Langseth and Jan Ole Similä (Eds.)

CAPPELEN DAMM FORSKNING

OPEN ACCESS

Public Procurement Pathways – Sustainability Edition

Marius Langseth and Jan Ole Similä (Eds.)

Public Procurement Pathways – Sustainability Edition

CAPPELEN DAMM FORSKNING

Boka er utgitt med støtte fra Anskaffelsesakademiet

ISBN Heftet utgave: 9788202892494
ISBN PDF: 9788202882976
ISBN EPUB: 9788202891725
ISBN HTML: 9788202891732
ISBN XML: 9788202891749
DOI: https://doi.org/10.23865/cdf.264

Dette er en fagfellevurdert antologi.

Cappelen Damm Forskning er redaksjonen for åpen forskningspublisering i Cappelen Damm Akademisk.

Omslagsdesign: Sissel Holt Boniface, Cappelen Damm AS
Omslagsfoto: Getty Images

Cappelen Damm Forskning
forskning@cappelendamm.no

Innhold

INTRODUKSJON

Offentlige anskaffelser som fagfelt og strategisk virkemiddel

Marius Langseth Kristiania / NTNU – Norges teknisk-naturvitenskapelige universitet, Norge

See English introduction below.

Offentlige anskaffelser, det offentlige sitt innkjøp av varer, tjenester og bygg- og anleggsarbeider, utgjør en kjernefunksjon i moderne offentlig forvaltning. Hvert år bruker offentlige virksomheter enorme summer på innkjøp; i Norge alene beløp utgiftene seg til rundt 780 milliarder kroner i 2023 (SSB, 2025). Dette tilsvarer en betydelig andel av økonomien (om lag 15 prosent av BNP), noe som illustrerer hvor viktig og omfattende dette fagfeltet er. Offentlige anskaffelser sikrer drift av helsevesen, utdanning, transport og andre viktige tjenester, og påvirker hverdagen til innbyggere og næringsliv.

Som fagfelt er offentlige anskaffelser tverrfaglig, med røtter i både juss, økonomi, ledelse, sosiologi og statsvitenskap. Tradisjonelt har fokuset vært på regelverksetterlevelse, konkurranse og kostnadseffektivitet, altså å gjøre gode kjøp innenfor lovens rammer og med effektiv bruk av samfunnets ressurser. I løpet av de siste par tiårene har imidlertid anskaffelser fått en utvidet rolle som et strategisk virkemiddel for å oppnå bredere samfunnsmål. Offentlige anskaffelser brukes nå aktivt for å bidra til mål innen klima og miljø gjennom grønne anskaffelser, til å fremme sosial inkludering og til å styrke et seriøst arbeidsliv gjennom sosiale anskaffelser, samt legge til rette for nyskaping gjennom innovative anskaffelser. Denne utviklingen har gjort innkjøpsfunksjonen stadig mer relevant for politikere og beslutningstakere som ønsker å styre samfunnet i en ønsket retning. Parallelt med denne strategiske dreiningen har det vokst frem et eget forskningsfelt for offentlige anskaffelser. Historisk sett var det begrenset akademisk interesse for innkjøp i offentlig sektor, men i de siste 25 årene har antall studier og

Sitering: Langseth, M. (2025). Offentlige anskaffelser som fagfelt og strategisk virkemiddel. I Langseth, M., & Similä, J. O. (Eds.), *Public Procurement Pathways – Sustainability Edition* (pp. 7–11). Cappelen Damm Akademisk. https://doi.org/10.23865/cdf.264.ch0

publiseringer økt. Vi har fått teoretiske rammeverk som f.eks. Khi V. Thai's modell (Thai, 2001) for å forstå anskaffelsessystemet og vi har sett at lovverk og praksis er blitt modernisert for å legge til rette for at miljømessige og sosiale hensyn kan integreres i anskaffelser. Denne utviklingen har åpnet døren for nye måter å tenke på innkjøp, men har også gjort innkjøpernes hverdag mer kompleks.

Til tross for fremgang står fagfeltet overfor flere aktuelle utfordringer. Offentlige oppdragsgivere må balansere tradisjonelle hensyn som pris og kvalitet med nye krav om miljø, sosiale forhold og innovasjon. Det er krevende å måle samfunnsnytte og bærekraftige effekter av innkjøp på en pålitelig måte og å unngå at grønne eller sosiale krav utilsiktet fører til mindre konkurranse eller høyere kostnader. Videre krever den strategiske rollen at innkjøpsorganisasjoner har tilstrekkelig kapasitet og kompetanse. Mangel på spesialisert kompetanse, særlig i mindre offentlige enheter, kan hemme evnen til å gjennomføre avanserte anskaffelser med nye målsettinger. Offentlig sektor er også tradisjonelt ofte forsiktig med risiko, og innovasjon eller utradisjonelle tilnærminger kan møtes med skepsis internt. I tillegg må innkjøpere navigere innenfor rammen av ett regelverk. Summen av dette gjør at offentlig sektor kontinuerlig må lære og tilpasse seg for å realisere potensialet i anskaffelser. Behovet for ny forskning melder seg når praksis utvikler seg raskt og utfordringene er sammensatte. Offentlige anskaffelser som forskningsfelt henger fortsatt noe etter når det gjelder teoretisk fundament og empirisk kunnskapsgrunnlag (Koala & Steinfeld, 2018). For å sikre kunnskapsbasert praksis trengs studier om hva som faktisk fungerer under ulike forutsetninger. Nye problemstillinger krever dypere innsikt, og denne skriftserien tar sikte på å dekke noen av kunnskapshullene ved å presentere ferske bidrag som både utdyper teori og deler praktiske erfaringer. For både forskere, praktikere og beslutningstakere kan slike studier gi et bedre grunnlag for gode beslutninger. Kort sagt: Ny forskning bidrar til at offentlige anskaffelser kan videreutvikles som et moderne, effektivt og samfunnsnyttig virkemiddel.

Oppbygning og innhold

Public Procurement Pathways er satt sammen som en samling av fagfellevurderte artikler, der hvert bidrag belyser ulike sider ved offentlige anskaffelser. Denne første utgaven har bærekraft som rød tråd, der både miljømessig og

sosial bærekraft står sentralt. Nedenfor følger en kort oversikt over bokens kapitler med deres temaer og caser:

- *Kapittel 2: Offentlige anskaffelser og bærekraftige rammeverk.* Forfatterne presenterer Khi V. Thais innkjøpsmodell fra 2001 opp mot dagens krav til bærekraftige offentlige anskaffelser.
- *Kapittel 3: Grønn anskaffelseskompetanse i norske kommuner*. I dette kapittelet presenteres en kvantitativ studie av grønne anskaffelser. Forfatterne ser på samspillet mellom kommunestørrelse, anskaffelseskompetanse og ressurstilgang for å se om større kommuner har et fortrinn i å implementere miljøhensyn.
- *Kapittel 4: Markedseffekter av miljøkrav*. Her undersøkes de økonomiske konsekvensene av å stille miljøkrav i anskaffelser. Forfatterne diskuterer hvilken effekt grønne offentlige anskaffelser kan ha på konkurranse og økonomisk effektivitet.
- *Kapittel 5: Veien mot lavutslippsanskaffelser*. Denne studien undersøker hvordan norske kommuner iverksetter lavutslippsanskaffelser, med særlig fokus på drivere, barrierer, strategier og nåværende praksis. Studien er basert på intervjudata fra ni norske kommuner.
- *Kapittel 6: Offentlige anskaffelser for sosiale formål*. I den siste studien rettes søkelyset mot sosiale hensyn i offentlige anskaffelser og hvordan innkjøp kan brukes til å oppnå positive sosiale effekter. Forfatterne utvikler et systemteoretisk rammeverk for å analysere innovative anskaffelsesprosjekter med sosiale mål, og illustrerer dette med en case fra Trondheim kommune.

Public Procurement Pathways: en ny skriftserie

Denne teksten markerer starten på *Public Procurement Pathways* som skriftserie. Det du nå leser er første utgave i det som er tenkt å bli en voksende serie av bidrag om offentlige anskaffelser. Tittelen *Pathways* henspiller på at det finnes mange veier innen innkjøpsfaget, og med denne serien ønsker vi å belyse ulike temaområder og utfordringer som offentlig sektor står overfor ved å samle nye forskningsbidrag. Første utgave har bærekraft som gjennomgående tema. Neste utgivelse vil ta for seg risiko og beredskap i anskaffelser. Et viktig mål for serien er å bygge bro mellom forskning og praksis, slik at bidragene ikke bare har akademisk verdi,

men også praktisk relevans. Ved jevnlig utgivelse av nye utgaver kan vi fange opp den raske utviklingen i fagfeltet og bringe inn flere stemmer og perspektiver. Vi håper med det at *Public Procurement Pathways* vil bli en verdifull ressurs for alle som ønsker en kunnskapsbasert praksis innen offentlige anskaffelser.

Anskaffelsesakademiet: initiativtaker og støttespiller

Arbeidet med denne boken og skriftserien er initiert og støttet av Anskaffelsesakademiet. Anskaffelsesakademiet ble etablert for å styrke kompetansen og kunnskapen innen offentlige anskaffelser i Norge. Akademiet tilbyr et bredt spekter av tiltak for de som ønsker faglig påfyll. Dette inkluderer utdanningstilbud, fra enkeltemner til studieløp på bachelor- og masternivå, i samarbeid med universiteter og høyskoler over hele landet. I tillegg arrangerer akademiet seminarer og konferanser, for eksempel en årlig Forskning & Utdanning-dag, hvor praktikere og forskere møtes for å dele erfaringer og diskutere ny kunnskap.

En annen sentral rolle for Anskaffelsesakademiet er å være en pådriver for forskning og kunnskapsutvikling. Akademiet er aktivt involvert i forskningsprosjekter og står som utgiver av denne forskningsbaserte skriftserien. Ved å lansere *Public Procurement Pathways* ønsker akademiet å gjøre ny forskning mer tilgjengelig og relevant for praktikere. I tillegg forvalter akademiet en såkornsmiddelordning som gir økonomisk støtte til lovende forskningsideer innen offentlige anskaffelser, slik at gode idéer får mulighet til å utvikle seg. Anskaffelsesakademiet legger også vekt på deling av eksisterende kunnskap: Via akademiets portaler og nettverk gjøres tidligere forskning og beste praksis tilgjengelig, enten det er i form av artikkelsamlinger, rapporter, podkaster eller bøker. Slik senkes terskelen for at oppdatert kunnskap tas i bruk hos den enkelte innkjøper og beslutningstaker.

Visjonen til Anskaffelsesakademiet er å fremme kunnskapsbaserte offentlige anskaffelser. Det innebærer at beslutninger i innkjøpsprosesser bør bygge på dokumentert kunnskap, fakta og analyser snarere enn på intuisjon eller tradisjon. Gjennom sitt arbeid med kompetanseheving, forskning og erfaringsdeling ønsker akademiet å bidra til en profesjonalisering

av innkjøpsfunksjonen i Norge. Dermed kan offentlige anskaffelser i større grad levere ønskede effekter, enten det gjelder kostnadseffektivitet, innovasjon, bærekraft eller andre samfunnsmål. Anskaffelsesakademiets engasjement i denne boken er et uttrykk for denne visjonen: Ved å støtte fremveksten av nye forskningsbidrag og spre dem til et bredt publikum, legges grunnlaget for bedre praksis fremover. Til slutt vil vi oppfordre leseren til å se denne boken som en invitasjon. Enten man er student, praktiker med et konkret problem, eller beslutningstaker på jakt etter inspirasjon til ny policy, håper vi at kunnskapen her vil motivere til videre læring og handling. Offentlige anskaffelser angår oss alle, og ved å øke kompetansen og dele erfaringer kan vi sammen finne de beste veiene videre på anskaffelsesområdet. God lesning!

Forfatterbiografi

Marius Langseth er førsteamanuensis ved Høyskolen Kristiania, tilknyttet School of Economics, Innovation and Technology. Han har en Ph.d. i økonomi og ledelse fra NTNU, der han forsket på datadrevet beslutningstaking i offentlige innkjøpssystemer. Langseth har tidligere erfaring som innkjøper i Moss kommune og som rådgiver i Digitaliseringsdirektoratet (tidligere Difi). Han leder også Anskaffelsesakademiet, som arbeider for å styrke kompetansen innen offentlige anskaffelser.

Referanser

DFØ. (2025). *Utgifter til offentlige innkjøp.* Direktoratet for forvaltning og økonomistyring. https://dfo.no/nokkeltall-og-statistikk/innkjop-i-offentlig-sektor/utgifter-til-offentlige-innkjop

Koala, K., & Steinfeld, J. (2018). Theory building in public procurement. *Journal of Public Procurement*, *18*(4), 282–305.

SSB (2025) https://www.ssb.no/statbank/table/10807/tableViewLayout1/

Thai, K. V. (2001). Public procurement re-examined. *Journal of Public Procurement*, *1*(1), 9–50.

INTRODUCTION IN ENGLISH

Public Procurement as a Professional Field and Policy Instrument

Marius Langseth Kristiania University of Applied Science / NTNU – Norwegian University of Science and Technology

Public procurement, the purchase of goods, services and construction works by public entities, sits at the center of modern government. In Norway, the yearly expenditure reached approximately NOK 780 billion in 2023, accounting for roughly 15 per cent of GDP (SSB, 2025). The sums involved keep schools heated, hospitals supplied, and roads maintained, but they also influence entire markets. As a discipline, procurement draws on law, economics, management, sociology and political science. For many years, the focus was compliance, competition and value for money: buying well, within the rules, at the lowest cost. During the past two decades, the scope has broadened. Governments now expect their purchasing power to advance environmental goals, contribute to social inclusion, and stimulate innovation. Procurement officers, therefore, work at the intersection of finance, policy and sustainability, and their decisions shape both public services and private-sector behaviour. The academic interest in public procurement has grown in the last 25 years from Khi V. Thai's system model from 2001 till today's successive reforms where the discussion is more related to environmental, social, and innovation elements in public procurement. Yet progress has brought new complexity. Buyers must weigh traditional concerns, such as price, quality, and risk, against climate, labour conditions, or innovation targets. Measuring the public value of such choices remains demanding. Tight budgets, aversion to risk and fragmented competence can slow the adoption of new approaches, especially in small contracting authorities. Research has not fully caught up with practice. A review by Koala and Steinfeld (2018) notes that procurement studies lag behind other management fields in theoretical grounding and robust empirical work. Evidence on what works and under which circumstances is still limited.

Without a stronger knowledge base, policy ambitions can fail in day-to-day implementation. This book, therefore, brings together new studies, in a Norwegian setting, that address recognised gaps and offer practitioners tested ideas for action.

The structure

The first volume of *Public Procurement Pathways* is a collection of peer-reviewed articles. All contributions address sustainability, whether environmental or social and together, they illustrate the evolving landscape of Norwegian procurement practices.

- Chapter 2 assesses Thai's 2001 model in light of today's sustainability demands.
- Chapter 3 analyses quantitative data on green procurement across municipalities of different sizes.
- Chapter 4 uses economic analyses to explore the market effects of environmental criteria.
- Chapter 5 presents a multiple-case study of low-carbon procurement in nine municipalities.
- Chapter 6 turns to social value. The authors combine system theory with a municipal case from Trondheim to map actors, resources and stages in social procurement projects.

Each study stands alone yet reading them as a set gives a broader picture of how legal frameworks, organisational capacity and market dynamics interact in Norwegian public procurement.

Public Procurement Pathways: the first volume in a new series

This is the opening part of *Public Procurement Pathways*, a series that will expand over time. Later volumes will cover themes such as risk and resilience, digitalisation or learning from mistakes. By publishing yearly, the series will track developments in the field and provide a platform for new voices. The overarching aim is to bridge the gap between research and practice: findings should inform policy, and lessons from practice should inspire further research.

The Norwegian Public Procurement Academy: initiator and supporter

The work behind this volume is coordinated and financed by the Norwegian Public Procurement Academy (NOPPA). The academy was founded to strengthen competence and knowledge sharing in Norwegian public procurement. Its activities include:

- collaborating with universities and colleges to offer courses and complete study programs
- hosting seminars, conferences and an annual Research & Education Day that brings practitioners and scholars together
- publishing this research-based series to make new knowledge accessible
- running a seed fund scheme that supports promising research ideas
- curating earlier studies, reports and podcasts so that professionals can find new knowledge

Through these initiatives, the academy aims to promote evidence-informed public procurement, decisions based on data, careful analysis, and transparent reasoning. By supporting academic work and facilitating its uptake, NOPPA contributes to a more professional procurement community and, by extension, to better public services.

Whether you are a student exploring the field, a practitioner seeking to solve a concrete problem, or a policymaker looking for new tools, this book is intended to be useful. The articles offer analysis, examples, and practical recommendations that can help you navigate the many choices facing public buyers today. We hope the volume encourages reflection, experimentation and collaboration and that you will stay with us as *Public Procurement Pathways* continues to grow. Enjoy reading.

References

DFØ. (2025). *Utgifter til offentlige innkjøp*. [Public procurement expenses] Direktoratet for forvaltning og økonomistyring. https://dfo.no/nokkeltall-og-statistikk/innkjop-i-offentlig-sektor/utgifter-til-offentlige-innkjop

Koala, K., & Steinfeld, J. (2018). Theory building in public procurement. *Journal of Public Procurement*, 18(4), 282–305.

SSB (2025). https://www.ssb.no/statbank/table/10807/tableViewLayout1/

Thai, K. V. (2001). Public procurement re-examined. *Journal of Public Procurement*, 1(1), 9–50.

CHAPTER 1

Evaluating Khi Thai's Public Procurement Model for Sustainable Public Procurement

Marius Langseth[1,2], Luitzen de Boer[2] and Helene Tronstad Moe[1]
[1]Kristiania University of Applied Science, [2]NTNU – Norwegian University of Science and technology

Sammendrag: Offentlige anskaffelser har utviklet seg fra å være et verktøy for kostnadseffektivitet og etterlevelse til å bli en strategisk mekanisme for å fremme bærekraftige mål. Studien vurderer Khi V. Thais modell for offentlige anskaffelser (2001) i lys av moderne behov for bærekraftige offentlige anskaffelser (SPP), med utgangspunkt i Raworths (2018) konsept om et sosialt fundament og et økologisk tak, og Smidt et al. (2022) sin modell for dynamisk politisk tilpasning. Ved hjelp av en narrativ litteraturstudie og bibliometrisk analyse av artikler i *Journal of Public Procurement*, finner studien at Thais modell gir et strukturert rammeverk, men mangler eksplisitte mekanismer for bærekraft. Modellens fem komponenter (politikkutforming, regulering, autorisasjon, operasjon og tilbakemelding) støtter grunnleggende styring, men integrerer ikke i tilstrekkelig grad tverrfaglig samarbeid, interessentinvolvering eller fleksible reguleringer. Fire forslag til forbedringer fremmes: (1) styrke modellens kobling til det omkringliggende systemet, (2) innføre en mekanisme for reguleringsmessig tilpasning, (3) etablere en struktur for tverrfaglig samarbeid, og (4) formalisere interessentinvolvering. Disse forslagene bygger på en forståelse av offentlige anskaffelser som en åpen, kompleks og dynamisk prosess. Modellen foreslås videreutviklet ved å plassere anskaffelser innenfor en ramme definert av et sosialt fundament og et økologisk tak, som illustrert av Raworth (2018). Resultatene indikerer at Thais modell kan tjene som en nyttig grunnstruktur, men at videre utvikling er nødvendig for å møte dagens krav til bærekraftige anskaffelser.

Nøkkelord: rammeverk for offentige anskaffelser, bibliometrisk analyse, narrativ litteraturstudie, konseptuell modellering

Sitering: Langseth, M., de Boer, L. & Moe, H. T. (2025). Evaluating Khi Thai's Public Procurement Model for Sustainable Public Procurement. I Langseth, M., & Similä, J. O. (Eds.), *Public Procurement Pathways – Sustainability Edition* (pp. 17–46). Cappelen Damm Akademisk. https://doi.org/10.23865/cdf.264.ch1

Abstract: Traditionally centered on cost-effectiveness and compliance, public procurement has evolved into a strategic tool for achieving sustainability objectives. Governments are increasingly adopting Sustainable Public Procurement (SPP) by integrating environmental (Green Public Procurement) and social (Socially Responsible Public Procurement) criteria, encouraging a re-examination of existing frameworks. This study assesses Khi Thai's (2001) public procurement model against contemporary SPP needs, drawing on Raworth's (2018) emphasis on maintaining a social foundation and an environmental ceiling, as well as Smidt et al.'s (2022) calls for dynamic policy alignment. Using a mixed-methods approach, including a narrative literature review and a bibliometric analysis of the Journal of Public Procurement, the findings reveal that while Thai's model supports strategic policy integration, it does not explicitly include the social foundation/environmental ceiling balance, regulatory flexibility, cross-functional collaboration, or stakeholder engagement. To address these gaps, four enhancements are proposed: strengthening the model's link to the broader procurement environment, introducing a regulatory adaptation mechanism, creating a cross-functional collaboration mechanism, and formalizing stakeholder engagement. These adaptations broaden the model's applicability for sustainability-oriented procurement.

Keywords: public procurement framework, bibliometric review, narative literature review, conceptual mapping

Introduction

Public procurement was originally seen as an instrument to ensure cost-effectiveness and regulatory compliance. Over time, it has evolved into a strategic approach for achieving sustainability goals, primarily through Sustainable Public Procurement (SPP). By integrating environmental (Green Public Procurement, GPP) and social (Socially Responsible Public Procurement, SRPP) factors, governments aim to use procurement processes to advance climate action, resource efficiency, and social equity. For example, Schotanus et al. (2024) studies factors that encourage or hinder sustainability in small public purchases. Despite the progress made, procurement frameworks originally created to prioritize efficiency, and compliance may not fully support sustainability-oriented decision-making (McCrudden, 2004; Schapper et al., 2006).

Khi V. Thai's (2001) public procurement model (Figure 1) has been widely recognized as a foundational framework for understanding public procurement systems. The model conceptualizes procurement as an

integrated system with five interconnected components. While Thai's model offers a structured approach to public procurement, its applicability to SPP remains underexplored (Igarashi, 2018). This study evaluates how Thai's model aligns with contemporary SPP priorities and whether adaptations are necessary to enhance its relevance. The study addresses two research questions: *RQ1: To what extent does Thai's (2001) model encompass the themes and priorities of sustainable public procurement? RQ2: How might Thai's model be adapted to better align with contemporary SPP practices?*

Findings indicate that while Thai's model provides a structural foundation for procurement systems, it does not explicitly integrate sustainability mechanisms. The model supports strategic policy integration and operational procurement activities but lacks emphasis on the contexts, the regulatory flexibility, cross-functional collaboration, and stakeholder engagement, elements that are critical for effective SPP. To address these gaps, we propose adaptations: (1) an understanding of the context of the social foundation and environmental ceiling the model operates within, (2) a regulatory adaptation mechanism to facilitate responsiveness to evolving sustainability policies, (3) a cross-functional collaboration component to improve interdepartmental coordination, and (4) a stakeholder engagement mechanism to integrate broader societal and market perspectives into procurement decisions. By assessing Thai's model through the lens of sustainability, this study contributes to the broader discourse on public procurement theory and practice. The following sections outline the theoretical framework, methodology, findings, and proposed adaptations to enhance the model's applicability to sustainable procurement.

Literature and theoretical framework

This section provides an overview of the development of SPP. It examines how Khi V. Thai's (2001) public procurement model aligns with sustainability-oriented procurement practices, including Green Public Procurement (GPP) and Socially Responsible Public Procurement (SRPP).

Khi V. Thai's Public Procurement Model

Khi V. Thai's (2001) model is one of the foundational frameworks in public procurement literature, offering a structured approach to understanding procurement as an integrated system with five key components:

1. Policy Making and Management: This concept refers to the strategic planning, goal setting, and policy formulation activities that guide procurement processes.
2. Legal and Regulatory Frameworks: These involve the laws, regulations, and standards that ensure compliance and accountability in procurement.
3. Procurement Authorization and Appropriations: Encompasses the budgetary controls and approval mechanisms that authorize procurement operations.
4. Operational Processes: This covers the core procurement functions, including supplier selection, contract management, and performance monitoring.
5. Feedback Mechanisms: Provides continuous improvement through performance evaluation and data analysis.

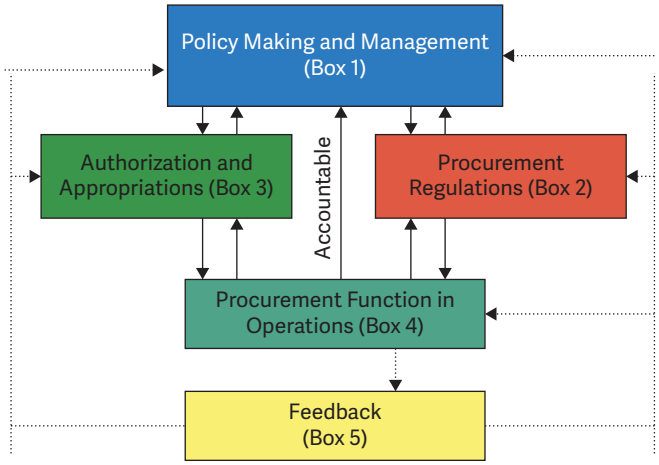


Figure 1. Khi-Thai Model of the Public Procurement System (Thai, 2001, p. 18)

Thai's model offers a broad framework for public procurement, highlighting how each component interacts to support effective and efficient procurement activities (Flynn & Davis, 2014; Patrucco et al., 2017). The structured approach helps to define procurement as an interconnected system, linking strategic planning, regulatory compliance, and operational functions. However, Thai's model was initially developed focusing on traditional procurement objectives such as cost-effectiveness, compliance, and risk mitigation. It does not explicitly address sustainability considerations like environmental impact assessments, social equity, or the cross-functional collaboration required for SPP.

Frameworks for sustainable public procurement: GPP and SRPP

Two frameworks have been developed within the broader concept of SPP: Green Public Procurement (GPP) and Socially Responsible Public Procurement (SRPP). Each framework addresses a specific dimension of sustainability, focusing on environmental and social priorities, respectively.

GPP is a framework that emphasizes reducing the environmental impacts of purchased goods and services throughout their lifecycle. GPP encourages procurement decisions that consider resource efficiency, greenhouse gas emissions, waste minimization, and lifecycle assessments (Walker & Brammer, 2009). By prioritizing products and services with lower environmental footprints, GPP seeks to minimize the ecological impact of public procurement and stimulate innovation in sustainable goods and services. Lifecycle assessments, eco-labels, and sustainability certifications are commonly used within GPP to evaluate and select products that align with environmental objectives (European Commission, 2017; Testa et al., 2016).

Socially Responsible Public Procurement (SRPP) focuses on social outcomes, aiming to promote fairness, inclusivity, and ethical standards within government procurement. SRPP prioritizes social equity by addressing labor rights, promoting diversity, and supporting local economic development (Erridge & Hennigan, 2012; Grandia et al., 2015). Key SRPP practices include requiring fair wages, promoting supplier diversity, and supporting local small and medium-sized enterprises (SMEs). SRPP positions procurement as a mechanism to address social inequalities and encourage inclusive economic growth. These frameworks illustrate SPP's multidimensional nature, including environmental and social considerations. They also underscore the complexity of integrating sustainability into procurement systems initially designed for economic efficiency.

Critical view of Thai's Model in the context of sustainable public procurement

As SPP gains importance, a fundamental question can be raised: Does Thai's model sufficiently cover mechanisms for incorporating sustainability, which are central to achieving SPP goals (Grandia et al., 2015). For example, GPP practices like lifecycle assessments and eco-label evaluations are not directly integrated into Thai's model. These tools are essential for evaluating the environmental impact of goods and services, which GPP emphasizes.

Consequently, practitioners using Thai's model must interpret and adapt the operational processes and feedback components to include environmental sustainability metrics (Testa et al., 2016). SRPP requires active collaboration with stakeholders, including local communities, labor unions, and suppliers, to achieve social outcomes. Thai's original model does not explicitly show how to support stakeholder engagement or collaborative processes necessary for addressing social value in procurement. The model's policy-making and operational components may need to be reinterpreted or expanded to incorporate these considerations (Grandia & Meehan, 2017).

SPP requires a procurement model that can adapt to rapidly changing sustainability policies and regulatory demands. While generic and flexible, Thai's model must explicitly show how to facilitate dynamic policy interactions or adjustments based on new sustainability mandates, particularly in environmental and social responsibility (Walker & Brammer, 2012). The strengths of Thai's model lie in its general applicability across diverse procurement contexts, allowing it to serve as a foundational framework. However, the lack of specific sustainability mechanisms suggests that the model requires adaptation to accommodate the objectives of GPP and SRPP fully. As a general conceptual foundation for bringing out these sustainability mechanisms in Thai's model, we will use the recent work of Raworth (2018) and Smidt et al. (2022), who, similarly to Thai, present a generic systems model that explicitly addresses sustainability.

Integrating a Dynamic Harmonized Sustainability Model

Smidt et al. (2022) propose a harmonized sustainability model emphasizing the necessity of an ongoing alignment of government sustainability policies and objectives with current supply and demand levels for natural resources. This approach aligns with Raworth's (2018) concept of doughnut economies, which sets a social foundation to secure essential human needs while maintaining an environmental ceiling that prevents overuse of planetary resources. Rather than developing isolated targets for resource extraction, government targets and policies should closely follow and reflect the relative positions of availability and demand and how these positions evolve. As demand may seem to approach original supply, limits must be imposed, and higher levels of re-use (Raworth, 2018) can be activated. Furthermore, Smidt et al. (2022) underline the importance of an open system approach,

extending policies beyond circular economy thinking, which essentially deploys a closed system logic. The open system feature provides the possibility for retrieving new resources, which is ultimately necessary to mitigate the possibility of so-called rebound effects occurring in closed, circular systems (Smidt et al., 2020). The alignment of government policy with the evolving positions of the actors responsible for the supply and demand of resources implies an interdisciplinary nature of policy and broad stakeholder involvement, not only among "politically powerful communities" but also (or even more so) marginalized ones (Smidt et al., 2020).

Methodology

This study employs a mixed-methods approach to evaluate the applicability of Thai's (2001) public procurement model within the Sustainable Public Procurement (SPP) framework. The methodology comprises two main components: (1) a focused narrative literature review and (2) a bibliometric analysis from the Journal of Public Procurement (JoPP). The research design reflects the need for both theoretical depth and empirical analysis. The narrative literature review provides insights into key themes and priorities in SPP by identifying influential articles from various procurement-related journals. Simultaneously, the bibliometric analysis offers an empirical basis for understanding trends and thematic developments within JoPP. Findings from both methods are mapped onto Thai's five components. We aim to assess the model's capacity to encompass SPP goals and to identify areas that might require additional modifications or interpretations.

Narrative literature review

The narrative literature review focuses on influential articles on SPP, particularly within the domains of GPP and SRPP. This review is intended to capture the current academic discourse on sustainability in public procurement, providing a basis to evaluate whether the practices and priorities outlined in recent research literature align with the components of Thai's model. We conducted a broad search in academic databases, including Lens.org, to identify relevant articles. The following keywords were used in the literature review: "Sustainable Procurement," "Green Public Procurement", "Socially Responsible Public Procurement", "Sustainable Public Procurement".

These keywords were combined using Boolean operators (AND & OR) to ensure a broad retrieval of relevant literature. The initial search results

resulted in over 18,000 hits. To ensure consistency, we established clear inclusion criteria for article selection. Only studies meeting all the following criteria were considered:

- Relevance to SPP: The article must explicitly address aspects of SPP, including its policies, practices, benefits, or challenges.
- Publication type: Only peer-reviewed original research articles (empirical or conceptual) were included.
- Language: Only articles published in English were considered.
- Scholarly impact: Articles needed to have accumulated a fair number of citations, which indicated their influence in the field. The number of citations were considered related to the age of the article.

After the initial screening based on these criteria, the pool of articles was refined to 167. Rather than including every article that met the citation threshold, we focused on the nine most influential articles. These were determined by ranking the eligible articles by their citation counts and a subjective review of the overall influence on SPP research on public procurement. Each of the nine articles was then reviewed to identify its core themes, contributions, and relevance to Thai's model.

Bibliometric analysis of the *Journal of Public Procurement* (JoPP)

The second component of our methodology involves a bibliometric analysis of articles published in the *Journal of Public Procurement* (JoPP) from 2001 to 2023. JoPP was the first journal in the field, and its publications offer a representative sample of scholarly trends in public procurement research. By analysing JoPP publications, we aim to gain empirical insights into how sustainability themes have evolved and to assess how these themes align with Thai's model. We collected a dataset of JoPP articles from 2001 to 2023 for bibliometric analysis. This dataset includes the publication year and title of each article. This dataset of JoPP articles was collected from the academic database Lens.org. The dataset included information on publication year, article title, author(s), institutional affiliations, abstracts to capture thematic focus, citation counts, and keywords. After a data-cleaning process standardizing author names, affiliations, and keyword terms, the final dataset comprised 361 research articles from JoPP.

The bibliometric analysis was conducted on emerging trends. This analysis provided a quantitative overview of the growth in SPP research and highlighted key periods of sustainability themes in JoPP. For thematic mapping, we used the tool VOSviewer (Van Eck & Waltman, 2013), which enabled us to create visual representations and identify clusters of related topics and keywords within JoPP publications. In addition to VOSviewer, Microsoft Excel was employed for data organization and descriptive statistical analysis. Excel facilitated tasks such as tabulating publication counts per year, tracking citation metrics, and cleaning the dataset to remove duplicate entries. The combined use of Excel and VOSviewer provided a bibliometric overview that enriched our understanding of sustainable public procurement research's intellectual structure and development.

Evaluation of the Thai Model using findings from the literature review and bibliometric analysis

The final stage of our methodology involved synthesizing the findings from the narrative literature review and the bibliometric analysis to evaluate Thai's (2001) model. The five components of Thai's model were systematically analyzed using the themes identified in the literature review and bibliometric analysis. We mapped sustainability themes extracted from the selected literature and the JoPP data onto Thai's model components, categorizing each theme with bibliometric data. Sustainability themes were categorized. This mapping process assessed Thai's model's adaptability to contemporary SPP priorities. It helped identify potential gaps, such as the challenge of integrating cross-functional collaboration to support social outcomes that the existing model may not adequately address. The mapping and thematic analysis provided insights into the strengths and limitations of Thai's model when applied to SPP. An important aspect of this evaluation involved a detailed content analysis of the selected articles. To ensure the reliability of this categorization, two researchers independently reviewed and classified each article according to a predetermined scheme that captured the sustainability focus; by integrating the qualitative insights from the narrative review with the quantitative patterns revealed through bibliometric mapping, this study provides a broad evaluation of Thai's model. The combined findings underscore areas where the model components are sufficiently adaptable to accommodate evolving SPP themes, supporting the model's generic applicability. These insights are discussed in detail in the discussion section.

Results

This section presents the findings from the narrative literature review and the bibliometric analysis conducted on the Journal of Public Procurement (JoPP) publications.

Findings from the narrative literature review

The narrative literature review ended up with nine papers (shown in Table 1). These papers represent influential works that have shaped the current academic understanding of SPP.

Table 1. Influential SPP papers and their contributions

Author/s	Key contributions and findings
Brammer, S., & Walker, H. (2011). Sustainable procurement in the public sector: An international comparative study. *International Journal of Operations & Production Management, 31*(4), 452–476.	First large-scale cross-country survey of SPP practices across 20 countries. Found broad adoption of environmental and social procurement policies but inconsistent implementation. Top management support and national policies were identified as key drivers. Using the PSR framework. It was revealed that while most agencies include sustainability criteria, many aspects remain under-addressed. Highlights the gap between policy and practice, aligning with Thai's Policy/Management and Operations boxes.
Walker, H., & Brammer, S. (2009). Sustainable procurement in the United Kingdom public sector. *Supply Chain Management: An International Journal, 14*(2), 128–137.	Survey of 106 UK public organizations on SPP uptake. Found strong political support for local economic development (SME inclusion), while environmental and social goals faced cost and expertise barriers. UK procurement adopted some sustainability elements (Thai's Management/Policy box), but conflicting efficiency mandates hinder a balanced approach (authorizations and budget priorities).
McCrudden, C. (2004). Using public procurement to achieve social outcomes. *Natural Resources Forum, 28*(4), 257–267.	Conceptual paper on social procurement (SRPP), tracing its history and role in promoting equality and labor rights. Differentiates 'green' and 'social' procurement, questioning their integration under sustainability. Highlights the need for legal frameworks to enable social criteria (Thai's Regulations and Authorizations). It concludes that aligning procurement with social goals is feasible but legally complex, linking to Thai's Policy box and external legal influences.
Preuss, L. (2007). Buying into our future: Sustainability initiatives in local government procurement. *Business Strategy and the Environment, 16*(5), 354–365.	Empirical study on UK local authorities' use of procurement for sustainability. Identified economic, social, and environmental initiatives but noted tensions between efficiency and sustainability. Found a gap between procurement's potential and actual impact, with organizational culture, leadership, and risk management as key factors (Thai's Operations/Management boxes). Reinforced the need to integrate sustainability while balancing value-for-money concerns.

Author/s	Key contributions and findings
Preuss, L. (2009). Addressing sustainable development through public procurement: The case of local government. *Supply Chain Management: An International Journal, 14*(3), 213–223.	Expanding on Preuss (2007), this study provides a deeper analysis of UK local government procurement as a tool for all three pillars of sustainability. Identifies transparency, political support, strategy, and risk aversion as key success factors. It finds that most councils use sustainability criteria, but often inconsistently. Emphasizes the need for better feedback and evaluation (Thai's Box 5) and improved internal management (planning, collaboration) to achieve SPP outcomes (Thai's Management and Operations elements).
Erridge, A. (2007). Public procurement, public value, and the Northern Ireland unemployment pilot. *Public Administration, 85*(4), 1023–1043.	Conceptual paper promoting a 'public value' approach to procurement. Using a Northern Ireland social procurement pilot, Erridge showed how procurement can address unemployment and social inclusion. Critiques the dominance of commercial goals and proposes a framework balancing commercial, regulatory, and socio-economic objectives. It aligns with Thai's policy/management box by emphasizing social value in strategy and touches on operations by highlighting practitioners' challenges in balancing priorities. Highly cited in SRPP debates, reinforcing procurement's evolving role in the 21st century.
Geng, Y., & Doberstein, B. (2008). Greening government procurement in developing countries: Building capacity in China. *Journal of Environmental Management, 88*(4), 932–938.	Pioneering study of GPP in a developing country, examining China's experience and capacity-building needs. It was found that institutional barriers, such as unclear product definitions and weak legal enforcement, were more significant obstacles than budget constraints. Emphasizes the need for clear standards (Thai's regulatory box) and capacity development (training and coordination are part of operations). Geng and Doberstein's recommendations, including pilot projects and legal reforms, have shaped later GPP policies, highlighting the role of capacity-building in sustainable procurement.
Li, L., & Geiser, K. (2005). Environmentally responsible public procurement (ERPP) and its implications for integrated product policy. *Journal of Cleaner Production, 13*(7), 705–715.	Early study linking public procurement with EU environmental policy, highlighting green purchasing as a driver for scaling eco-friendly product policies. Government demand incentivizes markets and complements tools like eco-labels and producer responsibility. Positions procurement as a demand-side environmental policy tool (Thai's Policy box) and emphasizes operational aspects like life-cycle thinking. It also notes the need for inter-agency coordination to refine policy through procurement outcomes.
Carter, C. R., & Jennings, M. M. (2004). The role of purchasing in corporate social responsibility: A structural equation analysis. Journal of Business Logistics, 25(1), 145–186.	A highly cited study introducing purchasing social responsibility (PSR) in a private-sector context identified key dimensions like environment, diversity, and human rights. Showed that procurement professionals influence CSR outcomes through supplier interactions. Later, it was applied in public SPP research (e.g., Brammer & Walker, 2011) to assess sustainability criteria. It aligns with Thai's management box (integrating CSR into procurement strategy) and operations (buyer skills and incentives), emphasizing the human role in advancing sustainability.

The influential studies highlight the importance of top-down policy commitment (Thai's Box 1) and legal frameworks (Box 2) in enabling SPP. For example, McCrudden (2004) analyses using public procurement to achieve social outcomes, tracing how government contracting has historically been linked to social policy. McCrudden's work centers on the policy-making and regulatory aspects of SRPP, Thai's Boxes 1 and 2, detailing how international and domestic legal regimes either permit or complicate the pursuit of social goals via procurement. For instance, he notes uncertainties in merging social procurement policies with trade rules and calls for further legal analysis. In doing so, McCrudden highlights that strong policy mandates and explicit legal authorizations (Box 3) are critical for SRPP, as is the careful design of procurement regulations to withstand legal analysis (Box 2).

Geng and Doberstein (2008) examined GPP adoption in China and found that institutional factors outweigh simple cost concerns. Their review concluded that "lack of a clear definition and legal uncertainty" were more significant barriers to GPP in China than financial constraints. This finding highlights the importance of regulatory clarity and policy guidance (Thai's Boxes 1 and 2) in SPP implementation. In other words, even with a budget (Box 3) available, GPP weakens without well-defined regulations and standards. Li and Geiser (2005) similarly emphasized the policy/regulatory dimension: studying environmentally responsible public procurement in the EU, they concluded that green procurement could be a "driving force in the integration of environmental product policy instruments". By embedding environmental requirements in public procurement, governments effectively link procurement regulations (Box 2) with broader environmental policies, illustrating a top-down alignment with Thai's policy box with sustainability goals. These works collectively show that high-level policy commitment (national action plans, laws, directives) and supportive legal frameworks are central for SPP. They map strongly to Thai's policy-making/management and regulatory boxes, suggesting that SPP success begins with clear goals, mandates, and rules set by policy-makers.

Another core theme in the literature is how sustainability is or is not integrated into the procurement function in operations (Thai's Box 4). Influential empirical studies have surveyed or observed public procurement practitioners to measure on-the-ground SPP practices. Preuss (2007) and Preuss (2009) are notable for exploring how local governments in

the UK embed sustainability in procurement. Preuss identified initiatives across all three pillars of sustainability, economic, social, and environmental, at the local level. For example, local authorities adopted economic sustainability by adjusting procurement processes to accommodate local SMEs, supported social objectives by contracting with not-for-profits, and pursued environmental goals by phasing out hazardous substances in procurement. Despite these efforts, Preuss found "a considerable gap between the potential of procurement to influence local government objectives and its actual impact to date". In Thai's terms, while the operations box (Box 4) was being leveraged in various ways (new processes, criteria, supplier engagement strategies), the feedback loop (Box 5) evaluating outcomes and closing the gap between ambition and reality appeared weak. Preuss's work also touches on internal management factors like organizational culture and risk aversion as influences on implementation, linking to Thai's Box 1 (policy/management). In a broader context, Brammer and Walker (2011) conducted a large-scale survey of over 280 public agencies across 20 countries to examine sustainable procurement practices. They focused on organizational commitment to sustainability, using purchasing social responsibility (PSR) with dimensions such as environment, diversity, human rights, philanthropy, and safety. Their comparative study strengthened the importance of national policy context (Boxes 1 and 2) in driving implementation but also generated insight into Box 4 (operations): most public organizations reported using at least some sustainability criteria in procurement, yet many aspects of sustainability were not fully addressed in practice. Brammer and Walker concluded that while commitment to SPP exists, public bodies need to broaden and deepen their implementation of all sustainability dimensions.

A subset of the top SPP papers pays special attention to procurement's social and economic objectives. These speak to Thai's policy/management box (1) in terms of setting many-sided goals for procurement, as well as the operational challenges (Box 4) of balancing those goals with traditional aims like cost efficiency. Erridge (2007) is cited for communicating the "public value" concept in procurement. He argued that governments had historically overstated value for money and that a new approach was needed to give broader public value, including social equity and community benefits. Erridge's analysis highlights the tension and trade-offs procurement officers face. By encouraging public value, Erridge calls for an expanded mandate in policy-making/management (Box 1) to prioritize

socio-economic outcomes alongside financial efficiency. This theme is repeated by Walker and Brammer (2009), who surveyed 106 UK public organizations. They found that support for local small businesses was the most widely implemented sustainability practice in local governments, reflecting an economic development motive. This corresponds to a social/economic policy goal (Box 1) implemented through procurement operations (Box 4). However, other aspects, like environmental purchasing or equity hiring clauses, were less integrated, suggesting an imbalance in operationalizing different sustainability aims. The dominance of the local economic goal illustrates how political priorities (Box 1) can drive certain procurement practices strongly while possibly downgrading other goals due to capacity or regulatory constraints. The articles by Erridge, Walker & Brammer, and McCrudden collectively show that achieving social and economic sustainability through procurement requires management support (policy, Box 1) and often new operational tools (e.g., set asides for SMEs, social criteria in bids, Box 4). They also highlight Thai's point about conflicting goals procurement officers must balance, cost, quality, and now sustainability, which is challenging without clear prioritization and guidance (Boxes 1 and 2) and possibly additional resources or training (Box 4). Notably, these studies indirectly refer to authorizations and appropriations (Box 3): implementing SRPP may require budgetary flexibility or legislative approval (for example, to pay a price premium for green products or to run pilot programs targeting disadvantaged suppliers). Walker and Brammer (2009) observed that central government pressure to aggregate contracts for efficiency sometimes conflicted with local SME-support goals. This exemplifies how higher-level authorizations/budget directives (Box 3) can constrain or enable sustainability initiatives on the ground. While not exclusive to the public sector, one well-cited study by Carter and Jennings (2004) introduced the concept of purchasing social responsibility and identified key dimensions, environment, diversity, human rights, and safety that define a holistic, sustainable procurement agenda. Their work influenced public procurement research by outlining what internal values and policies procurement departments might pursue to support sustainability. This link between organizational values/culture (Box 1) and actual procurement practices (Box 4) is apparent across the literature: for SPP to take root, public agencies must expand their procurement mission and empower procurement officers with the mandate and skills to act on the policy principles.

Findings from the bibliometric analysis of JoPP

The bibliometric analysis of JoPP publications from 2001 to 2023 reveals a steady increase in sustainability-related research, particularly over the last decade. Sustainability-focused publications in JoPP frequently feature keywords like "green procurement," "social responsibility," and "environmental impact," indicating a growing academic interest in sustainability themes within public procurement. Figure 2 displays the trends in publication volume for sustainability-related articles in JoPP, showing a significant increase in recent years. This growth aligns with the global policy shift towards sustainability in public procurement, with researchers increasingly addressing procurement decisions' environmental and social impacts. Figure 2 illustrates the upgoing trend in sustainability-focused publication volume in JoPP over time.

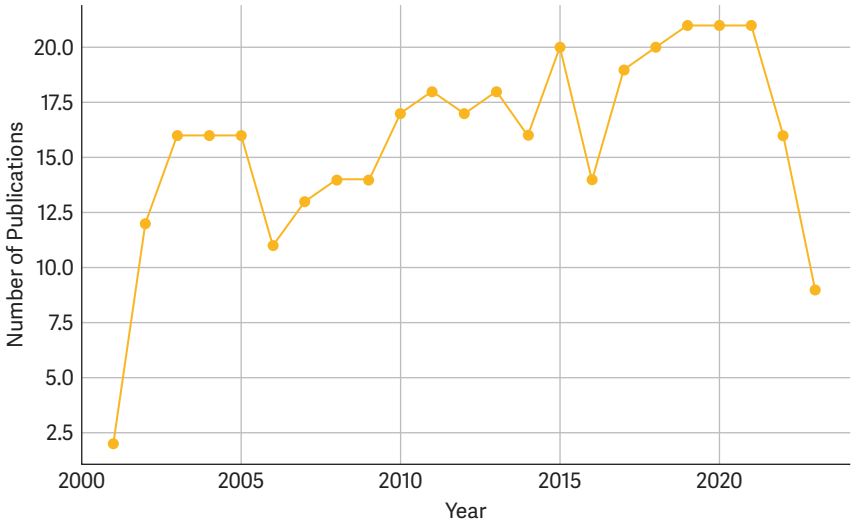


Figure 2. Trend in sustainability-focused publication volume in JoPP over time.

Using a co-occurrence analysis of keywords, we identified three major thematic clusters within the JoPP dataset:

1. Policy and Management, focusing on "sustainability policy" and "public procurement strategy."

2. Environmental Impact and Green Procurement, with keywords like "lifecycle assessment," "resource efficiency," and "eco-labels."
3. Social Responsibility and Ethics, covering themes related to "fair labor," "community welfare," and "social equity."

These clusters reflect the broad focus within JoPP on environmental and social sustainability, demonstrating a balanced research emphasis on GPP and SRPP themes.

Table 2. Lists and describes the thematic clusters identified in JoPP articles, with representative keywords

Thematic cluster	Representative keywords
Policy and Management	Sustainability policy, public procurement strategy
Environmental Impact and Green Procurement	Lifecycle assessment, resource efficiency, eco-labels
Social Responsibility and Ethics	Fair labor, community welfare, social equity
Other Topics	Diverse procurement themes not categorized

Mapping findings into Thai's Model: Alignment and gaps

The final analysis stage involved mapping the sustainability themes from the literature review and bibliometric findings onto Thai's (2001) public procurement model. This process allowed us to evaluate the model's alignment with SPP goals and identify specific areas where the model might require adaptation. Thai's policy-making and management component aligns well with sustainability themes identified in both GPP and SRPP. In particular, the focus on policy integration and strategic planning in JoPP articles highlights the importance of embedding sustainability within procurement policy frameworks. Policy integration is essential for ensuring that GPP and SRPP objectives are systematically incorporated into procurement practices (Flynn & Davis, 2014). This suggests that Thai's model can support sustainability when policies are clearly defined at the strategic level.

The operational processes component of Thai's model also aligns with many practical aspects of SPP, particularly for activities such as lifecycle assessments, eco-label evaluations, and supplier selection criteria that prioritize social equity. Both GPP and SRPP involve operational adjustments that can be accommodated within this component, although additional guidelines may be necessary to ensure these processes explicitly address sustainability outcomes.

However, several gaps were identified. The legal and regulatory frameworks component must fully capture the flexibility needed to adapt to rapidly evolving sustainability policies. Environmental and social procurement standards often require updates to regulatory frameworks, which Thai's model does not explicitly address. This limitation is particularly relevant for GPP, where new environmental regulations and sustainability certifications emerge frequently. Another gap is Thai's model's limited emphasis on cross-functional collaboration and stakeholder engagement, which are crucial for SRPP. Achieving social value in procurement often involves collaboration across departments, such as finance, legal, and social policy, the mapping of which Thai's model does not fully support. Similarly, the model lacks explicit mechanisms for integrating stakeholder input, which is fundamental in SRPP for addressing social equity and community needs. As argued earlier, elsewhere in his 2001 paper, Thai does acknowledge the need to consider the dynamic forces operating within the internal environment of the core model of the public procurement system. Still, the actual modelling of these forces was not developed in his paper.

Table 3. Summarizes alignment and gaps within Thai's model across each SPP theme, indicating where additional adaptation might be needed

SPP theme	Alignment with the Thai Model	Gaps and adaptation needs
Policy and Management	Strong alignment with Box 1 (Policy Making and Management) and Box 5 (Feedback).	Limited emphasis on interconnections with operational aspects (Box 4).
Environmental Impact and Green Procurement	Well-aligned with Box 2 (Procurement Regulations) and Box 3 (Authorization and Appropriations).	Integration with lifecycle assessment methodologies is underrepresented.
Social Responsibility and Ethics	Moderate alignment with Box 4 (Procurement Function in Operations).	Stronger links to policy-making mechanisms (Box 1) are needed to achieve social equity goals.
Feedback Mechanisms	Explicitly addressed in Box 5 (Feedback).	Requires more systematic integration of feedback into policy and operational adjustments.

While Thai's model provides a foundational structure that can adapt many elements of SPP, it has limitations in flexibility, cross-functional collaboration, and stakeholder engagement. The components of policy-making, operational, and feedback mechanisms offer a base for incorporating sustainability. However, the model's generic structure may require specific adjustments or reinterpretations to support GPP and SRPP fully.

These findings set the stage for discussing potential adaptations of Thai's model, which could enhance its applicability for SPP by addressing these identified gaps.

Discussion

This study evaluated the applicability of Khi V. Thai's (2001) public procurement model within the context of SPP, examining how well it aligns with themes in GPP and SRPP. Through a combined narrative literature review and bibliometric analysis of the Journal of Public Procurement, we identified strengths and limitations in Thai's model, suggesting that while it offers a robust foundational structure, it requires specific adaptations to support contemporary sustainability goals fully.

Furthermore, integrating Raworth's (2018) concept of doughnut economies, which sets a social foundation to secure essential human needs while maintaining an environmental ceiling and Smidt et al.'s (2022) harmonized sustainability model provides critical insights into the necessity of multidisciplinary approaches for achieving sustainable procurement outcomes. Collectively, the influential articles and bibliometric analyses of JoPP cover Thai's boxes unevenly. Policy-making (1) and Regulations (2) are addressed, and all the studies stress the need for clear sustainability policies, whether through national plans, laws, or internal directives. Authorizations/Appropriations (3) are less clearly discussed; however, several imply that political and budgetary support can affect SPP (Geng & Doberstein, 2008; Walker & Brammer, 2009). The Operations function (4) is a central focus: from surveys of procurement practice to case studies of implementation, these articles reveal how procurement processes and workforce capabilities determine SPP outcomes. They identify common operational barriers, lack of training, perceived costs, and the complexity of adding new criteria and drivers such as leadership support, inter-departmental collaboration, and supplier engagement. Finally, Feedback (5), the element involving evaluation and iterative improvement, is the least developed in these influential works. Most studies were cross-sectional, assessing the state of SPP at a point in time, with only indirect references to feedback mechanisms. Mapping these influential studies into Thai's framework reveals a few gaps where sustainability adds complexities beyond Thai's original five boxes. Thai's model is a general representation of public procurement systems, and it did not include sustainability objectives, which were considered external policy inputs. The reviewed

literature shows that sustainability blurs the line between external policy and internal process. For instance, Thai's model treats feedback mainly as internal "reforms/adjustments", but in SPP, feedback also means measuring real-world sustainability impacts, for example, carbon reduction, social value, and responding at the policy level. Few top-cited studies dealt with measurable impact assessment, indicating a gap in feedback mechanisms for sustainability outcomes.

Additionally, Thai's framework does not explicitly account for the role of stakeholders and public accountability in SPP. Erridge (2007) and others noted that public procurement is in a "multi-stakeholder procurement environment" where communities and end-users have voices in what procurement should achieve. Sustainability brings these external stakeholders and expectations to the front, suggesting that procurement feedback loops must extend outside the organization, which Thai's internal-focused model did not encompass fully. While Thai's model generally acknowledges conflicting goals, it does not provide a solution. The literature suggests that new performance metrics and incentives may be needed to realign "value for money" with sustainability, an evolution of Box 1 (policy/management) to redefine value in procurement. The influential SPP papers have primarily concentrated on policy/regulatory enablers, implementation practices, and the broadened objectives of procurement, which correspond to Thai's pillars of policy and operations. However, SPP research has expanded the procurement discussion to include outcome-based thinking and multi-stakeholder engagement, which Thai's model only vaguely covers.

Applying the arguments from Raworth (2018) and Smidt et al. (2022) to Thai's (2001) model of public procurement systems reveals both alignment and gaps. Thai's open system design, which recognizes the influence of external actors and feedback mechanisms, partly resonates with Raworth's social foundation and environmental ceiling framework. The feedback loop in Thai's model suggests a capacity to monitor resource flows and adjust procurement strategies, which could help safeguard ecological boundaries while addressing societal needs. However, the model does not explicitly indicate how to maintain the balance between these two poles, ensuring that procurement activities support social well-being without exceeding ecological limits. Moreover, Smidt et al. (2022) emphasize the need for continuous policy adaptation, cross-functional collaboration, and inclusive stakeholder engagement. Although Thai acknowledges the role of government policy as a distinct subsystem, the model does not fully illustrate how to incorporate dynamic updates to policy or how to embed broader

collaborative processes. This shortcoming may limit the model's ability to address sustainability goals comprehensively, especially when faced with shifting environmental constraints or evolving social priorities. An expanded version of Thai's model could explicitly integrate Raworth's dual emphasis on social welfare and ecological boundaries, while also building on Smidt et al.'s call for adaptive governance and stakeholder involvement, thereby creating a more robust and responsive framework for sustainable public procurement.

Strengths of Thai's Model in supporting SPP

Our findings indicate that Thai's model has several strengths in accommodating key aspects of SPP, mainly through its components of policy-making and management, operational processes, and feedback mechanisms.

The policy-making and management component aligns well with integrating sustainability goals strategically, supporting the prioritization of lifecycle assessments, eco-friendly supplier selection, and social value considerations in procurement policies. Embedding sustainability goals within the policy framework, as evidenced in recent GPP and SRPP literature, allows public procurement systems to systematically incorporate environmental and social objectives alongside economic ones (European Commission, 2017; Walker & Brammer, 2009). This alignment highlights Thai's model's flexibility in accommodating overarching sustainability goals within procurement's strategic planning.

The operational processes component also supports practical SPP activities, allowing for the integration of sustainability criteria into core procurement functions such as supplier selection, contract management, and compliance monitoring. For example, GPP practices such as evaluating suppliers based on eco-labels and lifecycle assessments fit naturally within this component. Similarly, SRPP's emphasis on fair labor practices and social inclusion can be effectively embedded at the operational level by incorporating social value criteria in supplier evaluations (Erridge & Hennigan, 2012; Grandia et al., 2015). Furthermore, the feedback mechanisms in Thai's model enable continuous monitoring and improvement, which is essential for meeting evolving sustainability goals. Effective sustainability practices require consistently gathering data on supplier performance and evaluating procurement impacts on environmental, ethical, political, and social objectives. Feedback loops facilitate the ongoing refinement of policies and

practices, helping procurement systems align with sustainability targets (Langseth, 2024; Testa et al., 2016). These strengths underscore the adaptability of Thai's model in structuring sustainable procurement activities, especially when interpreted in alignment with sustainability objectives. The model's foundational structure provides a framework for policy integration, operational adjustments, and feedback mechanisms to support SPP's environmental and social goals.

Limitations of Thai's Model for SPP

Despite its strengths, Thai's model has limitations when explicitly bringing out certain critical aspects of SPP, particularly in regulatory flexibility and dynamic alignment, cross-functional collaboration, and stakeholder engagement. Thai's model places considerable emphasis on compliance within its legal and regulatory frameworks component but lacks visible mechanisms for the adaptability necessary to accommodate evolving environmental and social standards. GPP practices, for example, often rely on regularly updated eco-label certifications and emerging regulations. Without a built-in mechanism for regulatory flexibility, Thai's model may not fully capture sustainability policies' dynamic and frequently changing nature, where new environmental mandates or social standards require rapid integration.

Achieving sustainability in procurement often requires collaboration across various departments and functions involving finance, legal, social policy, and environmental management. This interdisciplinary coordination is especially relevant for SRPP, where achieving social value often necessitates working with local community organizations, labor unions, and other external stakeholders. With its distinct, compartmentalized components, Thai's model does not explicitly facilitate cross-functional collaboration, which may limit its capacity to support the inter-departmental and multidisciplinary approaches that SPP requires.

SRPP practices require active engagement with a broad array of stakeholders, including suppliers, community groups, and other organizations. This interaction is important for ensuring that procurement strategies are responsive to social equity concerns and community needs. However, Thai's model does not present explicit mechanisms for stakeholder engagement, as it was primarily developed to support compliance and efficiency within procurement systems. The absence of a stakeholder engagement

component restricts Thai's model's applicability in SRPP contexts, where inclusivity and collaboration with external partners are essential.

These limitations suggest that while Thai's model provides a solid foundation, it may require further adaptations to meet the specific requirements of SPP. Enhancements in regulatory flexibility, collaboration across departments, and engagement with diverse stakeholders are critical for achieving comprehensive and effective sustainable procurement.

Proposed adaptations to Thai's Model for enhanced SPP applicability

This study proposes three specific adaptations based on the literature and the harmonized sustainability approach outlined by Smidt et al. (2022) to further bring out the Thai model's relevance for SPP. These adaptations address the model's limitations and aim to enhance its latent capacity to support sustainability-oriented procurement's complex, dynamic, and inclusive requirements. The first step in developing the mechanisms is to more closely connect the "core" model of the public procurement system (i.e. Thai's model of the five boxes, Figure 1 in his 2001 paper) with his model of environment of the public procurement system (Figure 5 in his 2001 paper). The rationale behind this step is that the harmonized approach advocated by Smidt et al. (2022) involves several of the actors (forces) in the public procurement system's environment, both what Thai refers to as external forces (including suppliers, political forces, legal forces) and internal forces (users and functions in the public procurement system other than procurement). Our overall enhanced model of Thai's public procurement system is shown in Figure 3. The three mechanisms are indicated by the acronyms RA (regulatory adaptation), CF (cross-functional collaboration) and SE (stakeholder engagement).

1. Regulatory Adaptation Mechanism (RA)

Explicating a mechanism for regulatory adaptability within the component of the legal and regulatory framework would allow procurement systems to remain responsive to rapidly changing environmental and social regulations. Drawing on Smidt et al.'s (2022) emphasis on policy integration, this adaptation would enable procurement systems to continually update and adapt legal frameworks to incorporate emerging sustainability standards and certifications. Such a mechanism could facilitate the alignment

of procurement practices with the latest regulatory requirements, ensuring that procurement remains compliant and relevant as sustainability policies evolve. Key to Smidt et al.'s approach here is the continuous monitoring of the dynamic balance between the supply of and demand for resources, both the resources currently used (and typically not renewable) and potentially new or re-used or re-gained resources. As shown in Figure 3, the mechanism RA taps into a connection that joins the monitoring of market forces (i.e. supply of resources by the supplier markets) with assessing the current demands (and needs) from an environmental and social value perspective. The results of this monitoring (typically the need to adjust policy and regulations) are passed on to Boxes 1 and 2 via the feedback box (Box 5).

2. Cross-Functional Collaboration Mechanism (CF)

Given the interdisciplinary nature of SPP, we propose introducing a Cross-Functional Collaboration Component within Thai's model. This adaptation would create a formal structure for collaboration across departments, ensuring that environmental, social, financial, and legal expertise is integrated into procurement decisions. Smidt et al. (2022) stress the importance of a multidisciplinary approach in sustainability models, suggesting that cross-functional collaboration enhances an organization's resilience and adaptability. This component would support SRPP's need for social impact assessments, labor protections, and community engagement, aligning procurement activities with diverse sustainability objectives. In Figure 3, we see that mechanism CF links the internal forces in the public procurement system environment to Box 4, i.e., the procurement organization. Again, the cross-functional collaboration's results (insights, conclusions) are passed on to the other parts of the procurement system.

3. Stakeholder Engagement Mechanism (SE)

To support SRPP's emphasis on inclusivity, we propose adding a Stakeholder Engagement Mechanism within policy-making or operational components. This mechanism would formalize the role of community and supplier engagement, facilitating continuous interaction with external stakeholders to gather input, communicate expectations, and collaboratively pursue social value goals. Smidt et al. (2022) highlight the value of broad stakeholder inclusion for achieving holistic sustainability outcomes. By embedding stakeholder engagement as a core procurement component, Thai's model

could address sustainability's social, ethical, and political dimensions more effectively, enhancing its relevance for SRPP applications. These proposed adaptations enable Thai's model to be more responsive, collaborative, and inclusive, strengthening its applicability within sustainability-oriented procurement frameworks. In our enhanced model, this mechanism (SE) joins the supplier market with representatives of the environmental and social value forces in the public procurement system environment. It connects their interactions with the procurement organization (Box 4).

4. Social foundation and environmental ceiling

To strengthen SPP's alignment with ecological and social thresholds, we propose incorporating a Doughnut Model Integration into the framework. This mechanism explicitly puts procurement activities between the environmental ceiling and the social foundation, reinforcing boundaries that public procurement should not overshoot or fall below. As Raworth (2018) argues, sustainable development requires economic systems to operate within these safe and just boundaries. By situating DMI alongside the SE and CF mechanisms, the model ensures that both procurement strategy (Box 1) and practice (Boxes 2–4) are guided by planetary and social limits. This enhancement helps Thai's model account for the environmental constraints and social obligations of SRPP, offering a more holistic governance structure for sustainability in public procurement. Figure 3 shows the adapted Thai model, placing the procurement system between a social foundation and an environmental ceiling, and adding regulatory adaptation, cross-functional collaboration, and stakeholder engagement (Raworth, 2018).

The original figure (Thai, 2001) shows five core boxes, policy-making and management, procurement regulations, authorization and appropriations, procurement function in operations, and feedback, organized in a closed loop. It focuses on the internal structure of the procurement system, showing how each component interacts in a largely self-contained manner. The adapted figure maintains Thai's five components but adds three mechanisms, regulatory adaptation, cross-functional collaboration, and stakeholder engagement, to Thai's five-box framework, placing the procurement system between a social foundation and an environmental ceiling. Regulatory adaptation connects emerging social and ecological requirements back to policy and regulations, cross-functional collaboration ensures that internal departments work together on sustainability objectives,

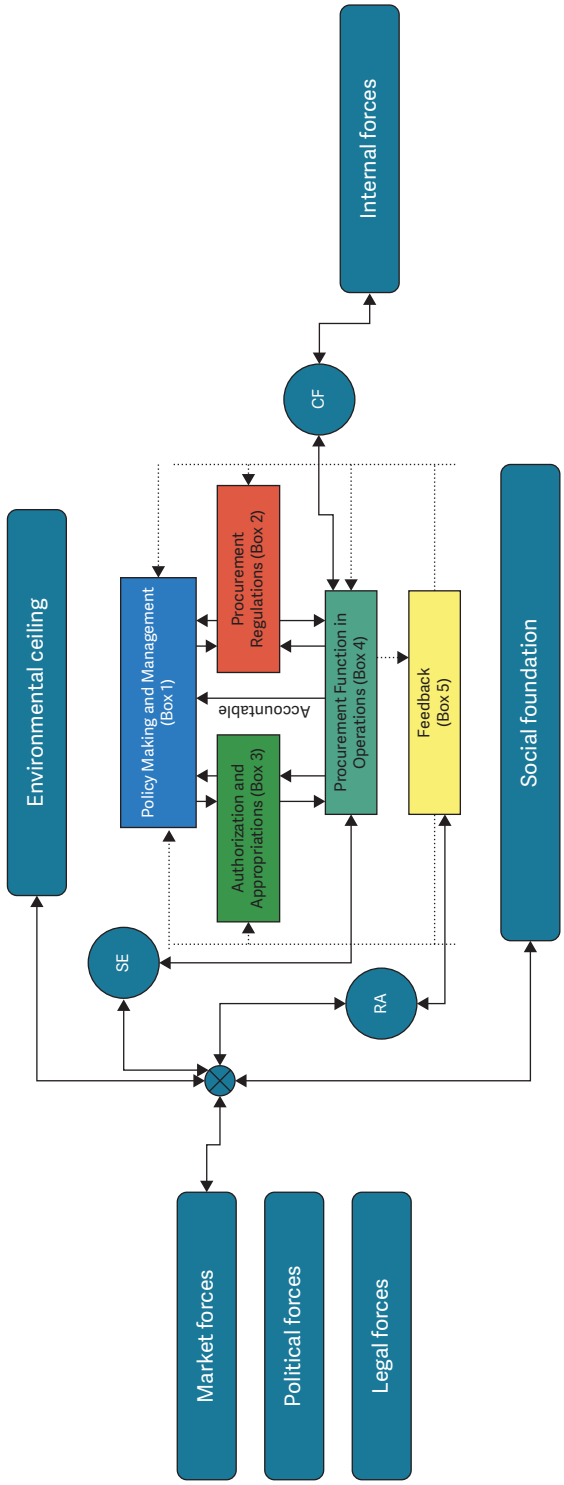


Figure 3. A sustainability-oriented model of the Public Procurement System (Adapted from Thai, 2001; Smidt et al., 2022 and Raworth, 2018)

and stakeholder engagement links the procurement system with external voices such as communities and suppliers.

Implications for theory and practice

The proposed adaptations to Thai's model bring implications for the theoretical development of public procurement frameworks and the practical application of SPP. Theoretically, these enhancements align with Smidt et al.'s (2022) harmonized model, which advocates for multidisciplinary policy integration. This integrated approach demonstrates that traditional procurement models can benefit from explicit components that support sustainability objectives, helping to position public procurement as a tool for achieving social and environmental goals alongside economic efficiency. Practically, these adaptations provide procurement professionals with a more comprehensive framework for implementing SPP strategies. Adding a Regulatory Adaptation Mechanism ensures that procurement systems remain agile and compliant with sustainability standards. At the same time, the Cross-Functional Collaboration Component supports smoother integration of social and environmental criteria into procurement activities. The Stakeholder Engagement Mechanism strengthens partnerships with local communities and suppliers, facilitating the alignment of procurement practices with broader societal goals. Together, these adaptations offer a robust framework for implementing SPP, empowering procurement professionals to drive sustainable market behaviors, encourage green innovation, and promote social equity.

Limitations and potential for future research

While this study broadly evaluates Thai's model, several limitations should be acknowledged. The study relies on secondary data and published literature, which may introduce some bias and restrict the broader applicability of the findings. The bibliometric analysis focuses solely on the Journal of Public Procurement, potentially overlooking relevant sustainability issues in other sources. Additionally, the thematic mapping process involves interpretative judgment, which might influence the alignment of sustainability themes with Thai's model. The absence of empirical validation through primary data limits the practical application of the proposed

model adaptations. Moreover, older articles receive more citations and are often viewed as influential, potentially biasing the analysis towards established perspectives.

Future research should empirically test the adapted model within various public procurement contexts, such as local government initiatives, sustainable infrastructure projects, and international development programs, to assess its practical utility and effectiveness. Future studies could explore how integrating Smidt et al.'s harmonized approach with Thai's model operates across different government levels and sectors. Quantitative metrics could also be developed to measure SPP outcomes within the adapted model, providing a basis for evaluating performance, continuous improvement, and best practices in sustainable procurement. Drawing on expertise from environmental science, social policy, and public administration, interdisciplinary research could further enhance the understanding of public procurement's role in achieving sustainable development goals. Such research would help refine the adapted model, validate its components, and expand its relevance for contemporary SPP applications.

Conclusion

This study set out to answer two research questions: RQ1: *To what extent does Thai's (2001) model encompass the themes and priorities of sustainable public procurement*? RQ2: *How might Thai's model be adapted to better align with contemporary SPP practices*? This study assessed Thai's (2001) public procurement model considering Raworth's (2018) emphasis on maintaining a social foundation and an environmental ceiling, Smidt et al.'s (2022) dynamic, policy-integrated approach, and findings from a narrative literature review and a bibliometric analysis of the Journal of Public Procurement. Regarding RQ1, the findings indicate that while Thai's model provides a solid framework for aligning policy and operations, it does not fully capture the sustainability concerns highlighted in recent studies. Its open system design and feedback loops can accommodate basic resource monitoring, yet the model lacks explicit mechanisms for incorporating Raworth's (2018) emphasis on a social foundation and an environmental ceiling, as well as the ongoing policy alignment suggested by Smidt et al. (2022). Addressing RQ2, four enhancements are proposed to strengthen the model's applicability for

sustainable procurement. First, the five components of Thai's model should be more tightly integrated with the broader procurement environment to reflect evolving supply and demand conditions. Second, a regulatory adaptation mechanism would enable continuous updates to meet new sustainability mandates. Third, a cross-functional collaboration mechanism would incorporate expertise from legal, finance, environmental, and social domains. Fourth, a stakeholder engagement mechanism would ensure input from local communities, suppliers, and marginalized groups. These modifications could be tested empirically in diverse contexts to assess their effectiveness in fostering socially and environmentally responsible procurement outcomes.

Author biographies

Marius Langseth is associate professor at Kristiania University of Applied Sciences, affiliated with the School of Economics, Innovation, and Technology, and associate professor II at NTNU – Norwegian University of Sceince and Technology. He holds a PhD in economics and management from NTNU, where he conducted research on data-driven decision-making in public procurement systems. Langseth has prior experience as a procurement officer in Moss municipality and as an advisor at the Agency for Public Management and eGovernment (formerly Difi). He is currently the leader of the Norwegian Public Procurement Academy, which works to strengthen research and education in public procurement.

Luitzen de Boer is professor at the Department of Industrial Economics and Technology Management (IØT) at the Norwegian University of Science and Technology (NTNU). He teaches and conducts research in the areas of purchasing management, public procurement, and logistics management, often focusing on issues related to sustainability and innovation.

Helene Tronstad Moe is associate professor of organisational psychology at Kristiania University of Applied Science, in the Department of Leadership and Organisation. She earned her doctorate at NTNU – Norwegian University of Sceince and Technology. Her research focuses on work life, leadership, personality testing, recruitment, and organisational psychology. She is an active communicator and is known as a "job expert" in *Aftenposten* and *E24*, where she offers advice on workplace challenges.

References

Brammer, S., & Walker, H. (2011). Sustainable procurement in the public sector: An international comparative study. *International Journal of Operations & Production Management, 31*(4), 452–476. https://doi.org/10.1108/01443571111119551

Carter, C. R., & Jennings, M. M. (2004). The role of purchasing in corporate social responsibility: A structural equation analysis. *Journal of Business Logistics, 25*(1), 145–186.

Erridge, A. (2007). Public procurement, public value, and the Northern Ireland unemployment pilot. *Public Administration, 85*(4), 1023–1043. https://doi.org/10.1111/j.1467-9299.2007.00674.x

Erridge, A., & Hennigan, S. (2012). Sustainable procurement in health and social care in Northern Ireland. *Public Money & Management, 32*(5), 377–384. https://doi.org/10.1080/09540962.2012.703419

European Commission. (2017). *Public procurement for a better environment: Green public procurement and the circular economy*. European Commission.

Flynn, A., & Davis, P. (2014). Theory in public procurement research. *Journal of Public Procurement, 14*(2), 139–180. https://doi.org/10.1108/JOPP-14-02-2014-B001

Geng, Y., & Doberstein, B. (2008). Greening government procurement in developing countries: Building capacity in China. *Journal of Environmental Management, 88*(4), 932–938.

Grandia, J., & Meehan, J. (2017). Public procurement as a policy tool: Using procurement to reach desired outcomes in society. *Journal of Public Procurement, 17*(3), 337–367. https://doi.org/10.1108/ijpsm-03-2017-0066

Grandia, J., Steijn, B., & Kuipers, B. (2015). It is not easy being green: Incremental procurement behavior. *Innovation: The European Journal of Social Science Research, 28*(3), 243–260. https://doi.org/10.1080/13511610.2015.1024639

Igarashi, M. (2018). *Towards more effective green public procurement: Empirical and conceptual studies of environmental criteria in decision-making and information processing* [Doctoral dissertation, Norwegian University of Science and Technology].

Langseth, M. (2024). *Data-driven decision-making in the public procurement system: The case of Norway*. NTNU.

Li, L., & Geiser, K. (2005). Environmentally responsible public procurement (ERPP) and its implications for integrated product policy. *Journal of Cleaner Production, 13*(7), 705–715.

McCrudden, C. (2004). Using public procurement to achieve social outcomes. *Natural Resources Forum, 28*(4), 257–267. https://doi.org/10.1111/j.1477-8947.2004.00099.x

Patrucco, A. S., Luzzini, D., & Ronchi, S. (2017). Research perspectives on public procurement: Content analysis of 14 years of publications in the Journal of Public Procurement *Journal of Public Procurement, 17*(2), 229–260. https://doi.org/10.1108/jopp-17-02-2017-b003

Preuss, L. (2007). Buying into our future: Sustainability initiatives in local government procurement. *Business Strategy and the Environment, 16*(5), 354–365. https://doi.org/10.1002/bse.578

Preuss, L. (2009). Addressing sustainable development through public procurement: The case of local government. *Supply Chain Management, 14*(3), 213–223. https://doi.org/10.1108/13598540910954557

Raworth, K. (2018). *Doughnut economics: Seven ways to think like a 21st century economist*. Chelsea Green Publishing.

Schapper, P. R., Veiga Malta, J. N., & Gilbert, D. L. (2006). An analytical framework for the management and reform of public procurement. *Journal of Public Procurement, 6*(1–2), 1–26.

Schotanus, F., Gelderman, C. J., & Jupijn, R. (2024). Enablers and barriers of sustainability for small public purchases. *Sustainability, 16*(22), 10109.

Smidt, S. J., Brophy, T., Bi, X., Mook, A., Adams, D. C., & Beck, S. M. (2022). Integrating policy to achieve a harmonized sustainability model: A multidisciplinary synthesis and conceptual framework. Journal of Environmental Management, 317, 115314.

Testa, F., Annunziata, E., Iraldo, F., & Frey, M. (2016). Drawbacks and opportunities of green public procurement: An effective tool for sustainable production. *Journal of Cleaner Production, 112*, 1893–1900.

Thai, K. V. (2001). Public procurement re-examined. *Journal of Public Procurement, 1*(1), 9–50.

Van Eck, N. J., & Waltman, L. (2013). *VOSviewer manual* (Version 1.1). Universiteit Leiden.

Walker, H., & Brammer, S. (2009). Sustainable procurement in the United Kingdom public sector. *Supply Chain Management, 14*(2), 128–137. https://doi.org/10.1108/13598540910941993

Walker, H., & Brammer, S. (2012). The relationship between sustainable procurement and e-procurement in the public sector. *International Journal of Production Economics*, *140*(1), 256-268. https://doi.org/10.1016/j.ijpe.2012.01.008

CHAPTER 2

Green Public Procurement in Norway: Examining the Impact of Resources and Competencies Across Municipalities of Different Sizes

Jan Ole Similä and Lars Molden
Nord University Business School, Norway

Sammendrag: Grønne offentlige anskaffelser har blitt et strategisk virkemiddel for å redusere miljøavtrykket i offentlig sektor, særlig i Norge hvor bærekraft støttes av politiske og juridiske rammeverk. Denne studien ser på samspillet mellom kommunestørrelse, anskaffelseskompetanse og ressurstilgang. Den utforsker om større kommuner, med større økonomisk og administrativ kapasitet, er bedre rustet til å implementere grønne anskaffelser enn mindre kommuner, eller om spesialisert anskaffelseskompetanse spiller en mer avgjørende rolle.

Analysene, gjennomført ved hjelp av PLS-SEM, viser at tilgangen på grønn anskaffelseskompetanse er avgjørende for implementering av grønne anskaffelser. Resultatene viser at grønn anskaffelseskompetanse ikke følger automatisk av organisasjonens størrelse, men er et resultat av målrettede investeringer i kompetanseutvikling. Videre viser analysen at ressurstilgang alene har begrenset direkte effekt på implementeringen av grønne anskaffelser, men effekten er betydelig større når ressursene benyttes i samspill med grønn anskaffelseskompetanse. Dette forsterker den avgjørende rollen kompetanse spiller i å omsette ressurser til effektive og bærekraftige anskaffelsesprosesser. Selv om kommunestørrelse har en viss direkte effekt på implementeringen av grønne anskaffelser, som kan tyde på at større kommuner har et fortrinn, viser analysene tydelig at det er tilgangen på kompetanse som er det virkelige betydningsfulle driveren for suksess.

Sitering: Similä, J. O. & Molden, L. (2025). Green Public Procurement in Norway: Examining the Impact of Resources and Competencies Across Municipalities of Different Sizes. I Langseth, M., & Similä, J. O. (Eds.), *Public Procurement Pathways – Sustainability Edition* (pp. 47–72). Cappelen Damm Akademisk. https://doi.org/10.23865/cdf.264.ch2

Disse innsiktene har viktige implikasjoner for både politikere og offentlige innkjøpsorganisasjoner. Investering i kompetanseutvikling, etablering av kunnskapsdelingsnettverk og strategisk ressursallokering er avgjørende for å styrke grønne offentlige anskaffelser. Kapittelet konkluderer med at en helhetlig tilnærming – hvor ressurser kombineres med spesialisert anskaffelseskekspertise – er nødvendig for å maksimere grønne anskaffelser.

Nøkkelord: offentlige anskaffelser, grønn offentlig anskaffelse, grønn anskaffelseskompetanse, organisatoriske ressurser

Abstract: Green public procurement is a strategic tool for reducing the environmental impact in the public sector, particularly in Norway, where sustainability is supported by political and legal frameworks. This study examines the role of municipality size, procurement competence, and resource availability in implementing green procurement. Using PLS-SEM analysis, the results show that specialized procurement competence is crucial for successful implementation, and that this competence is developed through targeted investment rather than just being linked to municipality size. While resource availability alone has limited direct impact, its effect is much stronger when combined with green procurement competence. Municipality size does have a modestly significant effect on the success of green procurement. These findings suggest that policymakers should focus on competence development, establish knowledge-sharing networks, and strategically allocate resources to strengthen green procurement processes. A holistic approach that combines resources with specialized expertise is key to maximizing green procurement.

Keywords: Public procurement, green public procurement, green public procurement competencies, organizational resources

Introduction

As governments seek to address climate change, environmental sustainability has become a key priority, reshaping policies and procurement practices worldwide. In Europe, initiatives such as the European Green Deal and the Corporate Sustainability Reporting Directive (CSRD), introduced in January 2023, are driving a shift toward greener public administration and private-sector accountability. Within this evolving landscape, Green Public Procurement (GPP) has emerged as a crucial mechanism for reducing the environmental impact of public spending by prioritizing sustainable goods

and services (Rainville, 2017). By leveraging their purchasing power, public authorities can drive markets toward environmentally friendly solutions and contribute to broader sustainability goals.

Norway, known for its ambitious environmental policies, provides a compelling case for examining how GPP is implemented at the municipal level. The Climate Change Act of 2017, which commits the country to achieving a low-emission society by 2050, underscores Norway's commitment to sustainability. Additionally, the country's decentralized governance structure, where municipalities play a significant role in public procurement, makes it particularly relevant for studying how local capacities shape GPP implementation. However, the extent to which municipalities can effectively integrate GPP depends on their resources and competencies, which vary significantly between larger and smaller municipalities. This study seeks to answer the question: *How do differences in resources and competencies influence the implementation of GPP across municipalities of varying sizes in Norway?*

Analyzing GPP across Norwegian municipalities provides valuable insights into how public entities of different sizes manage procurement to promote sustainability. While GPP offers benefits such as reduced environmental impact and potential cost savings, disparities in municipal resources and competencies may hinder its effective implementation. Understanding these variations is crucial for tailoring strategies that improve GPP adoption and lead to better environmental and administrative outcomes.

Despite a growing body of research on GPP, comparative studies examining its implementation across municipalities of different sizes remain limited. A literature search identified only two relevant studies (Bryngemark et al., 2023; Michelsen & de Boer, 2009) highlighting a significant gap in the understanding of how municipal capacity influences GPP effectiveness. This study addresses this gap by analyzing how variations in organizational resources, time availability, and procurement expertise impact the adoption of GPP practices in Norwegian municipalities. By doing so, it provides practical insights that can inform policy development and improve municipal procurement strategies.

The European Green Deal emphasizes the role of public procurement in driving sustainability, encouraging public authorities to "lead by example" (European Commission, 2019, p. 8). This directive has been reflected in Norway's updated public procurement act, which, as of January 2024, requires climate and environmental considerations to account for at least

30% of public tenders. Such policy changes reinforce the urgency of understanding how municipalities can enhance their GPP practices to comply with evolving legal requirements and sustainability goals.

Public procurement is widely recognized as a powerful policy tool for advancing societal objectives such as innovation, regional development, market competitiveness, and environmental sustainability (Caldwell et al., 2005; Eckersley et al., 2023; Georghiou et al., 2014; Grandia & Kruyen, 2020; Montalbán-Domingo et al., 2021). However, research suggests that the effectiveness of procurement in achieving these goals remains uncertain (Grandia & Meehan, 2017; Harland et al., 2021; Lundberg et al., 2016). GPP, which aims to reduce environmental impacts throughout the lifecycle of purchased goods and services (Rainville, 2017), has been a policy goal for decades (Marron, 1997), yet the ability of municipalities to develop the necessary resources and competencies for its implementation remains uneven.

Studies suggest that larger municipalities may have structural advantages in implementing GPP due to greater financial resources and administrative capacity (Michelsen & de Boer, 2009). However, this does not consistently translate into higher competency or successful implementation. For example, fewer than 6% of Norwegian municipalities report having sufficient green competence, with no clear correlation between municipality size and self-assessed GPP proficiency. In Sweden, Bryngemark et al. (2023) found that while larger municipalities are more likely to formalize GPP strategies, they often struggle with bureaucratic complexity that limits flexibility in applying green criteria. Additionally, GPP-specific education or experience did not significantly impact GPP adoption, suggesting that political leadership and strategic direction play more decisive roles than sheer municipal size.

These findings indicate that while larger municipalities may have more resources, effective GPP implementation also requires strong political commitment, strategic leadership, and adaptive governance structures. Smaller municipalities, despite having fewer resources, may benefit from greater flexibility and localized decision-making, potentially enabling more tailored and effective GPP strategies.

This study examines how variations in financial and organizational resources, procurement expertise, and administrative capacity influence the implementation of GPP in Norwegian municipalities. By analyzing how municipalities manage procurement within their resource constraints, the research provides insights into the dynamics shaping GPP adoption.

A deeper understanding of these factors can help inform strategies to strengthen green procurement practices and improve sustainability outcomes at the municipal level.

Theoretical background

The analysis is grounded in resource-based theory (RBT), which asserts that the resources an organization controls significantly affect its ability to achieve strategic goals (Barney, 1991). According to Barney, resources include all assets, capabilities, organizational processes, and knowledge that a firm controls, and for these resources to lead to sustained competitive advantage, they must be valuable, rare, imperfectly imitable, and non-substitutable.

Municipalities, though not typically analyzed in terms of competitive advantage, operate in a context where resource allocation directly impacts their ability to implement sustainable procurement practices (Cheng et al., 2018). GPP, which involves acquiring goods and services with reduced environmental impacts (Rainville, 2017), requires specific resources—particularly knowledge and capabilities tailored to sustainability. By framing the municipality as an organization with limited resources, we draw parallels to firm behavior, as first outlined by Penrose (1995), where the firm is seen as a pool of resources that determines its growth and strategic outcomes.

Municipalities' ability to prioritize and allocate resources toward GPP goals aligns with findings from Hitt et al. (2016), who emphasize that resources are key drivers of organizational performance. However, simply possessing resources is insufficient for success. As Sirmon et al. (2011) argue, the effective orchestration of resources is necessary to achieve strategic goals or develop a competitive advantage. Building on this, Andersén (2023) expands the traditional framework of resource orchestration, noting that its focus on value creation and economic performance can be enhanced by integrating environmental considerations. By incorporating a green dimension into resource orchestration, municipalities can ensure that their resource management also addresses environmental goals. This suggests that municipalities must not only access relevant resources but also strategically coordinate and deploy them to achieve GPP objectives. Those with better access to specialized knowledge on green procurement, combined with the ability to effectively manage and apply these resources, are more likely to succeed in meeting their GPP goals.

In line with RBT, access to resources and competencies is foundational for organizational success (Hitt et al., 2016). Research consistently highlights resource adequacy as a critical factor in effective public procurement, particularly in sustainability and innovation initiatives (Delmonico et al., 2018; Sönnichsen & Clement, 2020). Similä and Mwesiumo (2024) demonstrated that adequate resources are essential for effective green innovation procurement, often surpassing strategy and structure in importance. Their findings reinforce that access to necessary resources is pivotal in driving performance, especially for organizations committed to sustainable practices.

GPP competencies

Academic literature extensively discusses the competencies required for the effective implementation of GPP. From a broader perspective, Brammer and Walker (2011) identify knowledge as one of the key facilitators for the successful implementation of sustainable public procurement. Grandia and Voncken (2019) further highlight the indirect positive impact of knowledge on Green Public Procurement (GPP) implementation, noting that knowledge enhances motivation, which in turn drives GPP practices. Zhu et al. (2013) also emphasize the role of knowledge as a moderator in improving GPP practices, finding that awareness of public regulations related to GPP positively influences its adoption. Similarly, Liu, Xue, et al. (2019) confirm that understanding GPP regulations is essential for motivating GPP practices. Liu, Shi, et al. (2019) expand on this by showing that GPP training strengthens the link between procurers' awareness of GPP policies and their performance, highlighting the importance of GPP competencies. Finally, Testa et al. (2012) demonstrate that competence and expertise in GPP are critical for effectively implementing GPP initiatives. In conclusion, knowledge related to GPP is crucial for integrating environmental considerations into public procurement processes and ensuring that public authorities meet their sustainability goals. Building on this, it is important to explore more specific competencies that further enhance the implementation of GPP. These competencies discussed next offer a more detailed understanding of how GPP practices can be strengthened.

Strategic and policy competencies are foundational for GPP, encompassing the ability to align procurement practices with broader sustainability policies and regulations. Testa et al. (Testa, Annunziata, et al., 2016; Testa, Grappio, et al., 2016; Testa et al., 2012) emphasize the importance of understanding how GPP can be integrated into overarching environmental

policies and strategic plans. This includes familiarity with national law and EU regulations on GPP criteria, and the ability to develop and implement organizational GPP strategies. Regulatory knowledge ensures compliance with legal requirements, while strategic planning facilitates the incorporation of environmental objectives into procurement processes.

Technical and environmental competencies are crucial for evaluating the environmental impact of procurement choices and developing relevant criteria. According to Bratt et al. (2013), proficiency in life cycle assessment (LCA) is essential for assessing the environmental impacts of products or services throughout their life cycle. This competence helps in setting and applying environmental criteria in tender processes, ensuring that the procured goods and services meet sustainability standards. Furthermore, staying informed about sustainable products and technological advancements supports the procurement of environmentally friendly options.

Economic and financial competencies involve the ability to conduct cost-benefit analyses and manage financial aspects of GPP. Amann et al. (2014) highlight the importance of assessing the long-term economic benefits of green procurement, including potential savings from energy efficiency and waste reduction. Financial management skills are necessary for budgeting GPP initiatives, considering both upfront costs and long-term savings. These competencies ensure that procurement decisions are economically viable and aligned with sustainability goals.

Competencies related to market and supplier engagement are vital for fostering the development and supply of green products. Grandia and Meehan (2017) discuss the need for market analysis skills to understand trends and identify available sustainable products and services. Supplier collaboration skills enable procurement officials to encourage suppliers to develop and provide greener options. Additionally, the ability to promote innovation among suppliers helps stimulate the market towards more sustainable solutions.

Operational and management competencies are important in the process of designing and managing tender processes and evaluating GPP initiatives. Michelsen and de Boer (2009) point toward the importance of skills in tendering and contract management, ensuring that environmental criteria are incorporated into procurement processes. Competence in monitoring and evaluation is necessary to establish performance metrics and assess the effectiveness of GPP initiatives.

At last, communication and training competencies are essential for engaging stakeholders and providing education on GPP principles. Preuss (2009) highlights the ability to communicate the benefits of GPP to internal

and external stakeholders, fostering support for sustainable procurement practices. Training and education skills are necessary to equip procurement officials with the knowledge and resources needed to implement GPP effectively (Preuss & Walker, 2011). These competencies ensure that all stakeholders are informed and aligned with the organization's sustainability objectives.

Having established the critical competencies for GPP implementation, the next section examines how organizational size and resource availability shape these competencies and overall GPP performance.

The role of size, resources, and competencies in shaping green public procurement performance

Organizational size is traditionally defined by the resources an organization can access and deploy, including financial, human, and structural assets (Penrose, 1995). In the public sector, however, the impact of size on performance remains complex. Research on public management and procurement suggests that size—whether by employee count or budget size—does not consistently predict outcomes. Instead, the relationship between size and performance reveals both benefits and limitations (see e.g. Jung, 2012; Patrucco et al., 2019; Walker & Andrews, 2013).

Jung (2012) identified an inverted U-shaped relationship between the number of employees and organizational effectiveness in U.S. public sector organizations, showing that performance improves with growth up to a point before declining as size increases further. This decline suggests that beyond a certain size, added staff may lead to inefficiencies or misalignment of goals. Jung also found a negative log-linear relationship between budget size and effectiveness, implying that larger budgets contribute less to effectiveness with each incremental increase. These results underscore that size alone does not guarantee improved outcomes and can hinder efficiency under certain conditions.

Walker and Andrews (2013) reviewed several theoretical perspectives on the impact of size on local government performance, including economic theories advocating for an optimal organization size, contingency theories emphasizing structural alignment with goals, and the RBT focused on resources as a competitive advantage. They found that staff quality, planning, and networking positively influenced effectiveness, while size itself had a moderate impact on efficiency rather than direct performance. Larger

organizations may achieve higher technical and allocative efficiency—measured by cost-effectiveness and responsiveness—but size alone does not guarantee better goal achievement.

In public procurement, Patrucco et al. (2019) noted that organizational size and the size of procurement teams shape an organization's procurement structure and function. Smaller organizations with fewer procurement staff focus primarily on task execution, limiting their control over decisions. In contrast, larger organizations with more extensive procurement resources can establish centralized units with specialized competencies, which enhances their ability to manage procurement effectively. This capability is especially important in GPP, where specialized knowledge is crucial for implementing sustainable strategies. However, the study did not assess how structural differences affect performance outcomes.

Similä and Mwesiumo (2024) found a small positive effect of size on green innovation procurement, although they also observed that larger size can negatively affect perceived resource adequacy, including time, skills, and relevant competencies. Similarly, Michelsen and de Boer (2009) found no clear link between organizational size and competency levels in GPP, suggesting that larger organizations do not inherently possess the skills necessary for sustainable procurement. These findings indicate that while size provides access to resources, it does not guarantee the specialized competencies required for certain performance outcomes.

Nason et al. (2015) explored the dynamics of resources in larger organizations, finding mixed results on how size influences corporate entrepreneurship (intrapreneurship), which is vital for driving green initiatives (Le Loarne Lemaire et al., 2022). Larger organizations benefit from "slack" resources—excess financial or structural resources—that can be redirected toward strategic projects. However, bureaucratic complexities may hinder adaptability, reducing the effectiveness of resource deployment. This supports RBT, which suggests that while large organizations have more resources, they must strategically manage these resources to avoid inefficiencies and foster innovation.

Larger organizations typically possess greater financial and human resources, allowing them to engage in strategic initiatives such as GPP (Penrose, 1995; Testa et al., 2012). Larger municipalities, with more substantial administrative structures, can allocate staff to oversee GPP. This structure allows for clearer division of responsibilities, greater specialization, and targeted training, facilitating GPP implementation through access

to green procurement expertise. Smaller municipalities, in contrast, often lack these resources, leading to challenges in defining roles and acquiring the necessary expertise for effective GPP.

However, Testa, Annunziata, et al. (2016) found that organizational size does not significantly affect the likelihood of adopting GPP practices. This suggests that factors beyond size—such as organizational culture, commitment to sustainability, and external support—are also critical for GPP success. Similarly, Andrews et al. (2015) argue that size can either enhance or hinder capability development depending on factors like structural complexity and economies of scale. Larger organizations benefit from resource stability and workforce continuity but also face inefficiencies from layered structures. Smaller organizations, despite resource constraints, may capitalize on flexibility and autonomy, enabling quicker adaptation to shifting procurement demands.

Ultimately, performance is shaped by more than just organizational size—it is also depends on factors such as structural simplicity, adaptability, and resource flexibility. Rosell (2021) emphasizes that the quality and preparedness of individuals leading GPP initiatives is crucial. Successful GPP adoption relies more on the training, commitment, and capacity of procurement professionals than on organizational size alone. This highlights the importance of investing in the competencies of procurement officers to improve GPP performance, regardless of organizational size.

Propositions

In summary, while larger organizations inherently have more resources and can potentially develop specialized competencies that enhance certain performance metrics, size alone does not dictate performance outcomes. Organizational capability is determined by resource availability, competency development, structural efficiency, and adaptability, with a significant influence from the quality of individuals driving procurement strategies. Access to resources and competencies plays a central role in shaping performance, particularly in specialized areas like green public procurement. Based on this analysis, the following propositions are made:

Proposition 1: Larger organizations can improve procurement efficiency through better resource allocation and structured processes, but increased size may also introduce bureaucratic inefficiencies that hinder goal achievement.

Proposition 2: Larger municipalities are more likely to develop specialized GPP competencies due to greater resource availability.

Proposition 3: Larger municipalities have a greater financial and administrative capacity to implement GPP initiatives, which may enhance resource availability and procurement capabilities.

Proposition 4: Higher levels of GPP-related expertise, including specialized training and knowledge, improve the ability of public organizations to implement and sustain green procurement practices effectively.

Proposition 5: Higher levels of GPP resources enable more comprehensive GPP implementation, leading to improved adherence to sustainability criteria and procurement performance.

Figure 1 presents the five propositions based on and influenced by the existing literature. The dotted arrow reflects the ambivalence of the anticipated effect that organizational size can have on the performance of GPP.

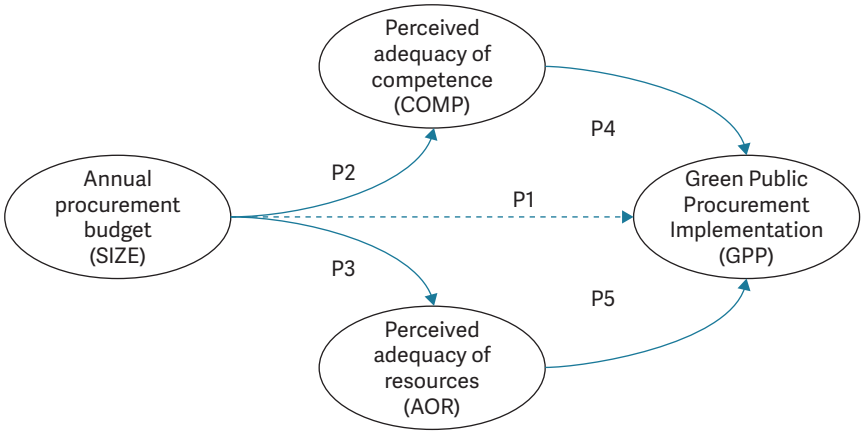


Figure 1. Conceptual Model

Research method

Research context

This study is set in Norway, which has actively pursued various initiatives to promote GPP. Norway's commitment to enhancing GPP is evident in its adoption of several key measures, including the implementation of Directive 2014/24/EU from the European Parliament and Council on public procurement, as well as the enactment of a new Public Procurement Act, and the ambitious Climate Change Act of 2017. This legislation places a strong emphasis on addressing social and environmental sustainability challenges.

The reason for choosing Norway as a context of this study is threefold. First, given Norway's dedication to advancing green public procurement,

it provides an ideal context. Second, due to Norway's strong commitment to sustainable public procurement and its support for green procurement practices, the findings from this research can offer valuable insights and inform future strategies. Finally, the quality of data from Norwegian registries is high lending face validity to our empirical research. The study focuses on a public organization, specifically the municipalities, which the Norwegian Public Procurement Act defines as a procuring entity involved in contracts for goods, services, or construction works, including licensing agreements or planning and design competitions, with an estimated value of approximately € 9,000 or more, excluding VAT.

Research design and data collection

This study makes use of data collected by the Norwegian Agency for Public and Financial Management. The data were collected through self-administered online surveys conducted in the spring of 2022 and 2024 sent to all public sector organizations that fall under the Public Procurement Act, consisting of municipalities, counties, state agencies, and state-owned enterprises. The Procurement survey is Norway's main survey, used as a basis for developing public procurement. The decision to use public procurement survey data in this study was driven by the goal of exploring the development of GPP within Norway's municipal sector. The public procurement survey is an extended survey addressing issues related to control and leadership, human-resources competence, digitalization, climate and environmental issues, and innovation. Key informants for both surveys are professionals who work with public procurement in their respective organizations. Montabon et al. (2018) argue that these informants are suitable, as they have a broad range of knowledge on the aspects asked about in the questionnaire or they have access to the information required to answer the questions. Although the survey is conducted for a range of different purposes beyond the scope of this chapter, the choice to use it for our purpose hinges on two factors. First, the survey nicely captures many of the core concepts we aim to explore, like green competencies, access to resources, and assessment of green procurement implementation. The questions are relevant operationalizations of these concepts and represent the underlying dimensions of their latent characteristics. Second, the survey encompasses a considerable subset of public procurement contracts above a threshold of 100,000 NOK. This suggests that it is fairly representative of the population of such contracts.

Operationalization of constructs and modeling

This study operationalizes the key constructs by applying partial least square structural equation modeling (PLS-SEM). PLS-SEM is a statistical method used for analyzing complex relationships among variables within structural models. This approach allows for the construction of variables based on underlying empirical items (single variables). The method estimates factor loadings on each individual item from a latent construct, as well as coefficients for the relationships between focal constructs. PLS-SEM is advantageous in several contexts. First, it is highly flexible regarding sample size and distributional assumptions, which is highly relevant for our sample size of 446. Moreover, it does not assume that the data follows a normal distribution. This is particularly relevant for survey data using Likert scales, as is the case in this chapter. Second, PLS-SEM allows for the inclusion of formative and reflective measurement models, making it ideal for models that include complex constructs and emergent variables. Third, the method allows for testing for mediating relationships between latent (and observable) variables. Mediation analysis provides valuable insights into causal processes, enabling researchers to move beyond simple associations and toward understanding the specific mechanisms by which effects unfold. By clarifying whether relationships between variables operate indirectly, mediation analysis adds theoretical depth and enhances the explanatory power of empirical findings. The descriptive statistics of the factor extracted from the factor analysis are presented in Table 1. We have also added the variance inflation factor (VIF) which is discussed in the model diagnostics section below.

Table 1. Descriptive statistics, correlations and VIF

	mean	sd	min	max	SIZE	COMP	AOR	GPP	VIF
SIZE	4.74	1.99	1.00	8.00	1	0.044	0.009	0.040	1.002
COMP	0.00	0.71	−1.71	1.93	0.044	1	0.422	0.943	1.219
AOR	0.00	0.43	−0.97	1.14	0.009	0.422	1	0.461	1.217
GPP	0.00	0.56	−1.56	1.74	0.040	0.943	0.461	1	

To evaluate a PLS-SEM approach we constructed several core variables based on items from the survey. The core variables (factors) in this chapter are *perceived adequacy of competency (COMP), perceived adequacy of resources (AOR),* and *green public procurement implementation (GPP).*

These are all captured by relevant items from the survey. In Table 2 we see the wording of each item tied to a latent construct focal to our chapter. COMP is captured by survey questions COMP1 through COMP4, AOR is captured by items AOR1 through AOR4, and GPP is captured by items GPP1 and GPP2. Annual procurement in total (SZO), referring to the financial approach to organizational size mentioned by Penrose (1995), is captured by a single item, *annual procurement in total*.

Table 2. Focal and control variables considered in this study

Construct		Indicator (loading in parentheses)
Size of organization (SIZE)	[SIZE]	Annual procurements in total
Perceived adequacy of competency (COMP) *Alpha: 0.9*	[COMP1]	To what extent do you feel that your organization possesses sufficient expertise in climate and environmental matters? (0.87)
	[COMP2]	To what extent do you feel that your organization has sufficient expertise to determine when it is relevant to set climate and environmental requirements and criteria in procurements? (0.90)
	[COMP3]	To what extent do you feel that your organization has sufficient expertise to identify which requirements and criteria effectively reduce climate and environmental impact, and which promote climate- and environment-friendly solutions? (0.93)
	[COMP4]	To what extent do you feel that your organization has sufficient expertise to quantify the climate and environmental gains achieved through procurement? (0.76)
Perceived adequacy of resources (AOR) *Alpha: 0.8*	[AOR1]	To what extent do you feel that your organization has sufficient time to plan and execute procurements with climate and environmental considerations? (0.85)
	[AOR2]	We have sufficient time and resources to clarify needs and prepare tenders effectively. (0.67)
	[AOR3]	We have sufficient time and resources to conduct tenders effectively. (0.77)
	[AOR4]	We have sufficient time and resources to effectively follow up on our contracts and suppliers. (0.75)
Green public procurement implementation (GPP) *Alpha: 0.7*	[GPP1]	Res1: To what extent do you feel that the procurement practices have led to good results in terms of reducing climate and environmental impact in procurement? (0.87)
	[GPP2]	Res2: To what extent does the municipality follow up on set goals and measures for climate and environmental considerations in procurement? (0.85)

Results

The reliability measure (Cronbach's alpha) indicates that the factors represent the underlying items thus suggesting that they are a good fit. Cronbach's alpha, depicted in Table 2, of above 0.7 is considered a good fit for latent constructs (Hair et al., 2019). Moreover, the factor loadings are also found in the corresponding table. These indicate that the underlying items load significantly on the suggested latent factors where a value above 0.6 is considered sufficient (Hair et al., 2019) (some authors argue that even 0.5 is sufficient). However, most of our items have a loading above 0.7 which is considered a very good fit. In other words, the items represent a latent construct relevant to this chapter.

Table 3. Estimated factor loadings using Bootstrapping with 10,000 simulations

			Original estimation	Bootstrapped mean	Bootstrapped SD	t-value	p-value
COMP 1	->	COMP	0.872	0.872	0.014	61.864	> 0.01
COMP 2	->	COMP	0.902	0.902	0.011	82.623	> 0.01
COMP 3	->	COMP	0.930	0.929	0.008	118.144	> 0.01
COMP 4	->	COMP	0.781	0.781	0.020	39.237	> 0.01
AOR 1	->	AOR	0.850	0.852	0.020	43.201	> 0.01
AOR 2	->	AOR	0.680	0.675	0.048	14.207	> 0.01
AOR 3	->	AOR	0.772	0.767	0.039	19.541	> 0.01
AOR 4	->	AOR	0.752	0.748	0.040	18.827	> 0.01
GPP 1	->	GPP	0.874	0.874	0.014	60.738	> 0.01
GPP 2	->	GPP	0.849	0.848	0.016	51.552	> 0.01

Table 3 shows the factor loadings with the corresponding standard deviation and t-values for a more detailed insight into the factor analysis undertaken in this chapter. The standard errors are estimated using bootstrapping with 10,000 simulations and indicate that all loadings are significant. This technique allows for estimating standard errors even though no statistical distribution is assumed. Bootstrapping simply resamples the dataset multiple times (10,000 in our case) and extracts standard errors and confidence intervals from this process. Moreover, bootstrapping is particularly useful for testing mediation effects, which involve indirect relationships. Through the process of generating an empirical distribution of the indirect effect,

bootstrapping enables robust mediation analysis and helps in determining the significance of indirect paths. This makes bootstrapping a useful technique in PLS-SEM analysis.

The PLS-SEM model allows for modeling-mediating variables as well as direct effects. Table 3 presents the fully estimated model in this chapter. A graphical representation of the key findings is also provided below in Figure 2. Here we observe that the size of the *annual procurement budget* (SIZE) has a moderate positive and significant effect on *Green Public Procurement Implementation* (GPP). This suggests that the larger the municipal procurement budget is, the higher the levels of GPP implementation are and lends support to Proposition 1. This is, however, just part of the story which we will return to shortly.

Furthermore, the results show that *perceived adequacy of competency* (COMP) has a positive and significant impact on GPP implementation. The effect size is very strong and accounts for a considerable share of variance in GPP (a total of 49.2% for the total model). This lends strong support to Proposition 4, suggesting that higher levels of GPP competencies lead to a higher degree of GPP implementation. We also see that the *perceived adequacy of resources* (AOR) has a significant positive effect on GPP implementation (6% level), albeit with a small effect size. This lends support to Proposition 5, suggesting that greater access to GPP resources leads to higher performance on GPP. A comparison between these two factors clearly indicates that COMP is a much better predictor of GPP than AOR.

More surprisingly, we see that SIZE has an insignificant effect on COMP. This finding contradicts Proposition 2, which states that larger municipalities are more likely to develop higher levels of GPP competencies compared to smaller ones. Furthermore, we find that SIZE has a negative and significant (10% level) effect on AOR, contrary to Proposition 3 stating that larger municipalities possess higher levels of GPP resources compared to smaller ones. This is related to Proposition 1 stating that organizational size has a mixed impact on performance. While larger organizations can enhance efficiency through better resource allocation and structured processes, they do not necessarily improve the achievement of formal policy objectives and may introduce bureaucratic inefficiencies that offset these gains. We would, on the one hand, expect AOR and COMP to be positively related to SIZE, but find that this is not the case. On the other hand, SIZE may have an impact on GPP through its impact on AOR and COMP. We checked whether AOR and COMP act as mediators but found no significant results

supporting this. These findings are counter-intuitive and need to be further addressed during the discussion in this chapter.

Table 4. Path coefficients in PLS-SEM with Bootstrapped Standard Errors (10,000 simulations)

			Original estimation	Bootstrapped mean	Bootstrapped SD	t-value	p-value
AOR	->	COMP	0.518	0.522	0.033	15.669	> 0.01
AOR	->	GPP	0.082	0.081	0.045	1.831	0.067
COMP	->	GPP	0.648	0.649	0.034	18.843	> 0.01
SIZE	->	AOR	–0.084	–0.084	0.049	–1.717	0.087
SIZE	->	COMP	0.054	0.052	0.047	1.135	0.259
SIZE	->	GPP	0.105	0.106	0.036	2.886	0.004

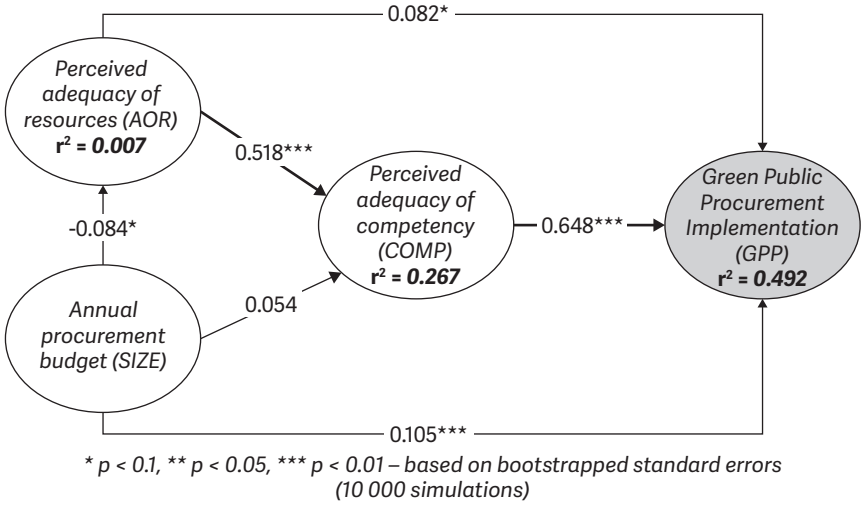


Figure 2. Graphical representation of PLS-SEM results

Looking at the overall performance of our model, we find that the model explains a considerable share of the variance in GPP (R^2 is 0.492). This suggests that SIZE, AOR, and COMP explain a lot of the variance in GPP performance with COMP being the most important factor. Taken together this indicates a good model fit with respect to explaining GPP. Moreover, the model shows that 26.7% (R^2 is 0.267) of variance in COMP is explained by AOR and SIZE with the former contributing the lion's share of this explanation. These findings suggest that it is a considerable mediation effect going on where AOR impacts GPP performance through its impact on COMP.

Model diagnostics

To determine the efficiency of our model, we ran a set of diagnostic tests. First, we checked for normality in the estimated residuals. A standard QQ-plot indicated that the residuals follow a normal distribution. A formal test using an asymptotic one-sample Kolmogorov-Smirnov test indicates some small issues related to non-normal residuals. We tested again using log transformation of variables. This resulted in no significant changes in the model predictions and the residuals were normal, so we concluded that our model fits the data well. Second, we tested for heteroskedasticity using the Breuch-Pagan test. This test indicated no problems with heteroskedasticity. Third, we tested our model for highly influential observations. Using Cook's distance we found no problems in this regard. Finally, we used VIF estimations to check for potential problems with multicollinearity. The VIF scores are presented in Table 1 and show no problems with multicollinearity. The VIF scores vary between 1.00 to 1.22, suggesting no material multicollinearity.

Discussion

This study aimed to examine the organizational resources required for implementing green public procurement, with a particular focus on the role of municipal size. The resources analyzed were categorized into access to relevant competencies, availability of time combined with general organizational capacity to support GPP initiatives. The analytical framework was inspired by RBT (Barney, 1991; Penrose, 1995), which posits that organizational growth leads to greater access to resources, and these enhanced resources positively impact organizational performance. The methodological approach for the analysis was PLS-SEM, enabling the testing and confirmation of the conceptual model developed for this study.

This study makes five key contributions, refining our understanding of the relationship between municipal size, resources, competencies, and GPP implementation.

First, addressing Proposition 1, our findings confirm that municipal size positively influences GPP implementation. This is significant given the ongoing debate in public administration regarding whether larger organizations benefit from their resource base or suffer from bureaucratic inefficiencies (Jung, 2012; Walker & Andrews, 2013). While prior studies in Nordic settings (Bryngemark et al., 2023; Michelsen & de Boer, 2009)

have shown mixed results, our findings reinforce the idea that size facilitates GPP adoption—despite the potential drawbacks of complexity and rigidity. This suggests that larger municipalities are better positioned to institutionalize GPP processes, even if size alone does not guarantee optimal performance. Andersson and Rusten (2024) further support this by identifying a strong tendency for large and metropolitan municipalities to lead GPP initiatives, attributing this to the limited in-house capacity and expertise in smaller municipalities.

Second, addressing Proposition 2, our results reveal that municipal size has only a weak and statistically insignificant direct effect on green procurement competencies. This challenges the assumption—rooted in RBT—that larger organizations inherently develop stronger expertise due to their broader resource pools. Instead, our findings—consistent with Hamdan et al. (2023) in their study of procurement processes in zero-emission neighborhood projects—suggest that competencies are not merely a byproduct of scale but rather the result of deliberate investments in training, leadership, and organizational culture (Andrews et al., 2015; Nason et al., 2015). This underscores the need for municipalities to prioritize competency-building initiatives rather than relying on size alone as a predictor of expertise.

Third, regarding Proposition 3, we find an unexpected negative relationship between municipal size and perceived access to resources. While larger municipalities theoretically have more extensive financial and administrative capacity, our results align with critiques suggesting that resource management inefficiencies can offset these advantages (Andrews et al., 2015). This finding highlights that simply having more resources does not guarantee their effective use—structural challenges, coordination difficulties, and competing priorities can constrain resource deployment. This has practical implications for policymakers: enhancing GPP performance in larger municipalities may require not just increasing resources but also improving resource governance and strategic allocation.

Fourth, supporting Proposition 4, our analysis confirms that green procurement competencies significantly enhance GPP implementation. This underscores the central role of expertise in driving sustainable procurement practices, reinforcing prior findings in RBT and GPP literature. While larger municipalities may have structural advantages in fostering competencies, our results indicate that size alone is insufficient—what matters most is whether municipalities actively invest in and leverage specialized procurement knowledge.

One of the most significant insights from our study is that procurement professionals' expertise is a key driver of GPP success. Procurement professionals act as critical agents in translating sustainability ambitions into concrete procurement decisions, ensuring that regulatory requirements, environmental criteria, and market engagement strategies are effectively implemented. Prior research suggests that competency gaps—whether in legal knowledge, sustainable procurement methodologies, or supplier engagement—can hinder GPP adoption (Grandia & Kruyen, 2020; Testa, Grappio, et al., 2016). Our findings reinforce this, showing that municipalities with higher procurement competencies are significantly better at implementing GPP, regardless of their size or available resources.

Moreover, the strong indirect relationship between access to resources and GPP performance—mediated by competencies—suggests that simply allocating e.g. financial or administrative resources is insufficient unless procurement professionals possess the necessary skills to deploy them effectively. This aligns with studies in public management emphasizing the importance of strategic human capital development (Andrews et al., 2015; Mwesiumo et al., Forthcoming). Without well-trained procurement staff, additional resources may remain underutilized or misallocated, limiting their potential impact on sustainability objectives.

Given the pivotal role of procurement professionals, municipalities should prioritize structured competency-building programs tailored to sustainable procurement. This can include:

- Targeted training programs: Formal training initiatives, such as specialized courses on sustainable procurement strategies, life-cycle costing, and environmental impact assessments, can equip procurement officers with the skills needed for effective GPP implementation.
- Knowledge sharing and peer-learning networks: Establishing collaborative networks among municipalities can facilitate best-practice exchange, reducing knowledge disparities between larger and smaller municipalities. Initiatives such as procurement forums or cross-municipality working groups can enhance professional expertise.
- Strategic integration of procurement functions: Ensuring that procurement teams are actively involved in broader municipal sustainability planning allows for better alignment between procurement decisions and long-term environmental objectives. Embedding sustainability criteria into procurement guidelines and performance evaluations can further institutionalize GPP practices.

By emphasizing competency development alongside resource allocation, municipalities can create an enabling environment where procurement professionals are empowered to drive meaningful improvements in GPP outcomes. This study highlights that municipal size and financial capacity alone do not determine success; rather, it is the ability of procurement professionals to leverage available resources effectively that shapes performance.

Finally, addressing Proposition 5, our findings show that while access to resources has only a weak direct effect on GPP implementation, it exerts a strong indirect effect through green procurement competencies. This suggests that simply increasing e.g. financial or administrative resources is insufficient to improve GPP performance unless those resources are strategically allocated and paired with relevant expertise. In other words, resources alone do not drive GPP success—what matters is how municipalities leverage these resources through skilled procurement professionals. This finding aligns with insights from Mwesiumo et al. (Forthcoming), who similarly observed that resources contribute to performance most effectively when mediated by competencies. It also reinforces broader public management literature, which suggests that capacity-building efforts must go beyond budgetary allocations to include investments in human capital and organizational learning (Andrews et al., 2015). For policymakers and municipal leaders, these results indicate that resource allocation strategies should be designed with a competency-oriented approach. Rather than merely increasing budgets for GPP initiatives, municipalities should focus on developing procurement expertise, streamlining resource governance, and fostering collaboration between procurement teams and sustainability officers.

Overall, our study highlights the need for an integrated approach to GPP implementation—one that balances access to resources with strong procurement competencies. While larger municipalities may have structural advantages in resource availability, their success in GPP ultimately depends on how well they develop and utilize procurement expertise. Our findings suggest that municipal leaders should prioritize competency-building initiatives, institutionalize sustainable procurement practices, and ensure that financial and administrative resources are effectively deployed to support GPP goals. By doing so, municipalities can move beyond mere policy adoption and achieve meaningful improvements in sustainable public procurement performance.

Conclusion

This study set out to examine how differences in resources and competencies influence the implementation of GPP across municipalities of varying sizes in Norway. The findings challenge the assumption that municipal size alone is a reliable predictor of GPP performance. While larger municipalities generally benefit from stronger institutional capacity, their size does not necessarily translate into greater access to green procurement competencies or other key resources. In fact, the results indicate a slight negative relationship between size and perceived resource availability, suggesting that structural complexities and competing priorities may offset the advantages of scale.

The most significant finding is the critical role of procurement competencies in driving GPP performance. Competencies exert a strong positive effect, with other resources proving most effective when combined with expertise rather than in isolation. This underscores the importance of investing in targeted competency development—through targeted training, peer networks, and strategic procurement integration, rather than relying solely on organizational size or resource accumulation to enhance GPP outcomes. By leveraging a RBT framework and employing PLS-SEM analysis, this study provides a robust explanatory model, offering new insights into the organizational dynamics shaping sustainable procurement practices.

From a policy perspective, these findings reinforce the potential of public procurement as a strategic tool for advancing environmental objectives (Grandia & Meehan, 2017; Harland et al., 2021). However, GPP success depends not just on increasing budgets but on ensuring procurement professionals are equipped with the right expertise. For municipal managers, this means that building a successful green procurement strategy requires deliberate investments in procurement expertise.

Notably, smaller municipalities that cultivate the necessary competencies can achieve strong GPP outcomes, while larger municipalities—despite their potential for greater resource pooling—must ensure that their scale does not dilute the strategic focus on competency development. Municipal decision-makers must embed these competency-building initiatives within procurement policies to optimize sustainability outcomes.

Future research should incorporate additional indicators to further explore the relationship between organizational size, resource distribution, and competency development. Moreover, further investigation is needed

to assess whether these findings are generalizable beyond the Norwegian context, providing a broader understanding of how municipalities across different governance systems and institutional environments can optimize GPP implementation.

Author biographies

Jan Ole Similä is the programme director of the Procurement Management programme at Nord University. He also co-leads the research group Leadership, Organizations, and Society (LOS) and serves as chairman of the Procurement Academy (*Anskaffelsesakademiet*). His research interests and publications span a broad range of topics, including contract management, public procurement, vertical integration, knowledge management, and competitiveness.

Lars Molden leads the research group *Diginn2Circle*, which focuses on digital transformation. He also teaches strategy, innovation, and methodology. His research interests and publications are related to strategy in dynamic environments, innovation, and collaboration. He is also interested in innovative quantitative methods.

References

Amann, M., K. Roehrich, J., Eßig, M., & Harland, C. (2014). Driving sustainable supply chain management in the public sector: The importance of public procurement in the European Union. *Supply Chain Management: An International Journal*, *19*(3), 351–366. https://doi.org/10.1108/SCM-12-2013-0447

Andersén, J. (2023). Green resource orchestration: A critical appraisal of the use of resource orchestration in environmental management research, and a research agenda for future study. *Business Strategy and the Environment*, *32*(8), 5506–5520. https://doi.org/10.1002/bse.3433

Andersson, I., & Rusten, G. (2024). Green innovative procurement in the municipality sector: A dual case study from Norway. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, *78*(3), 166–179. https://doi.org/10.1080/00291951.2024.2395255

Andrews, R., Beynon, M. J., & McDermott, A. M. (2015). Organizational capability in the public sector: A Configurational Approach. *Journal of Public Administration Research and Theory*, *26*(2), 239–258. https://doi.org/10.1093/jopart/muv005

Barney, J. B. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Brammer, S., & Walker, H. (2011). Sustainable procurement in the public sector: An international comparative study. *International Journal of Operations & Production Management*, *31*(4), 452–476. https://doi.org/10.1108/01443571111119551

Bratt, C., Hallstedt, S., Robèrt, K. H., Broman, G., & Oldmark, J. (2013). Assessment of criteria development for public procurement from a strategic sustainability perspective. *Journal of Cleaner Production*, *52*, 309–316. https://doi.org/10.1016/j.jclepro.2013.02.007

Bryngemark, E., Söderholm, P., & Thörn, M. (2023). The adoption of green public procurement practices: Analytical challenges and empirical illustration on Swedish municipalities. *Ecological Economics*, *204*, 107655. https://doi.org/10.1016/j.ecolecon.2022.107655

Caldwell, N., Walker, H., Harland, C., Knight, L., Zheng, J., & Wakeley, T. (2005). Promoting competitive markets: The role of public procurement. *Journal of Purchasing and Supply Management*, *11*(5), 242–251. https://doi.org/10.1016/j.pursup.2005.12.002

Cheng, W., Appolloni, A., D'Amato, A., & Zhu, Q. (2018). Green Public Procurement, missing concepts and future trends – A critical review. *Journal of Cleaner Production*, *176*, 770–784. https://doi.org/10.1016/j.jclepro.2017.12.027

Delmonico, D., Jabbour, C. J. C., Pereira, S. C. F., de Sousa Jabbour, A. B. L., Renwick, D. W. S., & Thomé, A. M. T. (2018). Unveiling barriers to sustainable public procurement in emerging economies: Evidence from a leading sustainable supply chain initiative in Latin America. *Resources, Conservation and Recycling*, *134*, 70–79. https://doi.org/10.1016/j.resconrec.2018.02.033

Eckersley, P., Flynn, A., Lakoma, K., & Ferry, L. (2023). Public procurement as a policy tool: the territorial dimension. *Regional Studies*, *57*(10), 2087–2101. https://doi.org/10.1080/00343404.2022.2134850

European Commission. (2019). *The European Green Deal*. European Commission. https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF

Georghiou, L., Edler, J., Uyarra, E., & Yeow, J. (2014). Policy instruments for public procurement of innovation: Choice, design and assessment. *Technological Forecasting and Social Change*, *86*, 1–12. https://doi.org/10.1016/j.techfore.2013.09.018

Grandia, J., & Kruyen, P. M. (2020). Assessing the implementation of sustainable public procurement using quantitative text-analysis tools: A large-scale analysis of Belgian public procurement notices. *Journal of Purchasing and Supply Management*, *26*(4), 100627. https://doi.org/10.1016/j.pursup.2020.100627

Grandia, J., & Meehan, J. (2017). Public procurement as a policy tool: Using procurement to reach desired outcomes in society. *International Journal of Public Sector Management*, *30*(4), 302–309. https://doi.org/10.1108/IJPSM-03-2017-0066

Grandia, J., & Voncken, D. (2019). Sustainable public procurement: The impact of ability, motivation, and opportunity on the implementation of different types of sustainable public procurement. *Sustainability*, *11*(19), 5215. https://doi.org/10.3390/su11195215

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis*. Cengage.

Hamdan, H. A. M., de Boer, L., & Andersen, P. H. (2023). The architecture of procurement in sustainable and zero-emission neighborhood projects—strategic challenges and new realities. *Environment Systems and Decisions*, *43*(3), 472–488. https://doi.org/10.1007/s10669-023-09908-z

Harland, C. M., Eßig, M., Lynch, J., & Patrucco, A. (2021). Policy-led public procurement: does strategic procurement deliver? *Journal of Public Procurement*, *21*(3), 221–228. https://doi.org/10.1108/JOPP-09-2021-089

Hitt, M. A., Xu, K., & Carnes, C. M. (2016). Resource based theory in operations management research. *Journal of Operations Management*, *41*, 77–94. https://doi.org/10.1016/j.jom.2015.11.002

Jung, C. S. (2012). Navigating a rough terrain of public management: Examining the relationship between organizational size and effectiveness. *Journal of Public Administration Research and Theory*, *23*(3), 663–686. https://doi.org/10.1093/jopart/mus040

Le Loarne Lemaire, S., Razgallah, M., Maalaoui, A., & Kraus, S. (2022). Becoming a green entrepreneur: An advanced entrepreneurial cognition model based on a practiced-based approach. *International Entrepreneurship and Management Journal*, *18*(2), 801–828. https://doi.org/10.1007/s11365-021-00791-1

Liu, J., Shi, B., Xue, J., & Wang, Q. (2019). Improving the green public procurement performance of Chinese local governments: From the perspective of officials' knowledge. *Journal of Purchasing and Supply Management*, *25*(3), 100501. https://doi.org/10.1016/j.pursup.2018.05.002

Liu, J., Xue, J., Yang, L., & Shi, B. (2019). Enhancing green public procurement practices in local governments: Chinese evidence based on a new research framework. *Journal of Cleaner Production*, *211*, 842–854. https://doi.org/10.1016/j.jclepro.2018.11.151

Lundberg, S., Marklund, P.-O., & Strömbäck, E. (2016). Is environmental policy by public procurement effective? *Public Finance Review*, *44*(4), 478–499. https://doi.org/10.1177/1091142115588977

Marron, D. B. (1997). Buying green: Government procurement as an instrument of environmental policy. *Public Finance Review*, *25*(3), 285–305. https://doi.org/10.1177/109114219702500302

Michelsen, O., & de Boer, L. (2009). Green procurement in Norway; a survey of practices at the municipal and county level. *Journal of Environmental Management*, *91*(1), 160–167. https://doi.org/10.1016/j.jenvman.2009.08.001

Montabon, F., Daugherty, P. J., & Chen, H. (2018). Setting standards for single respondent survey design. *Journal of Supply Chain Management*, *54*(1), 35–41. https://doi.org/10.1111/jscm.12158

Montalbán-Domingo, L., Pellicer, E., García-Segura, T., & Sanz-Benlloch, A. (2021). An integrated method for the assessment of social sustainability in public-works procurement. *Environmental Impact Assessment Review*, *89*, 106581. https://doi.org/10.1016/j.eiar.2021.106581

Mwesiumo, D., Similä, J. O., & Langseth, M. (Forthcoming). Conceptualization and empirical exploration of performance orientation in public procurement *Journal of Public Procurement*.

Nason, R. S., McKelvie, A., & Lumpkin, G. T. (2015). The role of organizational size in the heterogeneous nature of corporate entrepreneurship. *Small Business Economics*, *45*(2), 279–304. https://doi.org/10.1007/s11187-015-9632-6

Patrucco, A. S., Moretto, A., Ronchi, S., & Luzzini, D. (2019). Organisational choices in public procurement: what can public management learn from the private sector? *Local Government Studies*, *45*(6), 977–1000. https://doi.org/10.1080/03003930.2019.1608827

Penrose, E. (1995). *The theory of the growth of the firm* (3rd ed. with a new foreword by the author. ed.). Oxford University Press.

Preuss, L. (2009). Addressing sustainable development through public procurement: the case of local government. *Supply Chain Management: An International Journal*, *14*(3), 213–223.

Preuss, L., & Walker, H. (2011). Psychological barriers in the road to sustainable development: Evidence from public sector procurement. *Public Administration*, *89*(2), 493–521. https://doi.org/10.1111/j.1467-9299.2010.01893.x

Rainville, A. (2017). Standards in green public procurement – A framework to enhance innovation. *Journal of Cleaner Production*, *167*, 1029–1037. https://doi.org/10.1016/j.jclepro.2016.10.088

Rosell, J. (2021). Getting the green light on green public procurement: Macro and meso determinants. *Journal of Cleaner Production*, *279*, 123710. https://doi.org/10.1016/j.jclepro.2020.123710

Similä, J. O., & Mwesiumo, D. (2024). Implementing public procurement of green innovations: Does structural alignment matter? *Journal of Cleaner Production*, *461*, 142562. https://doi.org/10.1016/j.jclepro.2024.142562

Sirmon, D. G., Hitt, M. A., Ireland, R. D., & Gilbert, B. A. (2011). Resource orchestration to create competitive advantage:Breadth, depth, and life cycle effects. *Journal of management*, *37*(5), 1390–1412. https://doi.org/10.1177/0149206310385695

Sönnichsen, S. D., & Clement, J. (2020). Review of green and sustainable public procurement: Towards circular public procurement. *Journal of Cleaner Production*, *245*, 118901. https://doi.org/10.1016/j.jclepro.2019.118901

Testa, F., Annunziata, E., Iraldo, F., & Frey, M. (2016). Drawbacks and opportunities of green public procurement: an effective tool for sustainable production. *Journal of Cleaner Production*, *112*, 1893–1900. https://doi.org/10.1016/j.jclepro.2014.09.092

Testa, F., Grappio, P., Gusmerotti, N. M., Iraldo, F., & Frey, M. (2016). Examining green public procurement using content analysis: existing difficulties for procurers and useful

recommendations. *Environment, Development and Sustainability*, *18*(1), 197–219. https://doi.org/10.1007/s10668-015-9634-1

Testa, F., Iraldo, F., Frey, M., & Daddi, T. (2012). What factors influence the uptake of GPP (green public procurement) practices? New evidence from an Italian survey. *Ecological Economics*, *82*, 88–96. https://doi.org/10.1016/j.ecolecon.2012.07.011

Walker, R. M., & Andrews, R. (2013). Local government management and performance: A review of evidence. *Journal of Public Administration Research and Theory*, *25*(1), 101–133. https://doi.org/10.1093/jopart/mut038

Zhu, Q., Geng, Y., & Sarkis, J. (2013). Motivating green public procurement in China: An individual level perspective. *Journal of Environmental Management*, *126*, 85–95. https://doi.org/10.1016/j.jenvman.2013.04.009

KAPITTEL 3

Markedseffekt av miljøkrav i offentlige anskaffelser

Malin Arve[1] og Mads Greaker[2]
[1]NHH Norges Handelshøyskole, Norge [2]Handelshøyskolen ved OsloMet – Storbyuniversitetet

Sammendrag: Dette kapittelet presenterer en samfunnsøkonomisk analyse av grønne offentlige anskaffelser. Begrensede ressurser er utgangspunktet for analysen og dette fører til det grunnleggende prinsippet om økonomisk effektivitet. Økonomisk effektivitet er allerede tydelig formulert som mål i lovgivningen om offentlige anskaffelser. Vi undersøker hvilken effekt grønne offentlige anskaffelser kan ha på økonomisk effektivitet. Vi påpeker også at grønne krav skiller seg fra mange andre krav, som pris og kvalitet, ettersom miljøhensyn ikke bare kommer den offentlige virksomheten som kjøper varen eller tjenesten til gode.

Vi forklarer hvordan grønne krav i offentlige anskaffelsesprosesser kan føre til redusert konkurransepress og dermed høyere priser og lavere effektivitet. Vi konkluderer med at denne risikoen er særlig høy i markeder hvor det offentlige er en liten kjøper sett opp mot totalstørrelsen på markedet. Når det offentlige er en viktig kjøper på et marked, kan grønne krav i offentlige anskaffelser gi bedrifter insentiver til å tilpasse seg og gjennomføre det grønne skiftet. Vi foreslår også at grønne kriterier kan bidra til å dempe det opplevde prisfokuset og dermed gjøre offentlige anskaffelser mer attraktive for nye virksomheter.

I mange markeder finnes det ennå ikke grønne løsninger, eller de er for øyeblikket svært kostbare. Det er behov for innovasjon, og på enkelte områder kan offentlige anskaffelser bidra til å utvikle slike nye løsninger eller gjennom læring bidra til å redusere kostnadene ved å tilby grønne alternativer. Offentlige anskaffelser er imidlertid kun et tillegg til eksisterende, mer generelle og direkte miljøpolitiske virkemidler.

Nøkkelord: Konkurranse, effekt, effektivitet, innovasjon, insentiver, tilpasningskostnader

Sitering: Arve, M. & Greaker, M. (2025). Markedseffekt av miljøkrav i offentlige anskaffelser. I Langseth, M., & Similä, J. O. (Eds.), *Public Procurement Pathways – Sustainability Edition* (pp. 73–97). Cappelen Damm Akademisk. https://doi.org/10.23865/cdf.264.ch3

Abstract: This chapter presents an economic analysis of green public procurement. At the core of the analysis is the constraint of limited resources which leads to the fundamental principle of economic efficiency. Economic efficiency is already clearly stated as the aim of the laws on public procurement. We explore the effect that green public procurement may have on economic efficiency. We also note that green requirements differ from many other requirements such as price and quality as the greenness does not only benefit the public agency buying the particular good or service.

We explain how green requirements in public procurement processes may lead to reduced competitive pressure and thereby increased prices and reduced efficiency. We conclude that this risk is particularly high in markets where the public sector is a small buyer. When the public sector is an important buyer, green requirements in public procurement may give the firms incentives to pay the adaptation costs and make the green transition. We also suggest that green criteria could even take away some of the perceived price focus and thereby make public procurement more attractive to new firms.

In many markets, the green solutions do not yet exist, or are currently very expensive. Innovation is needed and, in some areas, public procurement could help develop such new solutions or contribute through learning by doing to the reduction of the cost of providing green alternatives. However, public procurement is only an addition to existing, more general and direct environmental policies.

Keyword: competition, effect, efficiency, innovation, incentives, adaptation costs

Innledning

Samfunnsøkonomisk analyse tar ofte utgangspunkt i ressursknapphet. For offentlige anskaffelser betyr det at offentlige budsjetter og pengebruk ikke er uten begrensninger. En viktig implikasjon av dette er at alle beslutninger og innkjøp har en alternativkostnad: Dersom for eksempel noe ikke kjøpes inn, kan ressursene som skulle ha blitt brukt til dette omdisponeres og brukes på noe annet som det offentlige ellers ikke hadde hatt ressurser til rådighet for. Fra et økonomisk perspektiv forklarer dette hvorfor formålet med anskaffelsesloven (2016, § 1) er å fremme effektiv bruk av samfunnets ressurser og konkurranseutsetting via anbudskonkurranser eller innhenting av flere tilbud sikrer at i teorien effektiv bruk av samfunnets ressurser.[1]

1 Se for eksempel Bjorvatn (2021) eller Riis og Moen (2011) for en innføring i samfunnsøkonomisk analyse, alternativkostnad og effektivitet.

I senere tid har det blitt vanligere å bruke offentlige anskaffelser også til å fremme andre mål. Grønne offentlige anskaffelser er et eksempel på praksis som har blitt utbredt på verdensbasis (Testa et al., 2012). EU og dets medlemsland har vist en sterk forpliktelse til å bruke offentlige anskaffelser som et virkemiddel til grønn omstilling (Tukker et al., 2008), men også andre land, som USA (Fischer, 2010) og Kina (Qiao & Wang, 2011; Wang et al., 2020), har lignende ambisjoner.

Mange utfordringer rundt samfunnshensyn skyldes markedssvikt. Konklusjonen at samfunnsøkonomisk effektivitet kan oppnås gjennom konkurranse hviler på at det enkelte individet og den enkelte organisasjonen bærer kostnadene og gevinstene ved sine valg. Hvis valg eller beslutninger som treffes har direkte konsekvenser for andre enn beslutningstageren, det vil si at de har *eksterne virkninger* eller *eksternaliteter*, reiser det seg nye spørsmål og utfordringer.[2] Standardeksempelet i samfunnsøkonomisk analyse på (negative) eksterne virkninger er forurensning som får (negative) konsekvenser for samfunn og individ langt ut over den organisasjonen som forurenser. Gitt sine begrensede ressurser, har en organisasjon ikke nødvendigvis sterke nok incentiver til å redusere sine utslipp da det har en kostnad for organisasjonen, men hoveddelen av gevinsten fra en slik beslutning oppnås av samfunnet som helhet, ikke organisasjonen. Klima- og miljøutfordringer generelt har som oftest slike eksterne virkninger som gjør det relevant å vurdere regulering av disse gjennom i lover og regler slik at det blir bedre samsvar mellom individet og organisasjonens incentiver og samfunnets ønsker.

Innovasjon er et eksempel som kan ha positive eksterne virkninger. En innovasjon gir nytte og merverdi for mer enn bare organisasjonen som innoverer. Organisasjonen har i seg selv ikke sterke nok incentiver til å investere i innovasjon sett fra samfunnets perspektiv. Det er derfor det finnes immaterielle rettigheter (som patenter) og andre offentlige støtteordninger for innovasjon slik at det igjen blir et bedre samsvar mellom individet og organisasjonens incentiver og samfunnets ønsker.

I dette kapittelet presenterer vi en analyse av effekten av miljøkrav og -kriterier i offentlige anskaffelser som tar utgangspunkt i samfunnsøkonomisk teori og effektivitet. Vi utfyller analysen med eksempler for å illustrere resultatene fra den teoretiske analysen. Vi presenterer original innsikt i hvordan miljøkrav og -kriterier påvirker offentlige anskaffelser. Analysen bygger på markedsanalyser i Lundberg og Marklund (2015) og utvider disse til å omfatte evalueringskriterier (i motsetning til absolutte krav som i den

2 Se for eksempel Bjorvatn (2021) eller Riis og Moen (2011) for en innføring om eksterne virkninger.

opprinnelige analysen), markedsutvidelse og innovasjon. I tillegg introduserer vi konkrete eksempler for å underbygge analysen.

Før vi begynner analysen redegjør vi kort for noen elementer fra samfunnsøkonomi og offentlige anskaffelser som er relevante for analysen.

Som nevnt innledningsvis tar analysen utgangspunkt i ressursknapphet og begrensede offentlige ressurser. For å få mest mulig ut av de begrensede ressursene må derfor ressurser brukes effektivt. Dette har konsekvenser i alle ledd av anskaffelsesprosessen.

Kort oppsummert kan anskaffelsesprosessen deler inn i tre hovedfaser: forberedelsesfasen, gjennomføringsfasen og realiseringsfasen (Lundberg et al., 2022). Fokuset i analysen i dette kapittelet er på gjennomføringsfasen og hvordan miljøkrav og -kriterier påvirker markedet, kostnader og priser, men effektivitetshensyn oppstår også i de andre fasene, både direkte og indirekte.

I forberedelsesfasen må det vurderes hva som skal kjøpes inn, hva som ikke skal kjøpes inn og hva som skal produseres internt. Disse vurderingene krever at for en mulig anskaffelse må det gjøres en vurdering av kostnadsbildet for selve anskaffelsen slik at avveininger mot alternativ bruk av ressurser for å dekke behovet (eller andre behov) muliggjøres. Det betyr at indirekte hensyntas effekter fra gjennomføringsfasen, men her må også alternativkostnaden vurderes, slik at budsjett allokeres til de innkjøpene som det er størst behov for innenfor den gitte budsjettrammen.

I realiseringsfasen må kontrakt og avtaleoppfølging sikre at utfallet av anbudskonkurransen opprettholdes og iverksettes på en effektiv og god måte. Konkurransen i gjennomføringsfasen presser frem gode tilbud som sikrer effektiv bruk av samfunnets ressurser, mens god oppfølging i realiseringsfasen sikrer at anskaffelsen gjennomføres som planlagt og i tråd med innholdet i det vinnende tilbudet. Dette vil blant annet si at unødvendige endringer som øker prisen på leveransen på uforholdsmessig måte, begrenses.

Resten av kapittelet er bygget opp som følger. Innledningsvis gir vi litt mer utdypende informasjon om miljøkrav (delkapittel 2). I delkapittel 3 (Konkurranseeffekter) presenterer vi det analytiske rammeverket for analysen. Dette brukes i delkapittel 4 (Markedsmakt) for å vise hvorfor og når miljøkrav og -kriterier i offentlige anskaffelser kan bidra til grønn omstilling. Hovedfokuset i delkapittel 3 (Konkurranseeffekter) og 4 (Markedsmakt) er det offentlige markedet, mens delkapittel 5 (Markedseffekt) utvider analysen til et bredere marked som også inkluderer private kjøp. Innovasjon og læringsprosess for ny teknologi er tema i delkapittel 6. Innsikten fra disse delkapitlene underbygger konklusjonen i delkapittel 7: Hvordan stille gode krav til grønne anskaffelser.

Mer om miljøkrav

Miljøkrav i offentlige anskaffelser kan utformes på mange måter. For det første står samfunnet overfor ulike typer av miljøutfordringer. Det mest omfattende problemet er global oppvarming som skyldes utslipp av drivhusgasser, hvor CO_2 er den viktigste gassen. Norge står for 0,1 prosent av de globale utslippene, så selv om Norge kuttet alle sine utslipp, ville oppvarmingen knapt påvirkes i det hele tatt. De fleste land i verden står overfor et lignende dilemma: Kutt i landets egne utslipp har liten betydning for det globale klima. Derfor har landene bestemt seg for å samarbeide om kutt i utslippene, og det er det som er førende for Norge. Nærmere bestemt har Norge en avtale med EU om å kutte drivhusgassutslippene med 55 prosent sammenlignet med 1990-nivå innen 2030.

Et annet presserende miljøproblem er tap av biologisk mangfold. Som følge av at arealer med uberørt natur stadig blir mindre og mer fragmenterte, utryddes arter i et økende tempo. Botemiddelet her er ikke å redusere forurensede utslipp, men å frede arealer mot alle former for inngrep. Mindre inngripende tiltak kan også ha betydning. Et eksempel er overgang fra flatehogst til plukkhogst i skogbruket som så vidt vi kan forstå vil øke det biologiske mangfoldet.[3] Uansett vil offentlige innkjøp spille en mindre rolle for bevaring av biologisk mangfold. Kommunenes egne arealplaner, som er hjemlet i plan- og bygningsloven, er et opplagt virkemiddel når det gjelder bevaring av biologisk mangfold. I den grad kommunen driver skogbruk, kan de også selv bestemme seg for å gå over til plukkhogst.

Økende mengder avfall og økt ressursuttak blir også sett på som et miljøproblem. EU fremmer derfor sirkulær økonomi. Det betyr at kasserte produkter ikke skal kastes og deponeres (eller brennes), men bearbeides slik at råstoffene i produktene kan brukes om igjen. Offentlig innkjøp kan opplagt spille en rolle her ved at man kjøper produkter fremstilt av resirkulerte råvarer istedenfor produkter basert på uttak av jomfruelige råvarer.

I tillegg til dette finnes det en rekke andre miljøproblemer som i mer eller mindre grad fortsatt er uløste; utslipp av plastrester i vannveier og havet, utslipp av næringssalter i fjorder (jf. Oslofjorden, som er tilnærmet tom for fisk) og lokal luftforurensning som blant annet gir til dels alvorlige luftveisplager for deler av befolkningen.

3 På engelsk *clearcut forestry* versus *continuous cover forestry,* se for eksempel Forestry Commission (2023).

Det er urealistisk at offentlige innkjøp skal kunne løse alle disse miljøproblemene. Myndighetene har dessuten til sin disposisjon bredere og dermed mer effektive virkemidler som ikke bare retter seg mot det offentlige forbruket, men også mot det private forbruket. I den forstand er offentlige anskaffelser et indirekte virkemiddel da det ikke direkte påvirker hele markedet. Skatter og generelle lover og regler er direkte virkemidler som påvirker alle aktører. Halvparten av klimagassutslippene i EØS (EU pluss Norge og Island) er for eksempel omfattet av det europeiske kvotehandelssystemet, heretter omtalt som EU ETS. EU ETS setter et tak på samlede utslipp fra alle aktører som er med i systemet, og krever at alle disse må ha kvoter tilsvarende sine utslipp. Videre blir utslippstaket senket år for år, og målsettingen er at alle utslipp skal være fjernet senest innen 2050. Spørsmålet er om det offentlige skal ta hensyn til utslipp som allerede er omfattet av en fungerende miljøregulering i sine innkjøp, eller om det bare blir en form for dobbeltregulering som ikke gir noen ekstra gevinst.

Et lignende system med omsettbare utslippskvoter kunne vært innført for avfall. Myndighetene kunne satt en øvre grense for hvor mye avfall av ulike kategorier som kunne deponeres eller brennes per år. Videre måtte aktøren som deponerte eller brant avfall inneha en kvote tilsvarende avfallsmengden som ble deponert (for denne kategorien). Kvotene kunne videre vært omsatt mellom aktører. I et slikt system ville bare det avfallet som det var mest kostnadskrevende eller minst verdifullt å resirkulere bli deponert. Når nå blant annet EU likevel ønsker å bruke offentlige innkjøp for å fremme en sirkulær økonomi, må det skyldes en form for svikt i politikkutformingen. Vi vil ikke gå nærmere inn på hva svikten kan være i denne artikkelen, men heller slå fast at offentlig innkjøp først og fremst kan spille en rolle på områder hvor den øvrige miljøpolitikken er utilstrekkelig.

Et slikt eksempel fra Norge er klimamålene for 2030. For den delen av utslippene som ikke er omfattet av EU ETS, blir det eksplisitt fremhevet i regjeringens miljørapportering, *Grønn bok* (Klima- og miljødepartementet, 2023), at offentlige innkjøp skal bidra til å nå klimamålet. Det dreier seg da særlig om utslipp fra anleggsvirksomhet og innenlands sjø- og veitransport. Mens elektrifiseringen av personbiler går etter planen, henger de andre veitransportsegmentene etter (se for eksempel Greaker et al., 2025; Miljødirektoratet, 2024). Fortsatt er et overveiende antall nye varebiler og lastebiler fossildrevne, og fortsatt drives de fleste anleggsmaskiner av diesel. Det betyr at klimamålene for utslippene som ikke er omfattet av EU ETS høyst sannsynlig ikke vil nås, og at offentlige innkjøp kan bringe oss nærmere målene.

Skal offentlige innkjøp bringe oss nærmere klimamålene, må klima på en eller annen måte inn i de offentlige anbudsdokumentene. Dette kan enten gjøres ved absolutte krav, for eksempel «anleggsplassen skal drives 100 prosent elektrisk». Eller det kan gjøres med et mer fleksibelt krav, for eksempel «klimagassutslipp fra anleggsplassen vil bli vektlagt ved valg av leverandør, og leverandører som kan tilby nullutslipp vil foretrekkes dersom ekstrakostnadene ikke overstiger 2000 kroner per tonn sparte CO_2-ekvivalenter». Hvordan kravet stilles vil opplagt ha effekt på konkurransen, noe vi går nærmere inn på i neste avsnitt.

Det kan tenkes at ulike miljømål kommer i konflikt. I et tenkt eksempel kunne en leverandør tilby bygninger basert på gjenbruksmaterialer, men ikke utslippsfri anleggsplass, mens den andre leverandøren tilbyr utslippsfri anleggsplass, dog med vanlige byggematerialer. Hvis det er spesifisert i anbudsdokumentene at utslipp fra byggeplassen prioriteres, blir valget enkelt. Hvis det derimot bare står generelt at miljø vil vektlegges, blir valget langt på vei opp til innkjøpers skjønn. Etter vår mening bør innkjøper på forhånd ta stilling til hvilken type miljøproblem det er mest hensiktsmessig at denne anskaffelsen skal bidra til å løse, og så spesifisere dette i anbudsdokumentene.

Konkurranseeffekter

Offentlige kontrakter blir i tråd med regelverket for offentlige anskaffelser tildelt på konkurransemessige vilkår og som oftest gjennom anbudskonkurranser.[4] I økonomisk teori modelleres derfor anbudskonkurransen som en (omvendt) auksjon (Klemperer, 2004). I tråd med denne teorien er det to hovedelement som påvirker prisen i offentlige anskaffelser:

1. Kostnadsnivået på varen eller tjenesten som skal anskaffelses
2. Konkurransen om den offentlige kontrakten, dvs. antall potensielle leverandører

I utgangspunktet kan en se for seg at en miljøvennlig versjon av en vare eller tjeneste koster mer enn et tilsvarende standard produkt som ikke er like miljøvennlig. Dette er for eksempel tilfelle for utslippsfrie byggeplasser.

4 I Europa opereres det med terskelverdier. Anskaffelser over slike terskelverdier må følge formelle prosedyrer som skal sikre konkurranse og effektiv bruk av samfunnets ressurser.

Siden prisen på en vare eller tjeneste reflekter kostnaden ved å levere den, så vil høyere kostnader generelt gi høyere priser. Dette omtales ofte som en direkte effekt av høyere kostnader på priser.

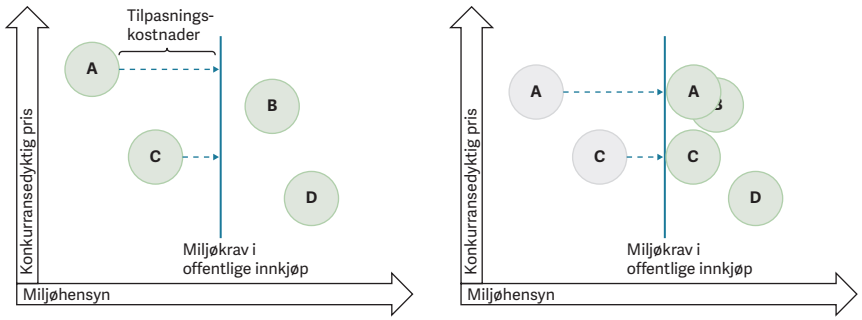
I tillegg vil antall potensielle leverandører påvirke prisen gjennom profittmarginen som leverandørene kan tillate seg når de leverer inn pristilbud til det offentlige. Dersom det er stor konkurranse og mange mulige leverandører, kan ikke den enkelte leverandører tillate seg en høy profittmargin da dette minsker leverandørens mulighet til å vinne anbudskonkurransen. Derfor vil høyere konkurranse og mange mulige leverandører gi lav profittmargin, mens lavere konkurranse og få mulige leverandører, vil gi en høyere profittmargin. Dersom en offentlig institusjon stiller absolutte miljøkrav i en anbudskonkurranse som alle leverandørene i utgangspunktet ikke oppfyller, kan det lede til redusert konkurranse da færre leverandører er kvalifiserte til å delta i anbudskonkurransen. Dette vil gi høyere profittmarginer og dermed høyere priser til det offentlige. Dette omtales ofte som en indirekte effekt da prispåvirkningen går via et annet ledd (her antall mulige leverandører og deres valg av profittmargin).

Argumentene i forrige avsnitt avhenger av at leverandørene ikke endrer seg, men poenget med å stille miljøkrav er også at markedet tar innover seg de eksterne virkningene, omstiller sin virksomhet og blir mer miljøvennlige. Dette er illustrert i figur 1, hvor det antas at det aktuelle markedet består av fire potensielle leverandører som varierer med tanke på miljøhensyn og hvor konkurransedyktig pris de har. Dersom det i en offentlig anskaffelse stilles miljøkrav som illustrert i figuren, vil i utgangspunktet ikke leverandør A og C være kvalifiserte, da deres produksjon ikke tilfredsstiller miljøkravet som stilles i anbudskonkurranse. Ved å tilpasse sin produksjon til de nye miljøhensynene vil derimot leverandørene kunne tilpasse seg de nye miljøkravene i anbudskonkurransen. I økonomisk teori omtales investeringene som skal til for å tilfredsstille de nye kravene som *tilpasningskostnader* (Lundberg & Marklund, 2015; Nordhaus, 2004). Disse kan variere fra leverandør til leverandør, men kan også være like for alle.

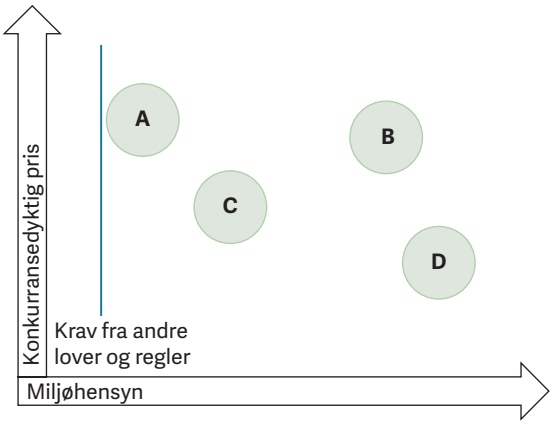
Dersom leverandørene A og C i figur 1 velger å betale tilpasningskostnaden kan de fortsatt delta i anbudskonkurransen, og konkurransen på det offentlige markedet opprettholdes. Det betyr at det offentlige ikke får økte priser som følge av lavere konkurranse.

I forbindelse med analysen i figur 1 er det viktig å merke seg to ting. For det første forutsetter analysen at det i anbudskonkurransen stilles miljøkrav ut over krav som allerede følger av andre lover, regler og standarder.

Dersom miljøkravene i anbudskonkurransen ikke gjør det og kun reflekterer gjeldende krav på markedet, vil automatisk alle leverandørene leve opp til kravene og, som illustrert i figur 2, påvirkes selvfølgelig ikke konkurransen. Det betyr at det offentlige ikke får økte priser som følge av lavere konkurranse, men samtidig kan det stilles spørsmål ved om dette faktisk bør omtales som miljøkrav eller om det egentlig bare er en form for grønnvasking.



Figur 1. Ønsket effekt av miljøkrav i offentlige anskaffelser

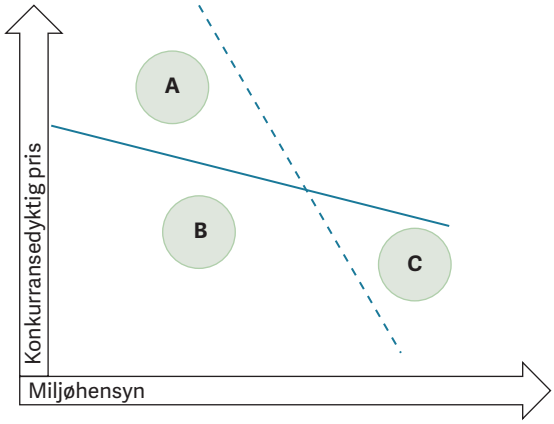


Figur 2. Miljøkrav som er like krav fra andre lover og regler

Analysen i figur 1 illustrerer hvordan markedet påvirkes av absolutte krav til miljø. I offentlige anskaffelser kan det også stilles, som beskrevet over, fleksible miljøkrav og -kriterier. I slike situasjoner brukes miljø som et av flere evalueringskriterier. Det betyr at miljøkriteriet må ses i relasjon til andre kriterier som for eksempel pris og kvalitet. Analysen i figur 1 kan utvides til å også dekke miljøkriterier i evalueringsfasen, men disse må da illustreres

med en nedadgående linje, i motsetning til en vertikal linje for absolutte krav. Dette er illustrert i figur 3. Jo høyere vekt miljøkriteriet har i tilbudsevalueringen, desto brattere linje. I figuren har leverandør A en relativt lav miljøskår, men høy prisskår, mens leverandør C skårer høyt på miljøhensyn, men lavt på pris. Fra figuren kan vi se at dersom miljøkriteriet har høy vekt (den heltrukne, blå linjen) så vinner C, mens leverandør A vinner dersom miljøkriteriet har en lavere vekt (den stiplete, blå linjen). Leverandør B har hverken høy miljøskår eller prisskår, og når derfor ikke opp uansett.

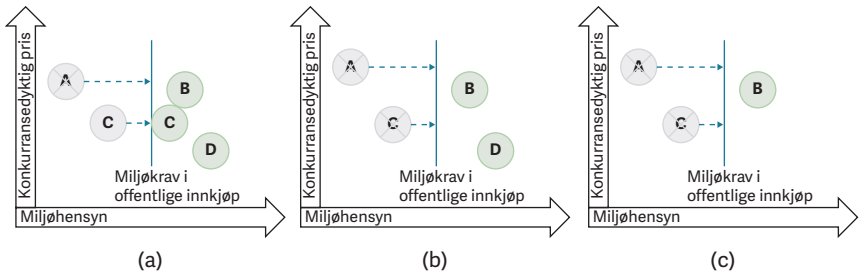
Miljøkrav i form av evalueringskriterier åpner også opp for flere strategiske hensyn som ikke er diskutert her. For eksempel hvordan man skal tilpasse seg? Er det bedre å styrke seg med hensyn til miljøkriteriet, eller er det mer hensiktsmessig og kostnadseffektivt å forbli relativt svak med hensyn til miljø og heller tilpasse seg ved å tilby lavere priser eller høyere kvalitet i en annen dimensjon?



Figur 3. Miljøkrav versus miljøkriterier

Fleksible miljøkrav kan gjøre det vanskeligere å hente ut monopolprofitt for en produsent som er alene om å tilby et renere produkt. Anta for eksempel at kun én produsent tilbyr utslippsfrie byggeplasser i et fylke. Dersom fylkesadministrasjonen setter utslippsfrie byggeplasser som et krav, vil den ene produsentene kunne hente ut monopolprofitt av det relevante offentlige markeder for byggeprosjekter. Resultatet vil kunne være høye priser og at færre byggeprosjekter blir gjennomført i fylket enn ønskelig. Et fleksibelt miljøkrav utformet som en makspris på miljøgevinsten fra bruk av denne leverandøren innebærer en skranke på hvor høyt leverandøren kan prise sitt produkt.

For enkelthets skyld vil resten av analysen i dette kapittelet sette søkelys på miljøkrav, men effektene vil også være til stede for miljøkriterier. Selv om målet med miljøkrav i offentlige anskaffelser er å kjøpe inn miljøvennlige varer og tjenester til en best mulig pris, er det ikke sikkert at markedet reagerer slik som det offentlige ønsker og som er oppsummert i figur 1. Figur 4 illustrer tre andre mulige utfall av miljøkrav i offentlige anskaffelser.



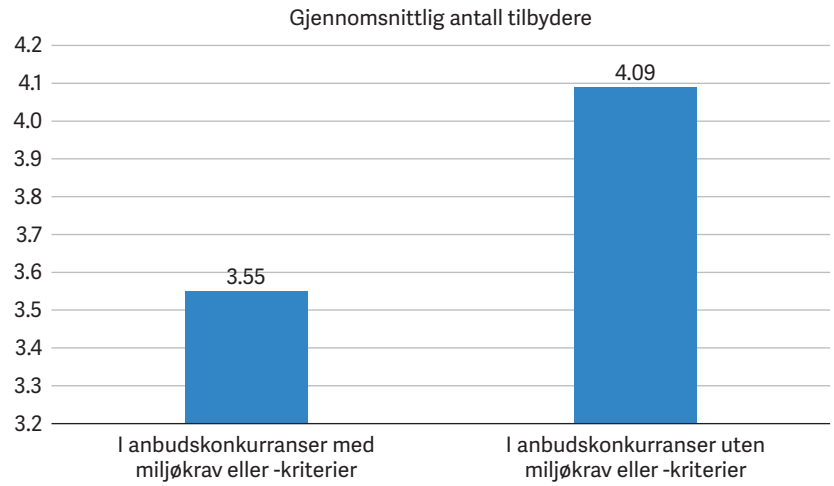
Figur 4. (med panel a, b og c): Alternative markedseffekter av miljøkrav i offentlige anskaffelser

Panel a i figur 4 illustrerer tilfellet hvor leverandør A vurderer at tilpasningskostnadene er for høye sammenlignet med forventet avkastning på deltagelse i anbudskonkurransen. Leverandør A velger derfor å ikke tilpasse seg miljøkravene og deltar dermed ikke i anbudskonkurransen. Leverandør C gjør derimot vurderingen at dennes tilpasningskostnader er lave nok til at anbudskonkurransen er verdt investeringen. Effekten av miljøkrav vil i dette tilfellet bli noe redusert konkurranse og høyere profittmarginer (som igjen gir høyere priser til det offentlige).

Det er også interessant å observere at det ikke er de leverandørene som leverer dårlig i miljødimensjonen som omstiller seg, men heller de leverandørene som allerede leverer relativt godt i miljødimensjonen som tilpasser seg. Spørsmålet er da om de mindre miljøvennlige leverandørene legges ned eller fortsetter å levere ikke-miljøvennlige varer og tjenester på det private markeder (eller til andre offentlige institusjoner som har valgt å ikke stille samme miljøkrav).

Panel b i figur 4 viser en situasjon hvor ingen av de potensielle leverandørene som per i dag ikke oppfyller det oppstilte miljøkravet velger å omstille seg. Det gir enda lavere konkurranse og indirekte høyere priser til det offentlige. En undersøkelse fra 2013 viste at det vanligste var mellom tre

og fire tilbud per offentlige anskaffelse i Norge (PricewaterhouseCoopers, 2013). I en slik situasjon vil det å miste to potensielle leverandører ha en signifikant effekt på konkurransen og dermed også prisene i offentlige anskaffelser. I en rapport peker funnene fra en spørreundersøkelse blant offentlige innkjøpere på at anbudskonkurranser der det tas klima- og miljøhensyn i gjennomsnitt får noe færre tilbud enn anbudskonkurranser der det ikke tas slike hensyn (Oslo Economics, 2018). Noe som tilsier at virkeligheten ligger nærmere panel a eller b i figur 4 enn figur 1. Dette styrkes ytterligere av resultater på franske data fra offentlige innkjøp som viser at for innkjøp over terskelverdi er det betydelige færre tilbud i konkurranser hvor det stilles miljøkrav eller -kriterier sammenlignet med konkurranser uten slike krav eller kriterier.[5] Figur 5 viser at i franske anbudsdata i perioden 2017–2019 var gjennomsnittstallet på antallet innkomne tilbud i anbudskonkurranser med miljøkrav eller -kriterier 4,08 sammenlignet med 3,55 i anbudskonkurranser uten slike krav eller kriterier. Det vil si at i gjennomsnitt er det i annenhver anbudskonkurranse med miljøkrav eller -kriterier én mindre tilbyder. Det er ganske mye når konkurransen (antall tilbydere) allerede er relativt lav.



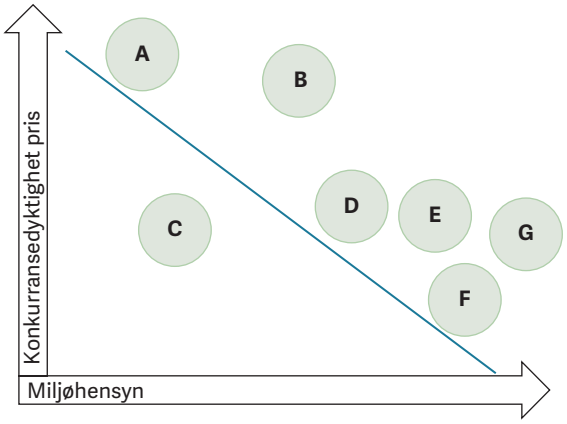
Figur 5. Antall innkomne tilbud i franske anbudskonkurranser, 2017–2019 (basert på data fra Arve og Desrieux (2024)

Et enda verre scenario er panel c i figur 4 hvor miljøkravene er slik at kun én potensiell leverandør oppfyller dem, og ingen andre potensielle

5 Tilsvarende data for Norge er ikke tilgjengelige da miljøkrav på nåværende tidspunkt ikke er lett identifiserbare i norske databaser.

leverandører velger å tilpasse seg miljøkravene i anbudskonkurransen. Med absolutte krav kan det føre til høye monopolpriser.

Miljøkrav eller -kriterier i offentlige anskaffelser kan også åpne dørene for økt konkurranse da det kan gå bort fra et smalt prisfokus som kan gjøre offentlige anskaffelser uattraktivt for små nisjeleverandører. Dette illustreres i figur 6, som er en utvidet versjon av figur 1 hvor en del av markedet som tidligere ikke var interessert i å levere tilbud i den offentlige anbudskonkurransen nå er inkludert. Disse er leverandørene E, F og G, som leverer godt på miljø, men ikke er like konkurransedyktige på pris som de leverandørene som tidligere har vært aktive i offentlige anbudskonkurranser. Gjennom å legge mer vekt på miljø gjennom konkrete og ambisiøse miljøkrav- og kriterier i anbudskonkurranser kan dette bli et interessant marked for disse nye leverandørene.



Figur 6. Økt deltagelse i offentlige anskaffelser

Markedsmakt

I Norge kjøper det offentlige inn varer og tjenester for mange hundre milliarder årlig. Tabell 1 viser at i 2023 brukte Norge totalt 780 milliarder kroner på offentlige innkjøp. Ofte brukes denne statistikken for å argumentere for at Norge må bruke sin innkjøpsmakt i den grønne omstillingen. Logikken bak dette argumentet er at 780 milliarder gjør at det offentlige er en innkjøper med stor makt, og at denne makten kan brukes til å påvirke leverandørene. Pisken bak speilet i denne logikken er at leverandører som velger å ikke tilpasse seg det offentliges krav mister mulighet til å tjene penger og

dermed har leverandørene insentiver til å omstille seg. I litteraturen kalles dette ofte «supply side policy» (Edquist & Zabala-Iturriagagoitia, 2020) og det kan forklare hvorfor offentlige anskaffelser har blitt et populært policy-instrument, både i Europa og resten av verden.

Tabell 1. Offentlige innkjøp (i millioner kroner), totalt og per sektor i perioden 2013–2023. Kilde: Statistisk sentralbyrå (2024)

	Offentlige innkjøp									
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Offentlige innkjøp i alt (A + B)	472 928	486 978	508 866	526 396	557 972	595 192	611 034	650 095	742 294	779 844
A1. Statsforvaltningen	209 061	220 168	232 379	246 628	262 386	280 239	294 067	308 420	338 841	374 069
A1.1. Statsforvaltningen ekskl. forsvaret	18 6476	195 623	206 066	214 431	226 025	238 027	250 037	262 088	289 925	317 513
A1.2. Forsvaret	22 585	24 545	26 313	32 197	36 361	42 212	44 030	46 332	48 916	56 556
A2. Kommuneforvaltningen	183 139	193 990	205 263	213 316	228 446	245 906	248 947	265 598	287 724	306 853
B1.1. Statlig forretningsdrift ekskl. oljesektoren	4 873	5 281	5 427	5 595	5 889	5 948	5 964	6 381	6 900	7 356
B1.2. Oljesektoren	70468	63 048	59 723	55 317	55 379	56 879	55 628	62 844	101 317	83 411
B2. Kommunal og fylkeskommunal forretningsdrift	5 387	4 491	6 074	5 540	5 872	6 220	6 428	6 852	7 512	8 155

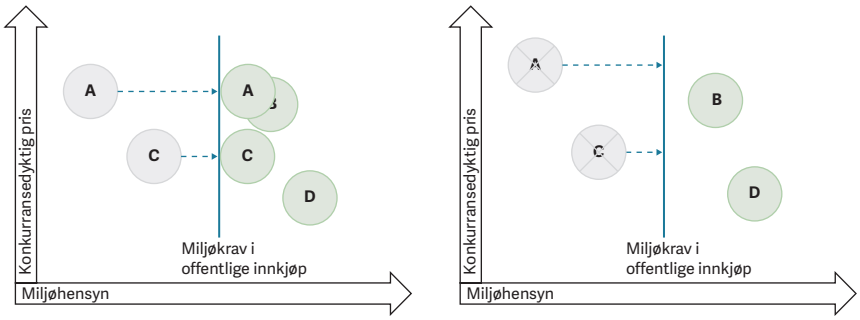
Selv om 780 milliarder kroner er en stor sum, argumenterer vi for at dette blir for enkelt: 780 milliarder kroner i årlige innkjøp betyr ikke nødvendigvis det at det offentlige er en stor innkjøper som kan bruke sin markedsmakt til å omstille private leverandører. Vår analyse baseres på at det ikke er den totale summen av norske innkjøp som er relevant, men hvor stor innkjøper det offentlige er i *det relevante markedet*. Vi argumenterer derfor for at det offentlige kan påvirke den grønne omstillingen i markeder hvor det offentlige er en stor markedsaktør, men totalsummen på offentlige

anskaffelser på tvers av markeder er irrelevant. Kort oppsummert betyr det at det offentlige som har stor markedsmakt i markedet for kortdistansebilferger, ikke kan bruke denne markedsmakten til å omstille leverandører i markedet for meieriprodukter.

Basert på analysen fra forrige delkapittel kan vi nå presentere våre resultater. Dersom det offentlige er en liten markedsaktør i et marked vil ikke strenge miljøkrav eller -kriterier i offentlige anskaffelser føre til grønn omstilling og vil dessuten gi lavere effektivitet i offentlige anskaffelser. Dette følger av analysen i forrige delkapittel siden leverandører som ikke oppfyller de oppstilte miljøkravene, ikke har insentiver til å omstille seg (det vil si betale tilpasningskostnaden). Miljøkravene i offentlige anskaffelser kan likevel sies å ha måloppnåelse i snever forstand, gjennom at det offentlige kun kjøper inn varer og tjenester som oppfyller miljøkravene), men disse miljøkravene har ingen effekt på størsteparten av markedet (alt som ikke dekkes av offentlige innkjøp, inkluder innkjøp fra privatpersoner og privat næringsliv). Miljøeffekten blir derfor liten. Lavere konkurranse i offentlige anskaffelser gir dessuten lavere effektivitet gjennom høyere profittmarginer og høyere priser på denne delen av markedet.

Dersom det offentlige derimot er en stor markedsaktør i et marked kan strenge miljøkrav eller -kriterier gi leverandører insentiver til å tilpasse seg det offentliges krav og dermed gi insentiver til en grønn omstilling som ei heller går på bekostning av effektivitet i offentlige anskaffelser da konkurransen i offentlige anbudskonkurranser opprettholdes. Disse resultatene er oppsummert i figur 7. For å bruke sin markedsmakt effektivt er det markedsmakten i det relevante markedet som er avgjør, ikke hvor mye det offentlige bruker på tvers av markeder.

Et godt eksempel på et marked hvor det offentlige har markedsmakt er (kortdistanse) bilferger. Fire år etter at «Ampere», verdens første elektriske bilferge, krysset Sognefjorden for første gang i 2015, var 14 elektriske ferger i drift og over 50 i bestilling (Øystese, 2019). Det er relativt lett å forestille seg at det offentlige er en stor innkjøper av denne type produkt da veinettet i Norge er offentlig og svært få andre aktører har behov for denne type leveranse. For denne type produkt er det derfor attraktivt for potensielle leverandører å levere tilbud i offentlige anbudskonkurranser da det private markedet er lite. Dersom det offentlige stiller miljøkrav i slike konkurranser er det derfor sannsynlig at potensielle leverandører er villige til å betale tilpasningskostnaden og omstille sin produksjon, noe som ser ut til å være bekreftet i av omstillingen av norske bilferger.



(a) Det offentlige er en stor markedsaktør (b) Det offentlige er en liten markedsaktør

Figur 7. Grønn omstilling og størrelsen på det offentliges markedsmakt

Det kan derfor argumenteres for at miljøkrav i offentlige anskaffelser har hatt en effekt i dette markedet. Samtidig har det kostet. Da det offentlige i slike anskaffelser begynte å stille strengere miljøkrav, fikk de batteriferger, men disse kostet også mer enn tradisjonelle ferger. I dette eksempelet var det Stortinget og regjeringen som innførte påbud om klimatiltak og strengere miljøkrav, men fylkeskommunene er de som effektuerte oppdraget da de er ansvarlige for mange av bilfergene i Norge. De stilte miljøkrav til nye bilfergeanskaffelser og fikk elektriske ferger. Dette førte også til økte innkjøpspriser, noe som i media ble omtalt som *fergeopprøret* da økte miljøkrav (Aglen, 2019; Skårdalsmo, 2020), i hvert fall på kort sikt, førte til større press på de fylkeskommunale budsjettene. Det at det koster å stille miljøkrav er ikke i seg selv et argument mot å gjøre det. De økte kostnadene til elektriske bilferger motsvares av reduserte klimakostnader. Det amerikanske miljødirektoratet (EPA) estimerer disse kostnadene til å være over $100 per tonn CO_2. Videre har Norge, som beskrevet over, forpliktet seg til å kutte sine utslipp. For å nå disse målene må tiltak så dyre som 2000 kroner per tonn CO_2 realiseres (Miljødirektoratet, 2023). Så dersom elektrifisering av bilferger har en tiltakskostnad for fylkene på under 2000 kroner per tonn CO_2, vil investeringen for Norge som helhet være samfunnsøkonomisk lønnsom (i den forstand at klimamålene nås til lavest mulig kostnad).

Markedseffekt

Analysen i forrige delkapittel konkluderer og gir konkrete råd om hvilke markeder det offentlige bør konsentrere seg om dersom Norge ønsker å bruke offentlige anskaffelser til å bidra til grønn omstilling og for å nå

klimamålene. Men analysen i forrige delkapittel så kun på den statiske effekten på det offentlige markedet. I dette delkapittelet ser vi på bredere effekter og mer presist hvordan miljøkrav og -kriterier i offentlige anskaffelser som gir leverandører insentiver til grønn omstilling kan påvirke resten av markedet. Men først presenterer vi en kort diskusjon rundt kostnader.

I bilfergeeksempelet fra forrige delkapittel kan en se for seg at konkurransen på markedet forble relativt uendret slik at analysen fra delkapittelet om konkurranseeffekt førte til en omstilling som i figur 1. Samtidig økte produksjonskostnadene da denne type ferger krever en mer avansert teknologi og dermed koster mer. Det førte til økte priser. Her er det viktig å skille mellom teknologi som (alltid) er dyrere og ny teknologi som over tid blir standard og billigere å bruke. I det første tilfellet vil grønn omstillingen og økte miljøkrav føre til permanent økte priser da basiskostnaden er på et høyere nivå for den nye teknologien. Men mange teknologier har kun høyere kostnader i oppstartsfasen. Når markedet blir mer vant med teknologien og teknologien har hatt tid til å modnes, så minker kostnadene. Dette kalles ofte læringseffekter og gir dermed et lavere prisnivå på lengre sikt. I slike tilfeller vil produksjonskostnaden i tidlig fase være relativt høy og føre til økte priser, men over tid vil kostnaden ved å bruke den nye teknologien gå ned og prisene vil også minke over tid. I et slikt scenario må det offentlige tenke langsiktig for å vurdere om økte kostnader på et tidspunkt er en nødvendig investering i ny teknologi for å få til en omstilling og lavere kostnader på lengre sikt.

Avslutningsvis er det også viktig å se på effekten på hele markedet og stille spørsmål ved hvordan miljøkrav i offentlige anskaffelser påvirker resten av markedet. Dersom det offentlige stiller miljøkrav i sine innkjøp og leverandørmarkedet velger å tilpasse seg disse kravene, påvirker dette resten av markedet, det vil si privatpersoners og næringslivets innkjøp? I samfunnsøkonomi faller dette inn under begrepet eksterne virkninger eller eksternaliteter.

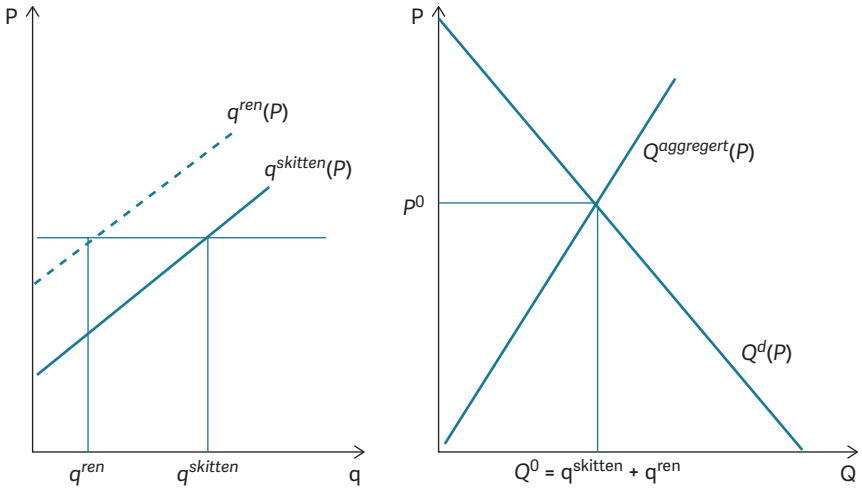
Miljøkrav i offentlige anskaffelser kan ha forskjellige typer eksterne virkninger. En viktig type eksterne virkninger er hvordan disse miljøkravene påvirker leverandørenes tilbud til privatpersoner og privat næringsliv. På den ene siden kan man tenke seg at siden leverandørene allerede har tilpasset seg miljøkrav i offentlige anskaffelser, så har dette en positiv ekstern virkning på resten av markedet da leverandørene nå også kan tilby mer miljøvennlige varer og tjenester til hele markedet eller andre nærliggende markeder. Et eksempel på det første kan tenkes å være Statens vegvesens

satsing på å redusere karbonavtrykket fra asfalt. Dette har ført til mer miljøvennlig asfalt og asfaltproduksjon, noe som har skapt interesse i flere land (Johnsen, 2022). I bilfergeeksempelet fra forrige delkapittel har omstillingen til elektriske bilferger hatt en positiv ekstern virkning på markedet for hurtigbåter og bulkskip (Øystese, 2021).

Men miljøkrav i offentlige anskaffelser kan også påvirke resten av markedet negativt slik at resten av markedet får et dårligere tilbud av miljøvennlige produkter. I mange tilfeller blir totaleffekten, det vil siden direkte effekten av miljøkrav i offentlige anskaffelser pluss den indirekte effekten på tilbudet av produkter til resten av markedet, mindre enn det økningen i offentlige innkjøp av miljøvennlige produkter skulle tilsi. Lundberg og Marklund (2013) viser i et svensk eksempel at effekten av miljøkrav reduseres dersom prisstigningen på økologisk mat som følger av anskaffelser fra én offentlig oppdragsgiver gjør at private kunder i mindre grad kjøper økologisk.

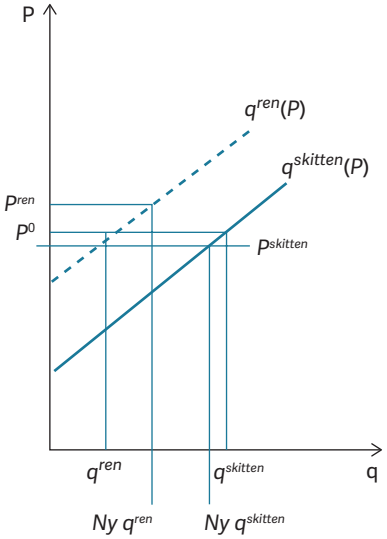
Nedenfor bruker vi tre diagram for å illustrere markedseffekter av grønne offentlige anskaffelser mer generelt. Istedenfor som over, hvor det er få leverandører av både skitne og rene varer, antar vi nå at det er mange produsenter, og at disse kan deles opp i dem som produserer med ren teknologi og dem som produserer med skitten teknologi. Det vil i et slikt tilfelle finnes en tilbudskurve for rene produkter og en tilbudskurve for skitne produkter som illustrert i figur 8 til venstre. Hvis produktene ellers er like, og markedet generelt ikke stiller miljøkrav, kan vi slå sammen de to tilbudskurvene til et aggregert tilbud og få frem markedsprisen der hvor etterspørselskurven krysser den aggregerte tilbudskurven (se høyre del av figur 8). Legg merke til at i likevekt vil det være en viss produksjon av rene produkter. Det kommer av at marginalkostnaden for skitne produkter også er stigende, slik at når produksjonen av skitne produkter er høy, blir det også lønnsomt med rene produkter. Et eksempel kan være kraft: På de gunstigste lokasjonene vil solkraft eller vindkraft være mer (bedriftsøkonomisk) lønnsomt enn kullkraft. I likevekt har vi altså q^{ren} produksjon av det rene produktet og $q^{skitten}$ produksjon av det skitne produktet. I likevekt vil det videre være både privat og offentlig konsum av det rene produktet innbakt i etterspørselskurven $Q^d(P)$.

Dersom det offentlige utgjør en liten del av markedet, er det tenkelig at «påtvunget» offentlig konsum av det rene produktet *kun* fortrenger privat konsum av det rene produktet. Likevekten er altså akkurat den samme som før, men det offentlige konsumerer mer rent produkt, mens det private konsumerer mer skittent produkt. I et slikt tilfelle oppnår det offentlige ingenting



Figur 8. Markedseffekter av grønne offentlige innkjøp

med å pålegge kjøp av rene produkter. Dersom det offentlige derimot er en stor markedsaktør, kan produksjonen av rene produkter øke. Imidlertid må det offentlige da godta høyere priser på rene produkter enn på skitne. Siden det offentlige er en stor markedsaktør, vil prisen på skitne produkter kunne falle, noe som vil gi økt konsum av skitne produkter blant private aktører. Offentlige innkjøp av rene produkter kan med andre ord ha en lekkasje effekt som svekker effektiviteten av politikken. Dette er illustrert i figur 9.



Figur 9. Betydning av det offentliges innkjøpsmakt

Her er det offentlige en stor aktør i markedet og lykkes med øke omsetningen av rene produkter fra q^{ren} til «Ny q^{ren}». For å oppnå dette må prisen stige fra den opprinnelige prisen P^0 til en ny pris på rene produkter P^{ren}. Det offentliges dreining av etterspørselen mot rene produkter, gjør at etterspørselen av skitne produkter totalt sett blir mindre og prisen på skitne produkter faller dermed fra P^0 til $P^{skitten}$. Vi får en viss lekkasjeeffekt siden det private øker sin etterspørsel etter skitne produkter. Dermed faller ikke etterspørselen etter skitne produkter like mye som økningen i rene produkter (som vist i figuren).

Innovasjon

Oppnåelse av klimamålene forutsetter innovasjon. Det vil for eksempel være svært vanskelig å gjøre lufttrafikken utslippsfri uten at det gjøres store fremskritt innenfor batteriteknologi eller hydrogenteknologi for fly. I boken *The Theory of Economic Development* (1934/2008) beskriver Schumpeter innovasjonsprosessen. Innovasjon starter med at det genereres en ny idé. Idéen kan være et nytt produkt eller en ny prosess. Før idéen settes i produksjon må den imidlertid raffineres og prøves ut i liten skala. Dersom dette er vellykket, tas idéen til markedet. I starten vil gjerne produksjonskostnadene være større enn for tilsvarende etablerte produkter, og markedsintroduksjonen skjer derfor ofte i nisjemarkeder hvor betalingsvilligheten er høy. Etter hvert vil erfaring med produksjon og utforming av den nye idéen medføre at produksjonskostnadene faller. Den nye idéen kan dermed komme til å dominere markedet.

En rekke empiriske studier har vist samfunnsnytten av FoU er vesentlig større enn den privatøkonomiske nytten.[6] Det er derfor samfunnsøkonomiske argumenter for at myndighetene bør fremme FoU gjennom direkte engasjement i FoU-virksomhet og ulike typer subsidier til private aktører. I Norge skjer det siste for eksempel gjennom Skattefunnordningen og finansiell støtte fra Forskningsrådet. Det er en pågående diskusjon hvorvidt myndighetene skal støtte all slags FoU eller om de for eksempel skal satse mer på miljøteknologi enn andre typer FoU. Vi går ikke inn i denne diskusjonen her, men nevner kun at det etter hvert finnes en betydelig litteratur som kommer til at miljøteknologi bør støttes mer

6 Se for eksempel Nordhaus (2002), som antar at den samfunnsøkonomiske gevinsten av klimainnovasjoner er mange ganger størrelsen av den private gevinsten.

enn andre teknologier (se for eksempel Greaker & Popp, 2023). Deretter har myndighetene langt på vei overlatt til markedsaktørene å filtrere ut hvilke idéer som skal gå videre til foredlingsfasen ut fra at omfanget av markedssvikt er mindre dokumentert i denne fasen og i markedsetableringsfasen. Schumpeter (1934/2008) forutsetter imidlertid at det finnes nisjemarkeder hvor betalingsvilligheten er høy slik at nye produkter og prosesser kan testes ut i markedet. I den grad slike nisjemarkeder ikke finnes i privat sektor, kan offentlige innkjøp spille en viktig rolle. Et mulig eksempel er utslippsfrie byggeplasser. Det må utvikles elektriske anleggsmaskiner og antagelig også nye rutiner for hvordan en elektrisk anleggsplass drives effektivt. En privat entreprenør som hele tiden er presset på byggekostnader, har antagelig lite å vinne på å velge utslippsfri anleggsplass. Imidlertid, dersom ingen velger slike anleggsplasser, vil læring for å få ned kostnadene kunne utebli.

Mange utslippsfrie teknologier har vist seg å ha store læringspotensial (se for eksempel Witajewski-Baltvilks et al., 2015). Læringspotensialet utløses ved omfattende bruk av den nye teknologien, og kan lede til signifikante fall i kostnadene for bruk av teknologien. Witajewski-Baltvilks et al. (2015) viser dette for solceller og vindkraft, mens Hensley et al. (2012) fant store læringseffekter i produksjonen av litiumbatterier og spådde vesentlige kostnadsfall, noe som har vist seg å stemme. Bramoullé og Olson (2005) argumenterer for at myndighetene skal ta hensyn til læringseffekter når de velger mellom ulike tiltak for å kutte utslipp. Et strengt fokus på kostnadseffektivitet vil kunne bety at kun modne teknologier med uttømt læringspotensial velges. Basert på Bramoullé og Olson (2005) kan man argumentere for at det offentlige noen ganger skal velge en dyrere ren teknologi dersom denne teknologien har et betydelig læringspotensial.

Det er opplagt vanskelig for den enkelte innkjøper å vurdere hvorvidt en ny teknologi har læringspotensial. Videre vil læringen bare bli utløst dersom offentlige innkjøpere koordinerer seg og flere velger samme teknologi. Det er derfor etter vår mening behov for koordinering når offentlige innkjøp skal brukes til å fremme teknologiutvikling. Dette kan for eksempel gjøres ved at myndighetene etablerer egne etater som løpende vurderer ulike teknologiers potensial, slik som Enova, eller at myndighetene setter ned tidsbegrensede ekspertutvalg som vurderer hvilke teknologier det skal satses på gjennom at offentlig innkjøp lager et nisjemarked for teknologiene. Det stilles imidlertid store krav til det

offentlige når det gjelder kompetanse, uavhengighet og transparens dersom det offentlige går tungt inn i teknologisatsinger. Ifølge Rodrik (2014) har offentlige teknologisatsinger lett for å bli fanget av spesialinteresser. Uansett, suksessen med utviklingen av elektriske bilferger som vi tidligere har trukket frem, hadde ikke vært mulig uten en overordnet koordinering. Utslippsfrie hurtigbåter ser ut til å være det neste området hvor offentlige innkjøp kan drive frem teknologiutviklingen. Mulige andre felt for en lignende koordinering er bruk av resirkulerte byggematerialer og utslippsfrie anleggsplasser. Før man setter i gang med denne typen koordinering, bør imidlertid potensialet for teknologiutvikling utredes og begrunnes.

Det ligger i sakens natur at dersom offentlige innkjøp skal brukes til å fremme teknologilæring, vil det medføre ekstra kostnader for innkjøper. En måte å koordinere teknologisatsingen på er at staten tilbyr fylker, kommuner og andre offentlige aktører støtte til anskaffelse av et utvalg umodne teknologier. Igjen er det behov for at potensialet for teknologiutvikling utredes og begrunnes før støtteordningene innføres.

Hvordan stille gode krav til grønne anskaffelser

Vi har allerede vært inne på temaet «hvordan stille krav til miljø i offentlige anskaffelser». Kravene bør spesifiseres i anbudsdokumentene. Vi mener videre at miljøkravene bør knyttes til selve ytelsen, og ikke til leverandøren. Det har lenge eksistert ulike miljøsertifiseringsordninger, både frivillige og lovpålagte. Et spørsmål er om det offentlige skal kreve at private aktører er miljøsertifiserte selv om den aktuelle miljøsertifiseringen ikke er lovpålagt. Her er vi skeptiske, da det er vanskelig å måle effekten på miljø av at en offentlig anskaffer innskrenker seg til å vurdere kun kandidater som har en ikke-lovpålagt miljøsertifisering. Og, som diskutert over, vil enhver innskrenkning av antall mulige leverandører begrense konkurransen og kunne gi høyere priser.

Videre er det et spørsmål om kravene til selve ytelsen bør være absolutte eller fleksible. I noen tilfeller finnes det konkurransedyktige grønne alternativer med mange mulige leverandører. Et slikt eksempel er elektriske personbiler. Det gir derfor mening at en offentlig aktør som skal kjøpe inn personbiler stiller krav om at disse skal være utslippsfrie. Det finnes også

et godt utvalg av elektriske varebiler, så også her bør det offentlige kunne stille et absolutt krav om null utslipp uten at det reduserer konkurransen for den offentlige kontrakten.

I andre tilfeller er tilbudet av utslippsfrie alternativer mer begrenset, slik at absolutte krav og høye tilpasningskostnader reduserer konkurransen uforholdsmessig mye. Utslippsfrie alternativer kan også innebære vesentlig høyere kostnader, i hvert fall på kort sikt, mens læringseffekter gjør at de høye kostnadene kan reduseres over tid dersom noen velger å investere i de utslippsfrie alternativene. En mulighet i slike tilfeller er å ta inn et forbehold i anbudsdokumentene. Det vil for eksempel si at man ønsker tilbud som kutter klimagassutslipp i sektorene som ikke er omfattet av EU ETS (hvor det allerede er en velfungerende regulering), men at man bare vil velge slike tilbud dersom kostnadene ved innsparingen i utslipp ikke overstiger en nærmere spesifisert grense. På Finansdepartementets hjemmesider ligger det slike priser man kan bruke som veiledende (Finansdepartementet, 2023). Ved å stille denne type krav sikrer man seg konkurranse mellom flere leverandører selv om det bare finnes en leverandør av den utslippsfrie varianten. Leverandøren av den utslippsfrie varianten kan da høyst sannsynlig ikke opptre som et rent monopol siden tilbudet da vil innebære for høye priser på utslippsreduksjonene. Bygge- og anleggsprosjekter kan være et godt eksempel. For slike prosjekter står leverandøren i valget mellom å bruke elektriske eller dieseldrevne anleggsmaskiner. Istedenfor å kreve elektriske anleggsmaskiner, kan innkjøper heller spesifisere at elektriske anleggsmaskiner vil bli valgt dersom kostnadene ved utslippsreduksjonene er under et visst nivå (regnet i kroner per tonn reduserte utslipp). Utslippskutt fra anleggsmaskiner er viktige for å nå norske klimamål, men siden det finnes mange måter å kutte utslippene på, er det uheldig for Norge hvis urimelige kostbare alternativer velges i stor utstrekning.

Som nevnt er det mange ulike typer av miljøproblemer som muligens kan påvirkes av offentlige anskaffelser. Det er viktig å huske på at Norge allerede har en miljøpolitikk på de fleste områder. Miljøpolitikken innebærer forbud og påbud, miljøskatter, krav om kjøp av utslippskvoter med mer. Denne miljøpolitikken skal i utgangspunktet løse miljøproblemet. Offentlige anskaffelser er kun et tillegg til miljøpolitikken. Det er dessuten frivillig for bedrifter å delta i offentlige anbudskonkurranser, hvilket gjør offentlige anskaffelser til et indirekte virkemiddel. Vi mener derfor at offentlige innkjøpere må ta en aktiv stilling til hvilket miljøproblem de mener denne

anskaffelsen skal bidra til å løse. For oss er det nærliggende å peke på klimagassutslipp som ikke er omfattet av EU ETS hvor det er tilnærmet enighet om at norsk politikk er utilstrekkelig til å nå målene. Samtidig må miljøkravene som stilles koordineres, slik at markedet får forutsigbarhet i hva som forventes av tilpasninger og hva som etterspørres av miljøforbedringer.

Forfatterbiografier

Malin Arve er professor ved NHH Norges Handelshøyskole. Hun forsker innen anvendt mikroøkonomi, kontraktsteori og offentlige anskaffelser.

Mads Greaker er professor ved Handelshøyskolen ved OsloMet. Greakers forskning er innenfor innovasjon, miljøøkonomi og ressursøkonomi.

Referanser

Aglen, T. S. (2019, 12. desember). Nå kommer fergeopprøret. *VG*. https://www.vg.no/nyheter/meninger/i/xPzxBV/naa-kommer-fergeopproeret

Anskaffelsesloven. (2016). *Lov om offentlige anskaffelser* (LOV-2016-06-17-73). Lovdata. https://lovdata.no/lov/2016-06-17-73

Arve, M. & Desrieux, C. (2024). *Environment and competition in public procurement* [Upublisert manuskript].

Bjorvatn, K. (2021). *Mikroøkonomi. En ABC på 1-2-3*. Fagbokforlaget.

Bramoullé, Y. & Olson, L. J. (2005). Allocation of pollution abatement under learning by doing. *Journal of Public Economics*, *89*(9), 1935–1960.

Edquist, C. & Zabala-Iturriagagoitia, J. M. (2020). Functional procurement for innovation, welfare, and the environment. *Science and Public Policy*, *47*(5), 595–603.

Finansdepartementet. (2023, 21. desember). *Karbonprisbaner for bruk i samfunnsøkonomiske analyser.* https://www.regjeringen.no/no/tema/okonomi-og-budsjett/statlig-okonomistyring/karbonprisbaner-for-bruk-i-samfunnsokonomiske-analyser-i-2024/id3020031/

Fischer, E. A. (2010). *Green procurement: Overview and issues for Congress*. CRS Report for Congress, Congressional Research Service.

Forestry Commission. (2023, 18. desember). *The benefits of continuous cover forestry.* https://www.gov.uk/government/publications/the-benefits-of-continuous-cover-forestry/the-benefits-of-continuous-cover-forestry

Greaker, M. & Popp, D. (2023). *Environmental economics, regulation, and innovation* (Working paper 60415). NBER.

Greaker, M., Sevillano, I., Sørgård, G. & Øistad, K. (2025). Hvilken rolle kan norskprodusert biodrivstoff spill i oppnåelsen av norske klimamål i 2030? *Samfunnsøkonomen*, (1).

Hensley, R., Newman, J. & Rogers, M. (2012). *Battery technology charges ahead*. McKinsey Quarterly.

Johnsen, V. M. (2022, 8. juli). *Nå blir også asfalten «grønn»*. TV2. https://www.tv2.no/broom/na-blir-ogsa-asfalten-gronn/14928510/

Klemperer, P. (2004). *Auctions: Theory and practice.* Princeton University Press.

Klima- og miljødepartementet. (2023). *Grønn bok. Regjeringas klimastatus og -plan*. Særskilt vedlegg til Prop. 1 S (2023–2024).

Lundberg, S., Arve, M., Bergman, M. & Henriksson, L. (2022). *Konjunkturrådets rapport 2022: Offentlig upphandling – i gränslandet mellan ekonomi och juridik*. SNS Förlag.

Lundberg, S. & Marklund, P.-O. (2013). Green public procurement as an environmental policy instrument: Cost effectiveness. *Environmental Economics*, *4*, 75–83.

Lundberg, S. & Marklund, P.-O. (2015). *Offentlig upphandling som miljöpolitiskt styrmedel* (SNS Analys nr 30). SNS.

Miljødirektoratet. (2023). *Klimatiltak i Norge mot 2030 – oppdatert kunnskapsgrunnlag om utslippsreduksjonspotensial, barrierer og mulige virkemidler* (Rapport M-2539). https://www.miljodirektoratet.no/publikasjoner/2023/juni-2023/klimatiltak-i-norge-mot-2030/

Miljødirektoratet. (2024). *Elektrifisering av varebiler: En gjennomgang av salgsmål, barrierer og virkemidler* (Rapport M-2852). https://www.miljodirektoratet.no/publikasjoner/2024/oktober-2024/elektrifisering-av-varebiler/

Nordhaus, W. D. (2002). Modeling induced innovation in climate-change policy. I A. Grübler, N. Nakicenovic & W. D. Nordhaus (Red.), *Modeling induced innovation in climate-change policy* (kap. 9). Resources for the Future Press.

Nordhaus, W. D. (2004). *Managing the global commons. The economics of climate change*. MIT Press.

Oslo Economics. (2018). *Virkninger av nye samfunnshensyn i offentlige anskaffelser*. Nærings- og fiskeridepartementet.

PricewaterhouseCoopers. (2013). *Oversikt over norske offentlige anskaffelser i perioden 2009–2012*. Fornyings-, administrasjon- og kirkedepartementet.

Riis, C. & Moen, E. R. (2011). *Moderne mikroøkonomi*. Gyldendal Akademisk.

Rodrik, D. (2014). Green industrial policy. *Oxford Review of Economic Policy*, *30*, 469–491.

Skårdalsmo, K. (2020, 30. januar). Ap ber Solberg bla opp for å kutte fergepriser. *Aftenposten*. https://www.aftenposten.no/norge/politikk/i/qLwwAz/ap-ber-solberg-bla-opp-for-aa-kutte-fergepriser

Qiao, Y. & Wang, C. (2011). Issues and challenges in implementing China's green public program. *Journal of Environmental Protection*, *8*, 1034–1045.

Schumpeter, J. A. (2008). *The theory of economic development*. Transaction Publishers. (Opprinnelig utgitt 1934)

Statistisk sentralbyrå. (2024). *10807: Offentlige innkjøp (mill. kr), etter sektor, art, statistikkvariabel og år* [Statistikk]. https://www.ssb.no/statbank/table/10807/

Testa, F., Iraldo, F., Frey, M. & Daddi, T. (2012). What factors influence the uptake of GPP (green public procurement) practices? New evidence from an Italian survey. *Ecological Economics*, *82*, 88–96.

Tukker, A., Emmert, S., Charter, M., Vessoli, C., Sto, E., Andersen, M. M., Geerken, T., Tischner, U. & Lahlou, S. (2012). Fostering change to sustainable consumption and production: An evidence based view. *Journal of Cleaner Production*, *16*, 1218–1225.

Wang, Q., Zhang, R. & Junqi, L. (2020). Price/time/intellectual efficiency of procurement: Uncovering the related factors in Chinese public authorities. *Journal of Purchasing and Supply Management*, *26*, Artikkel 100622.

Witajewski-Baltvilks, J., Verdolini, E. & Tavoni, M. (2015). Bending the learning curve. *Energy Economics*, *52*, 86–99.

Øystese, K. Å. (2019, 7. februar). *Elferge-revolusjonen startet på Vestlandet – nå kan hurtigbåtene stå for tur*. Energi og klima. https://www.energiogklima.no/meninger-og-analyse/debatt/elferge-revolusjonen-startet-pa-vestlandet-na-kan-hurtigbatene-sta-for-tur

Øystese, K. Å. (2021, 26. januar). *#Grønnskipsfart: Nærmere 60 elektriske bilferger innen 2021*. Energi og klima. https://www.energiogklima.no/nyhet/gronn-skipsfart/gronnskipsfart-naermere-60-elektriske-bilferger-innen-2021

CHAPTER 4

Navigating the Path to Low-Carbon Procurement: Insights from Norwegian Municipalities

Joanna Bardelosa Ervik and Deodat Edward Mwesiumo
Molde University College – Specialized University in Logistics, Norway

Sammendrag: Denne studien undersøker hvordan norske kommuner iverksetter lavutslippsanskaffelser (LCP), med særlig fokus på drivere, barrierer, strategier og nåværende praksis. Basert på kvalitative data fra ni kommuner, fremhever funnene at regulatoriske krav og økt bevissthet blant innkjøpsansvarlige er sentrale drivkrefter for LCP-adopsjon. Samtidig avdekkes flere utfordringer som hemmer fremdriften, herunder begrenset teknisk kompetanse, økonomiske restriksjoner, mangelfull dokumentasjon og begrenset tilgang til sertifiserte lavutslippsprodukter. Til tross for disse utfordringene, tar kommunene i bruk praktiske strategier som samkjøpsordninger, gjenbruk av materiell, strengere miljøkrav i anskaffelseskriterier samt investeringer i elbiler og fornybare energiløsninger. Studien presenterer et konseptuelt rammeverk som illustrerer hvordan regelverk, institusjonell kapasitet og markedsmodenhet samhandler og påvirker implementeringen av LCP. Den understreker også betydningen av kompetanseheving, interne retningslinjer og tilgang til pålitelig informasjon for å styrke beslutningsgrunnlaget i anskaffelsesprosesser. Ved å rette oppmerksomheten mot lokale myndigheters erfaringer, bidrar studien til den eksisterende litteraturen om bærekraftige offentlige anskaffelser og gir praktiske implikasjoner for beslutningstakere. Studien viser at selv om det gjøres fremskritt, er det behov for en mer helhetlig tilnærming som kombinerer regulatorisk støtte, faglig utvikling og leverandørinvolvering for å realisere LCPs fulle potensial. Fremtidig forskning bør utvides til flere land og undersøke målbare miljømessige og økonomiske effekter av LCP for å styrke politikkutforming og praksis.

Sitering: Ervik, J. B. & Mwesiumo, D. E. (2025). Navigating the Path to Low-Carbon Procurement: Insights from Norwegian Municipalities. I Langseth, M., & Similä, J. O. (Eds.), *Public Procurement Pathways – Sustainability Edition* (pp. 99–128). Cappelen Damm Akademisk. https://doi.org/10.23865/cdf.264.ch4

Nøkkelord: klimavennlige anskaffelser, kommuner, miljøreguleringer, karbonreduserende produkter og tjenester

Abstract: This study investigates how Norwegian municipalities adopt low-carbon procurement (LCP) practices, focusing on the drivers, barriers, strategies, and current practices shaping implementation. Drawing on qualitative data from nine municipalities, the findings highlight regulatory mandates and procurement officials' awareness as key drivers of LCP adoption. However, several barriers hinder progress, including limited technical expertise, financial constraints, insufficient documentation, and limited availability of certified low-carbon products. Despite these challenges, municipalities respond with practical strategies such as cooperative purchasing, reuse of materials, stricter environmental criteria, and investment in electric vehicles and renewable energy solutions. The study proposes a conceptual framework illustrating how regulations, institutional capacity, and market readiness interact to influence LCP adoption. It also emphasizes the importance of training, internal policies, and access to reliable information in supporting procurement decisions. By focusing on local government experiences, this research contributes to the broader literature on sustainable public procurement and offers practical insights for policymakers. It shows that while progress is being made, a more integrated approach combining regulatory support, professional development, and supplier engagement is needed to realize the full potential of LCP. Future research should broaden the scope across countries and explore measurable environmental and economic impacts of LCP to strengthen policy and practice.

Keywords: low-carbon procurement, municipalities, environmental regulations, carbon reduction products and services

Introduction

Climate change has emerged as one of the most pressing challenges of our time, with far-reaching consequences for ecosystems, economies, and societies worldwide. The increasing concentration of greenhouse gases (GHGs) in the atmosphere has been a primary driver of global warming, leading to more frequent and severe climatic events such as heat waves, droughts, and intense rainfall (Farmer & Cook, 2013). For instance, in European coastal metropolitan areas, temperatures have risen by nearly 1.91°C over recent decades, accompanied by a noticeable increase in extreme weather events (Espinosa et al., 2022). These trends highlight the need for immediate action to mitigate climate change and stabilize the Earth's climate system. Public procurement has the potential to play a critical role in reducing GHG

emissions by prioritizing low-carbon products (LCP) and services. LCPs are those that are designed to minimize carbon emissions throughout their lifecycle (Correia et al., 2013). However, despite its environmental benefits, LCP remains underexplored and under-implemented, particularly at the municipal level. While existing studies have examined broader concepts like Sustainable Public Procurement (SPP) and Green Public Procurement (GPP) (Rusu & Manta, 2023) few have examined the practicalities of implementing low-carbon procurement in real-world municipal settings.

Current research primarily addresses related topics such as consumer behavior toward carbon-labelled products (Sun et al., 2023)the influence of environmental values on green purchasing decisions (Liu & Yan, 2024), and the role of information in promoting low-carbon consumption (Wei et al., 2023). However, further research is essential to enhance our understanding of the specific strategies and challenges that municipalities encounter when implementing low-carbon procurement. Gaining this knowledge is vital as it enables local governments to more effectively integrate sustainable procurement practices into their broader climate policy frameworks. This study contributes by examining low-carbon procurement initiatives in nine Norwegian municipalities. It aims to identify strategies that facilitate successful implementation and barriers that hinder progress, providing practical insights for policymakers and procurement officials. Specifically, the study addresses the following research question: *What strategies can municipalities employ to overcome barriers and effectively implement low-carbon procurement practices?* The findings will contribute to the broader discussion on sustainable procurement, demonstrating how local governments can align their purchasing practices with national and international climate goals. The study also offers a valuable reference for other countries seeking to enhance their low-carbon procurement systems by focusing on Norway.

The following literature review examines key concepts and research on public procurement strategies, green growth performance, and challenges in implementing low-carbon procurement practices.

Literature review

Public procurement strategies

Public procurement is a powerful tool for sustainability. It shapes corporate behavior (Even-Tov et al., 2025), drives market transformation (Ortega Carrasco et al., 2024; Singh et al., 2024), and encourages

sustainable practices (Kjellberg et al., 2024). Several procurement models promote sustainability, each emphasizing different aspects of sustainable purchasing. These include Sustainable Public Procurement (SPP), Green Public Procurement (GPP), Circular Public Procurement (CPP), Eco-Procurement (EP), and Environmentally Preferable Purchasing (EPP). SPP balances environmental, social and economic factors. It minimizes harm and maximizes benefits (Rusu & Manta, 2023). GPP selects goods and services with the lowest environmental impact and considers energy efficiency, emissions, and resource use (European Commission, 2008). CPP integrates circular economy principles into procurement practices, emphasizing product and service reuse, recycling, and longevity (Zijp et al., 2022). EP prioritizes environmental sustainability in purchasing decisions, often driven by regulatory requirements or consumer demand (Wei et al., 2022). EPP, also known as green purchasing, focuses on selecting products with lower environmental impact than conventional products (Mai, 2012). While these concepts share common goals, they differ in scope and focus. Together, they provide a framework for sustainable public procurement.

Green growth performance

Green growth links economic, social and environmental progress (OECD, 2011). A study of OECD countries found that high environmental taxes, innovation, and governance create stronger green economies (Huh et al., 2018). In Scandinavia, for example, countries like Sweden and Denmark lead in sustainability performance by investing in renewable energy, energy efficiency, and resource management (Ates & Derinkuyu, 2021). Similarly, Norway excels in this area. Norway has promoted green procurement through framework agreements. These agreements establish pre-negotiated terms for purchasing goods and services, reducing the need for repeated tenders and streamlining the procurement process (DFØ, 2023). Norway also tracks green products and services, which make up 3% of the GDP (SSB, 2024). While this is a positive step, it also highlights the need for further progress, as countries like Finland have achieved higher levels of green contribution (6% of GDP). On the other hand, significant emitters like the U.S. and China focus on reducing greenhouse gas emissions (Filonchyk et al., 2024).

The role of local and regional public procurement

Public procurement officials are key to driving sustainable practices (Andhov et al., 2020). Thus, local and regional public procurement

initiatives can be crucial in adopting low-carbon technologies. Their decisions can encourage using low-carbon products and services, shape market demand, and promote innovation (Rusu & Manta, 2023). For example, policies like the lowest eligible bid and performance discount rates in construction projects can encourage using low-carbon materials by influencing bidding strategies (Jezzini & Assaad, 2024). In Italy, procurement officials have successfully led energy-efficiency programs that significantly cut carbon emissions (Malandrino et al., 2019). However, a study on Swedish municipalities found that larger municipalities are more likely to adopt green public procurement practices, although they may be less prone to adopt green criteria in tenders (Bryngemark et al., 2023). These efforts rely on having the proper knowledge, resources, and supportive policies to succeed. Abdallah (2023) argues that sustainability specialists can help reduce carbon footprints and promote renewable energy.

Regulatory frameworks and policy design

Research has shown that environmental policies positively influence green purchasing practices (Leal et al., 2020). The presence of guidelines and government regulations is essential for encouraging suppliers to embrace green practices, as these factors enhance the effectiveness of GPP (Singh et al., 2024). Thus, effective regulations are essential for promoting low-carbon procurement. For instance, GPP has been shown to significantly boost corporate green innovation, particularly in regions with strong environmental regulations, highlighting the importance of regulatory intensity in fostering low-carbon technology adoption (Kou et al., 2024). Another study on green public procurement in the U.S. highlighted the importance of policy design and implementation in advancing sustainability through procurement practices (Dimand & Cheng, 2023). Well-designed policies can create a supportive environment for developing and adopting low-carbon technologies, while poorly designed policies may fail to achieve their intended goals.

However, the complexity of regulatory frameworks can also pose challenges, particularly in compliance and innovation (Kadefors et al., 2020). For example, stricter environmental policies can reduce emissions and promote sustainable markets, but may also increase costs and bureaucratic hurdles (Chiappinelli & Zipperer, 2017). Balancing these trade-offs is critical for achieving long-term decarbonization goals.

Challenges in low-carbon procurement

Several studies show evidence that low-carbon procurement faces several hurdles. Firstly, high upfront costs make sustainable materials and technologies less attractive (AbdulRafiu, 2022). Low-carbon materials are often seen as expensive due to the high initial costs of research, development, and implementation, which require shared financial efforts from multiple stakeholders (He et al., 2015; Wang et al., 2014).

The second challenge is the lack of awareness and expertise hindering low-carbon practices (Kadefors et al., 2021). Many procurement officials lack the knowledge needed to incorporate environmental considerations into their decisions (Al Nuaimi et al., 2020). For instance, in Central Java, Indonesia, the absence of environmental certifications in procurement specifications resulted in government buildings being 46% less energy-efficient than private buildings (Puspitasari & Glennardo, 2021). Local governments in France and Germany also struggle with knowledge gaps, limited resources, and a lack of standardized data (Sugar et al., 2022). Another obstacle is organizational resistance to change. Some organizations lack the flexibility to adapt to new procurement practices (Hunka et al., 2023). Studies in Chile and New Zealand show that many procurement frameworks fail due to limited awareness among officials (Aparicio-Arias & Moreno, 2021).

The complexity of carbon markets and unclear regulations add to the challenge (Betz et al., 2022). Market maturity is essential for facilitating the transition to low-carbon procurement (Kadefors et al., 2021). Public procurement can stimulate demand for low-carbon technologies by prioritizing their purchase. As major buyers, governments can create economies of scale, reducing costs and encouraging wider adoption. The U.S. government's shift towards purchasing low-carbon materials has led contractors to adopt these technologies to remain competitive (Jezzini & Assaad, 2024). This demand encourages manufacturers to invest in R&D for low-carbon solutions, fostering market growth.

Lastly, in West Africa, outdated policies, weak implementation and collaboration slow down progress in implementing low-carbon strategies (Mewenemesse & Yan, 2023; Shaikh & Channa, 2022).

Strategies for low-carbon procurement

Several studies suggested strategies for adopting low-carbon procurement. For instance, Attolico & Scorza (2016) emphasize that early involvement

of stakeholders helps set clear goals and address potential challenges upfront. This leads to better planning, smoother execution, and more effective low-carbon procurement. Post-procurement reviews help identify gaps and improve future strategies. According to Ambalam Vassen (2021), procurement teams need clear sustainability goals to stay focused, practical guidelines to navigate decisions, and evaluation methods to measure progress effectively.

Training programs and knowledge-sharing can bridge the expertise gap (Vejaratnam et al., 2020). Public procurement can facilitate collaboration between different stakeholders, promoting knowledge transfer and adopting low-carbon technologies. For example, in the United States, local governments have adopted green public procurement practices through grassroots initiatives, leading to the sharing of best practices and technologies (Dimand & Cheng, 2023). Similarly, a study on Russian public procurement shows that providing clear information and guidance can help overcome this barrier (Shadrina et al., 2022). This collaboration accelerates the diffusion of low-carbon technologies across different regions and industries. Addressing this gap requires targeted training programs and the dissemination of best practices.

Stronger environmental policies and interdepartmental cooperation further support low-carbon procurement (New et al., 2002). Public procurement teams can use their purchasing power to create demand for green products and services, making sustainability the industry standard (Coggburn & Rahm, 2005). Consulting technical specialists helps procurement teams navigate complex regulations and market conditions (Berg et al., 2022). Procurement professionals must collaborate, share best practices, and stay informed about policy updates (Rutkowski et al., 2022).Other success factors include regulatory flexibility, market maturity, and proactive client engagement (Kadefors et al., 2021).

Building on this theoretical foundation, the methodology section outlines the multi-case study approach used to investigate low-carbon procurement practices in Norwegian municipalities.

Methodology

This study employed a multi-case study design (Saunders et al., 2015). This approach allows for an in-depth examination of LCP practices across different municipalities by comparing their experiences. The case study

approach was chosen for its appropriateness in examining complex, contemporary phenomena within real-life contexts where multiple sources of evidence are used (Yin, 2014). The phenomenon explored in this study is the practice and lived experience of sustainable procurement, focusing on how municipal actors interpret, implement, and experience sustainability goals through procurement processes. The context is defined as the Norwegian municipal public sector, where participants held roles related to procurement, sustainability, or environmental management. This research design incorporated semi-structured interviews and documentary analysis as complementary qualitative methods, enabling triangulation and enhancing the credibility and richness of the findings (Creswell & Poth, 2017; Merriam & Tisdell, 2015). By employing this multi-method approach within a bounded case study, the research aimed to uncover the conditions that influence the effectiveness or limitations of sustainable procurement and the decision-making processes that shape these practices.

Data collection and analysis

The primary data source for the study was semi-structured interviews. The interviews were conducted via Zoom between August and October 2023. Participants were from nine municipalities in Norway, selected based on their availability and willingness to participate. Each interview lasted between 15 and 40 minutes and was conducted in Norwegian. The transcripts were later translated into English. The participants include one municipal director and eight purchasing managers. Their experience ranged from 1 to 20 years, providing valuable insights into sustainable procurement practices. The demographic details of the respondents are summarized in Table 1.

The interview transcripts were analyzed using NVivo software, which helped organize and code the data. The analysis involved thematic coding, grouping data into themes to highlight key patterns and insights (Vaughn & Turner, 2016). This approach allowed the study to present participants' responses clearly while interpreting their significance.

Documentary analysis is also included to triangulate the findings rather than rely solely on interviews. The primary data were supplemented by secondary data from documents, including reports, official publications, and accreditation guidelines from Norwegian government agencies, organizations, and accreditation bodies from 2021 to 2024. These documents were selected because they provide essential context on regulatory

frameworks and practical challenges, such as financial limitations related to sustainable procurement in Norwegian municipalities.

This approach enhances the credibility and depth of the research by cross-verifying information from multiple sources. While interviews provide valuable firsthand insights, they may be influenced by personal perspectives or biases. Documentary analysis offers objective and contextual evidence that helps validate and complement the interview responses, ensuring a more comprehensive and reliable understanding of the topic. To ensure accuracy, the findings were shared with participants for feedback, helping to validate their viewpoints and strengthen the study's credibility.

This table provides an overview of the study participants, including their roles, experiences, and the municipalities they represent.

Table 1. Respondents stats

Municipality	Role	Service duration	Low-carbon procurement level	Engagement in low-carbon procurement
M1	Municipal Director	9	Low	Limited involvement in low-carbon products and services; lacks active attention.
M2	Purchasing Manager	6	Moderate	Some engagement in low-carbon procurement.
M3	Purchasing Manager	6	Moderate	Some engagement in low-carbon procurement.
M4	Purchasing Manager	2	Low	Limited involvement in low-carbon products and services; lacks active attention.
M5	Purchasing Manager	20	Moderate	Some engagement in low-carbon procurement.
M6	Purchasing Manager	1	Low	Limited involvement in low-carbon products and services; lacks active attention.
M7	Purchasing Manager	9	Low	Limited involvement in low-carbon products and services; lacks active attention
M8	Purchasing Manager	8	Moderate	Some engagement in low-carbon procurement.
M9	Purchasing Manager	2	High	Significant engagement in low-carbon procurement, with a strong focus on environmental criteria.

The experience of the participants varied between one and twenty years. The richness of their expertise offers indispensable research perspectives and insights. It also shows that municipalities have different levels of commitment to low-carbon procurement. Four municipalities (M1, M4, M6, and M7) reported low procurement levels, indicating limited focus and involvement in low-carbon products and services. Four others (M2, M3, M5, and M8) showed moderate procurement levels, suggesting some engagement. However, M9 stood out with high procurement levels, demonstrating a strong commitment, especially toward environmental criteria.

The findings of this qualitative analysis are presented in the next section, organized around key themes related to drivers, barriers, strategies, and current practices for low-carbon procurement adoption.

Findings

The analysis revealed several key themes related to drivers, barriers, strategies and current practices for low-carbon procurement adoption in the municipalities studied. The first theme, drivers of LCP, highlights the factors that encourage the adoption of low-carbon procurement practices. Regulatory mandates and increased awareness among procurement officials are key motivators and catalysts for environmentally responsible purchasing.

The second theme focuses on challenges that hinder the adoption of low-carbon procurement. These include a lack of technical expertise, financial constraints, insufficient documentation, the complexity and novelty of low-carbon products and services, and inconsistent market readiness. These barriers make it difficult for organizations to implement LCP effectively.

The third theme explores adoption strategies to address these challenges. The findings suggest that organizations can overcome obstacles by building expertise and making low-carbon procurement routine. Implementing stricter internal environmental policies, ensuring access to relevant information, and preparing the organization to adopt low-carbon products effectively are crucial. Also, fostering a continuous learning and collaboration culture and leveraging market influence can support the transition to sustainable procurement.

The fourth theme examines current practices in municipalities which have adopted various strategies to support sustainable procurement. Tables 2, 3, 4, and 5 provide further theme details.

Table 2. Drivers in LCP products and services

Concept	Respondents	Illustrative quotes	Triangulation
Regulations	M1	*"Politics discussed…then we have now a purchasing regulation… about environmental labelling and using environmental management in purchasing."*	Since January 1, 2024, Norwegian public procurement must consider the environment at least 30% when evaluating bids (Regjeringen.no, 2023).
	M3	*"Another aspect to consider is the lawmakers, who express a strong interest in environmental agreements… municipalities value sustainability when developing regulatory plans."*	
	M4	*"This sustainability decision making comes from above…if the municipality director stated it as a goal, then it is easier to implement it."*	
	M5	*"Now I know that starting in 2024, public procurement must include environment- and climate-related criteria where approximately 30% of the selection is weighted."*	
Awareness	M2	*"Environmental awareness is substantial for those who manage it daily, but insignificant for those whose primary responsibility is not related to it."*	
	M3	*"Our level of awareness has significantly increased in the recent year; the level of understanding has increased substantially."*	
	M4	*"A larger municipality has a greater awareness and understanding in sustainable procurement."*	
	M5	*"Yes, the awareness is rising and needed …push the advancement of knowledge."*	
	M6	*"I think it's been a little low so far, but I think it will get better soon as time goes by."*	
	M7	*"We have conducted a survey on the purchasing competence in municipalities, and the results indicate a poor level of competence… it fails to maintain its usefulness in everyday-life settings."*	
	M9	*"We have allocated resources, and it is my impression that there is a high level of understanding and awareness of this matter…it can be challenging as not everyone possesses the same level of understanding."*	

Introducing new environmental regulations as compulsory conditions for purchasing goods and services has driven municipalities to procure low-carbon products and services. As respondent M7 noted: "One of the primary objectives of the purchasing strategy is to prioritize environmentally sustainable purchasing because a new policy proposal will be formally endorsed in the autumn, it is expected." Similarly, assessing the understanding and awareness of sustainable procurement procedures among procurement professionals is crucial in the public procurement sector. This is supported by respondent M8, who stated, "It has been very popular in the procurement environment; I would say that awareness is very high."

Table 3. Challenges in the LCP products and services

Concept	Respondents	Illustrative quotes	Triangulation
Lack of technical competency	M1	*"It is somewhat challenging to determine the optimal option. Therefore, due to a certain level of unclear information, there may be some uncertainty regarding the nature of what emerges. There is now no definitive definition of what is considered the best. Consequently, it is challenging for us to accurately measure and verify the quality of the requirements in the competition."*	According to the DFØ report (2022), only 31% have sufficient expertise in sustainable procurement. Many municipalities lack the knowledge and skills needed for sustainable procurement, making it difficult to assess environmental requirements and implement green solutions effectively.
	M2	*"It is really difficult not to have the knowledge and understanding about the availability of products and criteria to establish... establishing definitive criteria for correctness is challenging..." lack of functionality comprehension."* *"We lack experts on whom we rely to engage user representatives in the procurement process, which is somewhat challenging... therefore, a form of knowledge is crucial."* *"Without knowledge and competence, the buyer will be prevented from engaging and asking about suppliers' practices."*	
	M5	*"Assessing the impact of that is challenging for us. How can we effectively promote something in which we lack substantial expertise? We lack the ability to perceive it or not to perceive it."*	

Concept	Respondents	Illustrative quotes	Triangulation
	M6	*"In some cases, it can be challenging to determine whether you should rate it or not."*	
	M8	*"The difficulty in purchasing environmentally friendly goods and services lies in possessing the appropriate expertise. Particularly about the specific criteria and standards that are strongly associated with the different services, items, and the methods of evaluating them... It is a challenge because smaller municipalities have slightly less access to relevant experience."*	
Financial constraints	M1	*"Smaller municipalities have smaller budgets... we will never be able to afford it."*	A recent survey by Kommunesektoren municipal economists shows that municipalities and county municipalities face a significant budget shortfall of around 10 billion kroner in 2024 (KS, 2024).
	M3	*"As the demand on quality increases, the cost for products becomes more expensive."*	
	M4	*"Any items that are sustainable are mostly costly compared to all other alternatives...It is easy to propose sustainable solutions but frequently the municipal manager firmly rejects them, citing financial constraints."*	
	M6	*One may establish the correlation between the strength of municipal's financial situation and the level of environmental standards; it can be a little more expensive."*	
	M7	*"The municipality must acquire low carbon products and services to reduce its carbon footprints, but it is very expensive."*	
	M8	*"In other words, environmental solutions can cost more."*	

(Cont.)

Table 3. *(Cont.)*

Concept	Respondents	Illustrative quotes	Triangulation
	M9	*"Following up on these environmental agreements and requirements, it requires expertise, time, and resources.*	
Insufficient documentation	M4	*"The primary challenge is in the inability to accurately quantify the emissions associated with a certain product or service. Frequently, suppliers lack the ability to provide documentation regarding the emission levels of their products."*	
	M7 M1	*"The municipality must obtain figures and show its carbon account."* *"That municipalities must acquire and present this information to lawmakers and employees to inform purchase decisions effectively."*	
Newness and complexity	M1	*"Assessing the carbon emission of things is complicated."*	
	M3	*"For many of the suppliers, the low carbon products are new to them, and it creates a problem."*	
	M7	*"The rules and regulations, the model and procurement process are so complicated…they need to simplify the expectations in reducing carbon measures, so that the local supplier can manage to deliver because it is too complicated."*	
	M8	*"The circumstances are complex and confusing; in numerous instances, it assumes that you possess a certain level of environmental expertise."*	
Resistance to change	M7	*"There is a prevailing skepticism among the staff…we encounter skeptical employees who will be utilizing the current framework and hesitant to making any changes…there is resistance to change."*	

Concept	Respondents	Illustrative quotes	Triangulation
	M9	*"It is necessary to engage in activity outside of the organization, to develop a strong focus and a willingness to change."*	
Large framework agreement	M2	*"We have a very large framework agreement, which presents challenges in managing it."*	
Market readiness inconsistency	M4	*"You lack products in certain sectors where you have the opportunity to actively purchase a product with low emissions."*	
	M5	*"There are no materials available."*	
	M9	*"For the environment and sustainability, we have to ensure competition, so we cannot set stricter requirements than what the market is able to meet."*	

Procurement teams often lack the technical and environmental expertise to set effective criteria. This makes it hard to evaluate technical aspects and develop comprehensive standards. Without the proper knowledge, managing the carbon footprint of purchased products and services becomes a challenge. Limited competence among procurement professionals hinders informed decision-making and sustainable procurement practices. For example, a representative from M9 explained, "The biggest challenge is where we do not have a good standard requirement and we do not have technical environmental expertise, so we cannot assess when it comes to technical things." Similarly, M3 added, "We have no competence to evaluate it."

The limitations of financial constraints are a significant hurdle for sustainability initiatives in Norwegian municipalities. This observation underscores the intricate balance between sustainability goals and financial viability that municipalities must navigate. Despite high demand, limited budget allocations often impede the procurement of sustainable options. M5 shared, "Economy is an important factor because all municipalities are under financial pressure." Likewise, M2 noted, "It quickly turns out that the person placing the order may have financial constraints that prevent them from purchasing anything above what is necessary…It is always that low carbon products are mostly expensive."

In addition, many municipalities struggle to get proper information from suppliers, especially about the carbon footprint of products and services. M4 said, "Obstacles arise from the absence of information on emissions associated with products and services, which hampers the ability to make well-informed decisions." Suppliers often struggle to keep up with the growing environmental demands in tenders. M1 explained that local contractors face difficulties because of the complexity of the procurement process. M4 added, "These are still new, and the unfamiliarity of suppliers with these products further complicates the procurement process." Lastly, internal resistance and the complexity of large agreements also make it harder to change. M7 pointed out that employees often resist new practices, and M2 mentioned the difficulties in managing large framework agreements. These challenges show how technical skills, budget limitations, market readiness, and internal processes affect municipalities' ability to make sustainable choices.

Table 4. Enablers in LCP products and services

Concept	Municipalities	Illustrative quotes	Triangulation
Environmental certification	M1	*"We're aiming to limit carbon emissions by setting environmental standards and requiring environmental certification from suppliers..." Environmental care is also required in construction projects; it must be environmentally certified."*	Miljøfyrtårn", meaning "Environmental Lighthouse" in English, is a Norwegian accreditation system that promotes sustainability. To get accredited, businesses must implement environmental management, use resources efficiently, follow laws, uphold social responsibility, and commit to ongoing improvement, Miljøfyrtårn (2024).
	M2	*"Agreement drives our environmental label; it means eco-labelled products...we have Miljøfyrtårn as part of our strategy."*	
	M3	*"We have a framework agreement, where we can choose the most eco-friendly goods."*	
	M6	*"We adhere to the environmental rules and standards, we require companies must have an environmental system... such as Miljøfyrtårn."*	

Concept	Municipalities	Illustrative quotes	Triangulation
	M8	*"We demand for certification and labelling schemes…environmental certification must be in place."*	
	M9	*"The purpose is to advocate for environmental requirements. We should prioritize the promotion of eco-labelled products."*	
Purchasing cooperation	M1	*"We have purchasing cooperation with…like any other municipalities."*	Formalized, comprehensive procurement cooperatives are contract-based agreements built on shared procurement expertise. Around 70% of Norway's municipalities participate in 36 such cooperatives. They have a general mandate and authority to make purchases on behalf of their members (Nærings- og fiskeridepartementet, 2021).
	M2	*"A comprehensive and collaborative framework agreement operates with every municipality. Our role as host municipality is to facilitate collaboration."*	
	M3	*"We are collaborating through inter-municipal purchasing cooperation."*	
	M4	*"We have a purchasing partnership."*	
	M5	*"We are involved in a purchasing collaboration."*	
	M6	*"Our partnership with the municipality includes joint buying."*	
	M7	*"Many of our purchases were made from a framework agreement."*	
Competence and routine	M2	*"To have knowledge and competence are the crucial aspects to succeed."*	
	M4	*"The success factor is to have knowledge; it is crucial to establish a team of climate advisers and sustainability experts within the organization who can advocate for that specific perspective."*	

(Cont.)

Table 4. *(Cont.)*

Concept	Municipalities	Illustrative quotes	Triangulation
	M7	*"There must be an increase in employee skills development … competence is very important… to ensure that the purchaser is confident in buying because they understand the items…. by establishing regulations and routines to expedite the process."*	
	M9	*"It is after all the competence, the technical competence needed."*	
Stricter environmental rules	M1	*"We should have a stronger environmental focus."*	
	M3	*"The requirement for sustainability has to be there from the start of the purchasing process, we must be very clear of what we want, the requirement specifications of what we must have, including such considerations."*	
	M4	*"Decision makers must be clear that both the supplier and the manufacturer must be capable of providing documentation regarding the specific amount of CO2 emissions associated with each product."*	
	M6	*"Do it via rules, in my opinion… that the new procurement standards will impose stricter standards for the welfare of the environment."*	
	M7	*"In my opinion, what we need is a procurement strategy that creates regulations and routines to ensure its implementation. It is also important that the community sector is included in the municipal plan."*	
	M8	*"My advice would be to approach sustainability in a deliberate and concrete strategy…everyone must acknowledge the importance of sustainability, also solidifying or making it concrete."*	
	M9	*"It is the standardization of requirements and documentation."*	

Concept	Municipalities	Illustrative quotes	Triangulation
Access to information and preparedness	M1	*"We need to have an improved standard, an ideal environmental guideline with clear definitions of what should be present in carbon emissions, standards that we could develop and afterwards align ourselves with..."*	
	M2	*"Purchasing should be involved in the very beginning of the project to ensure that sustainability issues can be included in the budget decisions, but from my experience, purchasing will be called in the last 2 minutes before the municipality published the project to the public, where the budget is already set. Then we could no longer influence anything."*	
	M5	*"There is a distance between who decides i.e. politicians and us in municipality administration, so if they made the preparatory work for us, strategy for good acquisition and availability of the information to get the job done right..."*	
	M8	*"This information should be conveyed to the employees inside the organization who are participating in the procurement process, guaranteeing that it is effectively addressed during the purchase.... create templates and standardized criteria and make it available so that it is used in practice."*	
	M9	*"To use all the guides and aids that are available."*	
Continuous learning and collaboration	M4	*"Learn from recommendations from other towns that have previously made few purchases or acquisitions, which subsequently facilitates the argument that sustainability criteria should be incorporated into procurement."*	
	M7	*"In the decision making, it is important to show my politicians, my employees that here is our carbon footprint, if we care to manage to switch to low-carbon procurement...It will be a good help if the higher authority simplifies things, points that we could use."*	

(Cont.)

Table 4. *(Cont.)*

Concept	Municipalities	Illustrative quotes	Triangulation
Leveraging market power	M1	*"We must be able to use the market power that we have, to acquire environmental materials."*	
	M3	*"The municipality has a very high impact on influence through tendering."*	

Municipalities are making efforts to reduce their carbon emissions by establishing environmental criteria. They demand environmental certifications from suppliers and companies that participate in procurement operations. These testimonies demonstrate the significant influence of environmental mandates in shaping procurement practices towards sustainability objectives within Norwegian municipalities. M7 noted, "We require environmental certification like Miljøfyrtårn." In addition, municipalities participate in inter-municipal purchasing cooperation initiatives. They have substantial cooperation framework agreements that facilitate joint purchases. This allows them to leverage their combined purchasing power to negotiate better rates and pricing with the suppliers.

Promoting competence in procurement procedures is imperative to fostering confidence and sustainability. M5 acknowledged that "Addressing gaps in knowledge and competency regarding carbon emissions is essential for informed decision-making." Similarly, M6 added, "The necessity of robust criteria endorsed by management and communicated to stakeholders to ensure sustainable integration in procurement processes."

The respondents advocated the implementation of stricter environmental regulations to promote the procurement of low-carbon products and services. The proposed measures include incorporating environmental criteria into specifications and setting precise carbon emission benchmarks. M2 highlighted the importance of "More rigorous rules in purchasing such items," suggesting that current practices lack the necessary rules to drive real change. Another participant (M4) proposed a practical step forward: requiring suppliers to clearly document their products' carbon emissions. This would make it easier for buyers to compare options and prioritize low-carbon alternatives. Similarly, M5 pointed the role of government "to establish and communicate standardized criteria for procurement practices."

A successful procurement process begins with timely involvement and access to the right information. Several respondents voiced concern over a recurring issue: Sustainability considerations often come too late in the process, frequently sidelined due to delayed procurement engagement.

This misalignment can be particularly damaging when budget constraints are already in place. Still, participants emphasized that budget limitations should not come at the cost of sustainability. They argued that sustainability goals must remain central, regardless of financial pressures. M8 stressed "the necessity of integrating procurement with project planning before budget estimations." This ensures that sustainability is not treated as an afterthought but embedded from the start.

Tailored tools and guidelines are needed to support this, especially for municipalities operating with limited resources. As M6 put it, there is a pressing need for "the creation of environmental procurement norms and easily available support systems," underscoring how practical, accessible frameworks can empower smaller public bodies to stay aligned with environmental goals.

Across the responses, there was a strong consensus about the value of continuous education, collaboration, and professional development in driving sustainable procurement forward. However, while most acknowledged these principles, only one respondent—M9—shared firsthand experience of low-carbon purchasing, demonstrating the difference between knowing what should be done and actively doing it.

M9 described a practical, collaborative approach: "We are learning from each other, looking at what others have done and using the available resources…using the professional experts that are available, seeking their advice, then educating each other." This mindset reflects mutual learning and resource sharing. M9's experience is a concrete example of how ongoing education, expert support, and a willingness to collaborate can turn sustainability ideals into meaningful action.

Table 5. Current practices in LCP products and services

Concept	Respondents	Illustrative quotes
Procurement of electric vehicles	M1	*"the most climate-friendly option is to buy electric cars"*
	M2	*"The home care service now has many electric vehicles."*
	M3	*"There are only electric vehicles."*
	M6	*"There are likely electric cars."*
	M8	*"A car that runs on renewable energy."*
Repurposed existing structure	M2	*"We reused the building structure instead of demolishing an old nursing home."*
Reused furniture	M4	*"We have made efforts to reuse furniture in shared spaces. Buying second-hand helps minimize the overall carbon footprint."*
Solar cells	M2	*"We have installed solar panels as part of our sustainability efforts."*

(Cont.)

Table 5. *(Cont.)*

Concept	Respondents	Illustrative quotes
Euro 6 Vehicle Type	M5	*"Regarding vehicles and machinery, we always require that they have the best available technology, such as being classified at least Euro 6."*
	M1	*"Environmental standards for transport were mandated under EU legislation."*
	M8	*"We set requirements for Euro classes, and we only approve the highest Euro classes."*
	M9	*"We require that all vehicles be classified as at least Euro 6, and additionally, we stipulate that if they are to replace vehicles during the contract period, they must comply with these requirements."*

Municipalities are adopting various low-carbon procurement strategies to reduce their environmental impact and promote sustainability. A key practice is the procurement of electric vehicles, with municipalities such as M1, M2 and M6 prioritizing electric cars for services like home care, aiming to use renewable energy and minimize carbon footprints. Additionally, repurposing existing buildings, such as M2's reuse of an old nursing home building, helps reduce waste and environmental damage by avoiding demolition. Many municipalities, including M4, also focus on reusing furniture in shared spaces and purchasing second-hand items to minimize the overall carbon footprint. The installation of solar panels, as seen in M2, is another strategy to harness renewable energy.

Finally, strict requirements for vehicle standards, such as Euro 6, are being set by municipalities like M1, M5, M8 and M9, ensuring that all vehicles meet high environmental standards and are replaced with compliant models during the contract period. These practices highlight the municipalities' commitment to incorporating sustainability into their procurement processes.

The following discussion section interprets these findings in light of existing literature and proposes a conceptual framework for understanding low-carbon procurement adoption in municipalities.

Discussion

Summary of findings

The analysis revealed several key themes related to adopting low-carbon procurement (LCP) across nine Norwegian municipalities. These themes are categorized as drivers, barriers, strategies, and current practices.

The first theme, *drivers of LCP*, identifies regulatory mandates and increased awareness among procurement officials as the main motivators for adopting low-carbon practices. These drivers influence municipalities to prioritize environmental considerations in procurement decisions.

The second theme focuses on *barriers to LCP adoption*, including limited technical expertise, financial constraints, insufficient documentation, the complexity of low-carbon alternatives, and inconsistent market readiness. These challenges hinder municipalities from fully integrating LCP into their procurement processes.

The third theme, *strategies for overcoming barriers*, highlights the importance of building institutional expertise, making sustainability a routine part of procurement, strengthening internal policies, and ensuring access to up-to-date information. A continuous learning and collaboration culture is essential, alongside leveraging public procurement to influence the market toward more sustainable options.

The fourth theme examines *current practices* that municipalities have adopted. These include procuring electric vehicles, reusing existing buildings and furniture, installing solar panels, and enforcing strict vehicle emission standards (e.g., Euro 6 compliance). These efforts reflect concrete steps taken to reduce carbon emissions and promote sustainability.

Interpretation of the findings

This study contributes to understanding how municipalities can overcome barriers and implement effective LCP strategies, addressing the central research question: "What strategies can municipalities employ to overcome barriers and effectively implement low-carbon procurement practices?"

Drivers of LCP: Regulations and awareness

The findings support previous research emphasizing the importance of regulatory frameworks as key drivers of sustainable procurement (Attolico & Scorza, 2016; Jezzini & Assaad, 2024). The recent Norwegian policy requiring 30% environmental criteria in bid evaluations (Regjeringen.no, 2023) demonstrates how legal mandates can compel municipalities to prioritize low-carbon alternatives. Increased awareness among procurement officials also plays a significant role, aligning with Berg et al. (2022), who found that knowledgeable procurement staff are more likely to champion sustainable practices.

Barriers: Expertise, funding, and market readiness

Several municipalities reported challenges related to technical expertise and financial limitations, consistent with prior studies (Kadefors et al., 2021; AbdulRafiu, 2022; Wang et al., 2014). The lack of certified low-carbon products and complex documentation requirements further limit LCP adoption, echoing Mewenemesse & Yan (2023) and Sugar et al. (2022), who noted that limited market readiness and procurement complexity can stall sustainability progress.

Strategies: Capacity-building and collaboration

To address these barriers, the study found that training programs, access to reliable environmental information, and internal sustainability policies help municipalities comply more effectively with environmental goals. These strategies support findings by Vejaratnam et al. (2020) and Correia et al. (2013), who argue that knowledge-building and information access are foundational to sustainable decision-making.

Collaborative approaches, such as cooperative purchasing and knowledge-sharing among municipalities, emerged as important mechanisms for overcoming cost and capacity challenges. These practices align with Dimand & Cheng (2023) and Hunka et al. (2023), who stress the role of inter-organizational cooperation in driving procurement innovation.

Current practices: Practical implementation of LCP

The adoption of electric vehicles, reuse of infrastructure, and strict environmental standards across several municipalities shows that LCP is being operationalized in tangible ways. These examples provide practical insights into how sustainability goals can be translated into everyday procurement activities, moving beyond abstract concepts into real-world impact. This supports the view that public procurement can act as a lever for market transformation (Coggburn & Rahm, 2005).

Contribution to knowledge and practice

This study contributes to the literature by offering empirical evidence from municipal-level procurement, an area often overlooked in broader discussions on sustainable public procurement (SPP) and green public procurement (GPP). The study offers a grounded perspective that complements

existing theoretical work by focusing on how local regulatory frameworks, institutional capacity, and market factors shape LCP practices.

It also provides practical insights for policymakers and procurement professionals, highlighting the importance of combining regulatory support with institutional readiness and market engagement. The conceptual framework (Figure 1) developed from these findings illustrates the dynamic interplay between drivers, barriers, strategies, and outcomes in LCP adoption.

Limitations and future research

While this study offers valuable insights, its findings are based on nine Norwegian municipalities, which limits generalizability. Future research should expand the sample and conduct cross-country comparisons to explore how different policy and market contexts influence LCP. Additionally, more quantitative studies are needed to assess the environmental and economic benefits of LCP, providing robust evidence to support policy development.

The concluding section synthesizes the key insights from this study and offers recommendations for policy and practice to advance low-carbon procurement implementation.

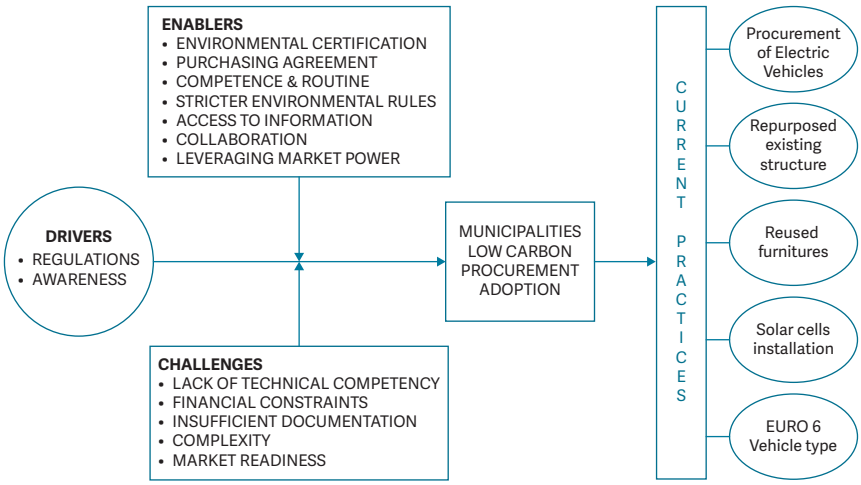


Figure 1. Conceptual Framework of LCP Adoption

Conclusion

This study examined municipalities' strategies to overcome barriers and effectively implement low-carbon procurement (LCP). Based on data from

nine Norwegian municipalities, the findings highlight four key themes: drivers of LCP, implementation barriers, response strategies, and current procurement practices.

Regulatory mandates and increased awareness among procurement professionals emerged as the main drivers for adopting LCP. However, implementation is challenged by limited technical expertise, financial constraints, lack of documentation, complex procurement processes, and market gaps in certified low-carbon products. These findings are consistent with existing literature, emphasizing the structural and capacity-related obstacles local governments face.

Municipalities that have advanced in LCP adoption have taken practical steps, such as investing in training, applying stricter environmental standards, reusing existing infrastructure and equipment, and engaging in cooperative purchasing. While these efforts demonstrate a commitment to sustainability, they remain fragmented and insufficient to drive systemic change.

To strengthen LCP implementation, municipalities should take a more integrated approach. Key recommendations include:

- Enhancing regulatory enforcement and aligning procurement with national climate goals.
- Providing structured training and professional development for procurement staff.
- Improving access to clear, updated information on low-carbon alternatives.
- Engaging suppliers to foster innovation and expand the market for sustainable products.
- Encouraging inter-municipal collaboration and shared learning to support institutional capacity-building.

This study contributes to the literature by offering empirical, context-specific insights into LCP at the municipal level. It moves beyond theoretical discussions by analyzing real-world practices and challenges in sustainable procurement. The conceptual framework developed here offers a practical guide for understanding the interplay between regulatory, institutional, and market factors in LCP adoption.

While the study provides valuable insights, its findings are based on a limited sample of Norwegian municipalities. Future research should include more extensive, cross-country comparisons to better understand how policy environments and market conditions influence LCP outcomes.

Additionally, quantitative studies are needed to assess the low-carbon procurement's environmental and financial impact, providing more substantial evidence to support policy development.

All things considered, low-carbon procurement presents a promising strategy for municipalities to contribute to climate goals. With the right combination of regulation, knowledge, and collaboration, local governments can use public procurement as a powerful sustainability and climate action tool.

Author biographies

Joanna Bardelosa Ervik is a Ph.D. candidate at Molde University College, specializing in sustainability and climate policy. Her research explores carbon reduction measures' mechanisms, variations, and cost-effectiveness in Norwegian public procurement. Her academic interests include sustainable public procurement, supply chain management, international marketing, and carbon footprint analysis.

Deodat Edward Mwesiumo is a Professor of Supply Chain Management at Molde University College. His research and teaching cover a wide spectrum of topics within the field of supply chain management. He has a particular focus on public procurement, where his work explores critical areas such as the procurement of innovative solutions, green public procurement, performance-oriented procurement practices, and the application of data-driven approaches to improve procurement outcomes.

References

Abdallah, T. (2023). Chapter 3—Environmental sustainability professionals. In T. Abdallah (Ed.), *Sustainable Mass Transit, 2nd ed.* (pp. 31–44). Elsevier. https://doi.org/10.1016/B978-0-443-15271-9.00008-X

AbdulRafiu, A. (2022). Policy seduction and governance resistance? Examining public funding agencies and academic institutions on decarbonisation research. *Science and Public Policy*, *50*(1), 87–101. https://doi.org/10.1093/scipol/scac051

Al Nuaimi, B. K., Khan, M., & Ajmal, M. (2020). Implementing sustainable procurement in the United Arab Emirates public sector. *Journal of Public Procurement*, *20*(2), 97–117. https://doi.org/10.1108/JOPP-07-2019-0044

Ambalam Vassen, S. (2021). Measures for the Challenges of Sustainable Procurement in the Construction Industry. *Scientific & Academic Publishing*, *10*, 89–400.

Andhov, M., Caranta, R., Andhov, M., Caranta, R., Stoffel, T., Grandia, J., Janssen, W. A., Vornicu, R., Czarnezki, J. J., Gromnica, A., Tallbo, K., Martin-Ortega, O., Mélon, L., Edman, Å., Göthberg, P., Nohrstedt, P., & Wiesbrock, A. (2020). *Sustainability through public procurement: The way forward-Reform Proposals*. https://ssrn.com/abstract=3559393

Aparicio-Arias, R., & Moreno, J. (2021). Factors influencing public procurement during disasters: The cases of Chile and New Zealand. *Journal of Public Procurement*, *21*(2), 206–219. https://doi.org/10.1108/JOPP-01-2021-0002

Ates, S. A., & Derinkuyu, K. (2021). Green growth and OECD countries: Measurement of country performances through distance-based analysis (DBA). *Environment, Development and Sustainability*, *23*(10), 15062–15073. https://doi.org/10.1007/s10668-021-01285-4

Attolico, A., & Scorza, F. (2016). A Transnational Cooperation Perspective for "Low Carbon Economy". In O. Gervasi, B. Murgante, S. Misra, A. M. A. C. Rocha, C. M. Torre, D. Taniar, B. O. Apduhan, E. Stankova, & S. Wang (Eds.), *Computational Science and Its Applications – ICCSA 2016* (pp. 636–641). Springer International Publishing.

Berg, A., Alhola, K., Peltomaa, J., & Tietari, S. (2022). Developing together: The Finnish way of promoting sustainable public procurement. *Journal of Public Procurement*, *22*(4), 245–264. https://doi.org/10.1108/JOPP-11-2021-0072

Betz, R., Michaelowa, A., Castro, P., Kotsch, R., Mehling, M. A., Michaelowa, K., & Baranzini, A. (2022). *The Carbon Market Challenge*. https://api.semanticscholar.org/CorpusID:252240292

Bryngemark, E., Söderholm, P., & Thörn, M. (2023). The adoption of green public procurement practices: Analytical challenges and empirical illustration on Swedish municipalities. *Ecological Economics*, *204*, 107655. https://doi.org/10.1016/j.ecolecon.2022.107655

Chiappinelli, O., & Zipperer, V. (2017). Using public procurement as a decarbonisation policy: A look at Germany. *Berlin: Deutsches Institut Für Wirtschaftsforschung (DIW)*, *7*, 523–53249.

Coggburn, J. D., & Rahm, D. (2005). Environmentally preferable purchasing: Who is doing what in the United States? *Journal of Public Procurement*, *5*(1), 23–53. https://doi.org/10.1108/JOPP-05-01-2005-B002

Correia, F., Howard, M., Hawkins, B., Pye, A., & Lamming, R. (2013). Low carbon procurement: An emerging agenda. *Journal of Purchasing and Supply Management*, *19*(1), 58–64. https://doi.org/10.1016/j.pursup.2012.11.004

Creswell, J. W., & Poth, C. N. (2017). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (4th, illustrated, annotated ed.). SAGE Publications.

DFØ. (2022). *Hovedrapport: Anskaffelsesundersøkelsen Direktoratet for forvaltning og økonomistyring*. https://anskaffelser.no/sites/default/files/2022-06/Anskaffelsesundersokelsen_hovedrapport_2022.pdf

DFØ. (2023, July 7). *Rammeavtalar*. https://anskaffelser.no/nn/avtaler-og-regelverk/rammeavtalar

Dimand, A.-M., & Cheng, S. (2023). Bottom-up innovation adoption of green public procurement in the United States. *Local Government Studies*, *49*(6), 1359–1385. https://doi.org/10.1080/03003930.2022.2161523

Espinosa, L. A., Portela, M. M., Matos, J. P., & Gharbia, S. (2022). Climate Change Trends in a European Coastal Metropolitan Area: Rainfall, Temperature, and Extreme Events (1864–2021). *Atmosphere*, *13*(12). https://doi.org/10.3390/atmos13121995

European Commission. (2008). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Public Procurement for a Better Environment SEC(2008) 2124 SEC(2008) 2125 SEC* (p. 2126).

Even-Tov, O., She, G., Wang, L. L., & Yang, D. (2025). How government procurement shapes corporate climate disclosures, commitments, and actions. *Review of Accounting Studies*. https://doi.org/10.1007/s11142-024-09866-0

Farmer, G. T., & Cook, J. (2013). Climate Change Trends. In G. T. Farmer & J. Cook (Eds.), *Climate Change Science: A Modern Synthesis: Volume 1—The Physical Climate* (pp. 97–133). Springer Netherlands. https://doi.org/10.1007/978-94-007-5757-8_5

Filonchyk, M., Peterson, M. P., Yan, H., Gusev, A., Zhang, L., He, Y., & Yang, S. (2024). Greenhouse gas emissions and reduction strategies for the world's largest greenhouse gas emitters. *Science of The Total Environment*, *944*, 173895. https://doi.org/10.1016/j.scitotenv.2024.173895

He, B., Wang, J., & Deng, Z. (2015). Cost-constrained low-carbon product design. *International Journal of Advanced Manufacturing Technology*, *79*(9–12), 1821–1828. https://doi.org/10.1007/s00170-015-6947-z

Huh, T., Kim, Y., & Kim, J. H. (2018). Towards a Green State: A Comparative Study on OECD Countries through Fuzzy-Set Analysis. *Sustainability*, *10*(9). https://doi.org/10.3390/su10093181

Hunka, A., Vanacore, E., Mellquist, A.-C., & Fuertes-Gine, L. (2023). How to increase the uptake of circular public procurement? Lessons learned from local authorities in Sweden. *Journal of Public Procurement*, *23*(2), 245–271. https://doi.org/10.1108/JOPP-08-2022-0039

Jezzini, Y., & Assaad, R. H. (2024). Modeling the Impact of Low-Carbon Procurement on Bidding Dynamics. *Journal of Management in Engineering*, *40*(4), 04024022. https://doi.org/10.1061/JMENEA.MEENG-5997

Kadefors, A., Lingegård, S., Uppenberg, S., Alkan-Olsson, J., & Balian, D. (2020). Designing and implementing procurement requirements for carbon reduction in infrastructure construction – international overview and experiences. *Journal of Environmental Planning and Management*, *64*, 611–634.

Kadefors, A., Lingegård, S., Uppenberg, S., Alkan-Olsson, J., & Balian, D. (2021). Designing and implementing procurement requirements for carbon reduction in infrastructure construction–international overview and experiences. *Journal of Environmental Planning and Management*, *64*(4), 611–634. https://doi.org/10.1080/09640568.2020.1778453

Kjellberg, M., Skoglund, W., & Haller, H. (2024). Decreasing the carbon footprint of food through public procurement—A case study from the municipality of Härnösand. *Frontiers in Nutrition*, *11*. https://doi.org/10.3389/fnut.2024.1330892

Kou, M., Zhang, L., Wang, H., Wang, Y., & Shan, Z. (2024). The heterogeneous impact of green public procurement on corporate green innovation. *Resources, Conservation and Recycling*, *203*, 107441. https://doi.org/10.1016/j.resconrec.2024.107441

KS. (2024). *Nye tall fra KS: Svært krevende økonomisk situasjon også i 2025*. https://www.ks.no/fagomrader/okonomi/kno/nye-tall-svart-krevende-okonomisk-situasjon-i-2025/

Leal, A. R., Perez-Castillo, D., Amorós, J. E., & Husted, B. W. (2020). Municipal Green Purchasing in Mexico: Policy Adoption and Implementation Success. *Sustainability*, *12*(20). https://doi.org/10.3390/su12208339

Liu, X., & Yan, W. (2024). Current advances in slag foaming processes toward reduced CO2 emission for electric arc furnace steelmaking. *Journal of CO2 Utilization*, *90*. Scopus. https://doi.org/10.1016/j.jcou.2024.102979

Mai, N. P. (2012). *Environmental Awareness and Attitude towards Green Purchasing of Vietnamese Consumers*. https://api.semanticscholar.org/CorpusID:14303288

Malandrino, O., Sica, D., & Supino, S. (2019). The Role of Public Administration in Sustainable Urban Development: Evidence from Italy. *Smart Cities*, *2*(1), 82–95. https://doi.org/10.3390/smartcities2010006

Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative Research: A Guide to Design and Implementation* (4th ed.). John Wiley and Sons.

Mewenemesse, H. T., & Yan, Q. (2023). Policy Analysis of the Challenges to an Effective Switch to Low-Carbon Energy in the Economic Community of West African States. *Energies*. https://api.semanticscholar.org/CorpusID:257242421

Miljøfyrtårn. (2024). *OM MILJØFYRTÅRN*.

Nærings- og fiskeridepartementet. (2021). *Innkjøpssamarbeid i kommunesektoren*. Nærings- og fiskeridepartementet.

New, S., Green, K., & Morton, B. (2002). An analysis of private versus public sector responses to the environmental challenges of the supply chain. *Journal of Public Procurement*, *2*(1), 93–105. https://doi.org/10.1108/JOPP-02-01-2002-B004

OECD. (2011). *Towards Green Growth* [OECD Green Growth Studies]. OECD Publishing. https://www.oecd.org/en/publications/towards-green-growth_9789264111318-en.html

Ortega Carrasco, P., Iannone, F., Ferrón Vílchez, V., & Testa, F. (2024). Green public procurement as an effective way for sustainable development: A systematic literature review and bibliometric analysis. *Sustainable Development*. https://doi.org/10.1002/sd.3234

Puspitasari, N. B., & Glennardo, P. (2021). Assessment of green public procurement specifications in government institutions: Case study in Central Java, Indonesia. *IOP Conference Series: Earth and Environmental Science*, *794*(1), 012093. https://doi.org/10.1088/1755-1315/794/1/012093

Regjeringen.no. (2023). *Forslag til ny anskaffelseslov: Skal gjøre offentlige innkjøp enklere og mer bærekraftige*.

Rusu, E., & Manta, O. (2023). Forecasting and Directions Regarding Sustainable Public Procurement. *IETI Transactions on Data Analysis and Forecasting (iTDAF)*, *1*(2), 98–107. https://doi.org/10.3991/itdaf.v1i2.39987

Rutkowski, C. J., Eboch, K., Carr, A., & Greer, B. M. (2022). Strategic procurement collaboration for the common good: Private and public procurement relationship during a pandemic. *Journal of Public Procurement*, *22*(1), 43–63. https://doi.org/10.1108/JOPP-10-2020-0076

Saunders, M., Lewis, P., & Thornhill, A. (2015). *Research Methods for Business Students* (7th ed.). Pearson Education limited.

Shadrina, E. V., Vinogradov, D. V., & Kashin, D. V. (2022). Implicit incentives in green public procurement: Good intentions versus rigid regulations. *Ecological Economics*, *198*, 107458. https://doi.org/10.1016/j.ecolecon.2022.107458

Shaikh, A. R., & Channa, K. A. (2022). Drivers and deterrents of sustainable procurement practices – an exploratory study in the context of Pakistani HEIs. *Journal of Public Procurement*, *22*(4), 289–313. https://doi.org/10.1108/JOPP-02-2022-0006

Singh, S., Singh, G., Singh, S., & Misra, S. C. (2024). Understanding green procurement dynamics: An assessment framework for public sector organizations. *Journal of Environmental Management*, *351*, 119756. https://doi.org/10.1016/j.jenvman.2023.119756

SSB. (2024). *Grønne varer og tjenester*. https://www.ssb.no/natur-og-miljo/miljoregnskap/artikler/gronne-varer-og-tjenester/_/attachment/inline/0b7651f9-27cd-4552-843f-a6366884e340:b0d7b311331b8d099ed5936f7c6e685e8535097b/RAPP2024-01.pdf

Sugar, K., Moya Mose, T., Nolden, C., Davis, M., Eyre, N., Sanchez-Graells, A., & Van der Horst, D. (2022). *Local decarbonisation opportunities and barriers: UK public procurement legislation*. *3*, 895–895.

Sun, M., Gao, X., Jing, X., & Cheng, F. (2023). The influence of internal and external factors on the purchase intention of carbon-labeled products. *Journal of Cleaner Production*, *419*, 138272. https://doi.org/10.1016/j.jclepro.2023.138272

Vaughn, P., & Turner, C. (2016). Decoding via Coding: Analyzing Qualitative Text Data Through Thematic Coding and Survey Methodologies. *Journal of Library Administration*, *56*(1), 41–51. https://doi.org/10.1080/01930826.2015.1105035

Vejaratnam, N., Mohamad, Z. F., & Chenayah, S. (2020). A systematic review of barriers impeding the implementation of government green procurement. *Journal of Public Procurement*, *20*(4), 451–471. https://doi.org/10.1108/JOPP-02-2020-0013

Wang, Y., Ren, H., & Li, C. (2014). Cost-Benefit Analysis of Stakeholders for Low-Carbon Building. In J. Wang, Z. Ding, L. Zou, & J. Zuo (Eds.), *Proceedings of the 17th International Symposium on Advancement of Construction Management and Real Estate* (pp. 117–123). Springer Berlin Heidelberg.

Wei, B., Wang, N., Jiang, Q., & He, Z. (2022). Green Procurement and Outsourcing. In N. Wang, Q. Jiang, B. Jiang, & Z. He (Eds.), *Enterprises' Green Growth Model and Value Chain Reconstruction: Theory and Method* (pp. 205–223). Springer Nature Singapore. https://doi.org/10.1007/978-981-19-3991-4_9

Wei, J., Zhang, L., Yang, R., & Song, M. (2023). A new perspective to promote sustainable low-carbon consumption: The influence of informational incentive and social influence. *Journal of Environmental Management*, *327*, 116848. https://doi.org/10.1016/j.jenvman.2022.116848

Yin, R. K. (2014). *Case Study Research: Vol. Volume 5 of Applied social research methods series* (Illustrated). SAGE Publications.

Zijp, M., Dekker, E., Hauck, M., De Koning, A., Bijleveld, M., Tokaya, J., De Valk, E., Hollander, A., & Posthuma, L. (2022). Measuring the Effect of Circular Public Procurement on Government's Environmental Impact. *Sustainability*, *14*(16). https://doi.org/10.3390/su141610271

CHAPTER 5

Activating the public procurement system for social outcomes

A framework for tracking and advancing the mobilization and interaction of critical actors and resources

Luitzen de Boer, Sophie Hunt, Robert Grande, Anna Knudsen, Elsebeth Holmen and Jin Kristian Hurum
NTNU – Norwegian University of Science and Technology, Norway

Sammendrag: I denne artikkelen utvikler vi et analytisk rammeverk og ontologisk tilnærming, forankret i systemteori og kybernetikk, for å analysere og forme innovative offentlige anskaffelsesprosjekter. Ved å bruke en generisk struktur gitt av systemteori, kombinerer rammeverket to eksisterende modeller for offentlige anskaffelser, nemlig modellene til Thai (2001) og Sætertrø et al. (2023). Førstnevnte er av mer generell karakter, sistnevnte fokuserer mer spesifikt på innovative anskaffelsesprosjekter. Utviklingen av rammeverket illustreres av et pågående sosialt anskaffelsesprosjekt i Trondheim kommune. Noen foreløpige eksempler på hvordan rammeverket kan brukes til å analysere dette prosjektet er gitt. Når vi reflekterer over eksemplene, diskuterer vi også hvordan rammeverket kan legge til rette for en performativ ontologisk tilnærming som skissert av Pickering (2010), og som gir både praktikere som jobber med offentlige anskaffelser og forskere en felles plattform for selvreferanse og samordnet handling.

Nøkkelord: sosial bærekraft, offentlige anskaffelser, innovasjon, systemteori

Sitering: de Boer, L., Hunt, S., Grande, R., Knudsen, A., Holmen, E. & Hurum, J. K. (2025). Activating the public procurement system for social outcomes – A framework for tracking and advancing the mobilization and interaction of critical actors and resources. I Langseth, M., & Similä, J. O. (Eds.), *Public Procurement Pathways – Sustainability Edition* (pp. 129–154). Cappelen Damm Akademisk.
https://doi.org/10.23865/cdf.264.ch5

Summary: In this paper we develop an analytical framework and ontological approach, grounded in system theory and cybernetics, for analyzing and shaping innovative public procurement projects. Utilizing a generic structure provided by system theory, the framework combines two existing models of public procurement, namely the models by Thai (2001) and Sætertrø et al. (2023). The former is of a more general nature, the latter more specifically focuses on innovative procurement projects. The framework development is illustrated by an unfolding social procurement project in the Norwegian municipality of Trondheim. Some tentative examples of how the framework can be used in analyzing this project are provided. Reflecting on the examples, we also discuss how the framework can facilitate a performative ontological approach as outlined by Pickering (2010) providing both public procurement practitioners and researchers a joint platform for self-reference and concerted action.

Keywords: social sustainability, public procurement, innovation, system theory

Introduction

Public procurement is the governmental acquisition of goods and services and is one of the most important activities of the government (Thai, 2001). Norway has a tremendous state budget, with its annual spending on public procurement in 2023 accounting for circa 780 billion NOK (DFØ, 2025). This means that economically, it has great capacity to attend to social needs.

Chapter 1 of a recent white paper by the Norwegian government (Meld. St. 33, 2024) outlines that, despite the state's wealth and expansive public sector, Norway is experiencing increasing strains on its welfare system, driven by an ageing population and a rising number of young people outside employment, education, or training. These demographic shifts are contributing to growing social challenges, including social exclusion, long-term dependency on benefits, and youth unemployment.

In consequence, the sustainability of the welfare system is called into question, and new and innovative solutions are required. Multiple opportunities exist for generating additional social value through procurement, for instance through the selection of social suppliers such as nonprofits and social entrepreneurs, innovative procedures, e.g., impact contracts, and embedding social criteria into contracts (Furneaux & Barraket, 2014; Hunt et al., 2024; McCrudden, 2004). Nonetheless, advancements in social

procurement have been slow, and several barriers impede its progression (Brammer & Walker, 2011). Barriers relate to challenges in measuring social value, public sector risk aversion and uncertainty, procedural rigidity, and perceived higher costs (Brammer & Walker, 2011; Hunt et al., 2024; Knudsen et al., 2021).

While empirical research on this topic in Norway is emerging (Knudsen et al., 2021), there is still much to learn about how the said barriers impede progress and how these might be overcome. Furthermore, as more empirical research and subsequent findings become available, we also need theoretical models and concepts for analyzing the data and uncovering patterns and causal relationships that in return can aid practitioners and policy makers in addressing the barriers. While progress has been made in this area, Koala & Steinfeld (2018) concluded in their comprehensive study of the field that, despite some increase in the number of articles that contribute to theory building, public procurement still lags behind in terms of theoretical grounding and understanding. They also underline the importance of (theory producing) research aimed at public procurement practitioners by providing them with guidance for making better decisions (p. 297).

Against this background, the problem statement guiding our research can be formulated as follows: how can we theoretically conceptualize the system of processes, actors and resources involved in (and required for) innovative public procurement initiatives aimed at achieving social sustainability?

The aim of the paper is twofold. First, it aims to contribute to narrowing the "theory gap" by developing a theoretical, analytical framework for advancing academic research in public procurement, and in particular in social sustainability. We show how a formal decomposition logic based on general system theory (Kickert & van Gigch, 1979) can provide a foundation for conceptually combining Thai's (2001) general model of public procurement and a recent model of resources and actors involved in innovative public procurement at the municipal level developed by Sætertrø et al. (2023) into a rigorous analytical framework. The framework provides three separate dimensions of analysis of the "entire" public procurement system: subsystems ("who"), aspect systems ("what") and phase systems ("when"). The framework is meant to aid in uncovering how the individual and joint activities undertaken by a set of actors within and outside the

municipality aimed at preparing and carrying out an innovative public procurement project unfold and how this unfolding can be understood as a series of dynamic interactions within the public procurement system as conceptualized by Thai (2001).

Second, and in a broader sense, we aim to show how we can regard such analytical frameworks ontologically, and hence, *how* we imagine that practitioners can advance their practice using the framework and, what the role of researchers is in this. To this end, and following naturally from our use of system theory, we adopt a cybernetic perspective outlined by Pickering (2010), which he coined a *performative* ontology. We shall return to this in the discussion at the end of the paper.

While the research is essentially theoretical, we will use an ongoing social procurement project in the Norwegian municipality of Trondheim as a point of reference and inspiration, much in the vein of the systematic combining approach (Dubois & Gadde, 2002), a critical realist (CR) perspective on case studies as discussed by Aastrup & Halldorson (2008) and illustrating the proposed ontological approach developed in the paper by covering a first round of interaction between theoretical models in the literature and initial observations of empirical actions.

Increased understanding of this series of interactions may provide a basis for developing models and tools for supporting practice and policy development, not only for social public procurement but also sustainable public procurement in general.

The paper is organized as follows. The next section presents the theoretical background for the study, namely the models by Thai (2001) and Sætertrø et al. (2023). This is followed by a brief description of the ongoing social procurement project in Trondheim. In the following section (Analysis), we first briefly discuss the decomposition procedure suggested by Kickert & van Gigch (1979) and then we apply it by considering how the models by Thai (2001) and Sætertrø et al. (2023) – when combined into a single three-dimensional framework – can be conceived as the decomposition of a "complete" (yet ultimately unknowable) public procurement system, in this case, inspired by a first, tentative observation of the procurement system of the municipality of Trondheim. Next, in the discussion, we propose how our mapping of the case in Trondheim by using this framework can be understood as facilitating a forward-looking search in Pickering's terms. The conclusion chapter closes the paper.

Theoretical background

Despite the growing body of international public procurement research literature, few comprehensive frameworks or models have been developed (Langseth, 2024). Thai's model of the public procurement system (Thai, 2001) still seems the most developed and cited model and we will use this model as one of the main building blocks of our framework. This model also seems particularly appropriate as Thai's intention when developing the model was to capture the dynamic nature of the public procurement function, considering it not as one process but rather as a complex system consisting of several interacting subsystems. A basic visualization of the model is shown in Figure 1 below.

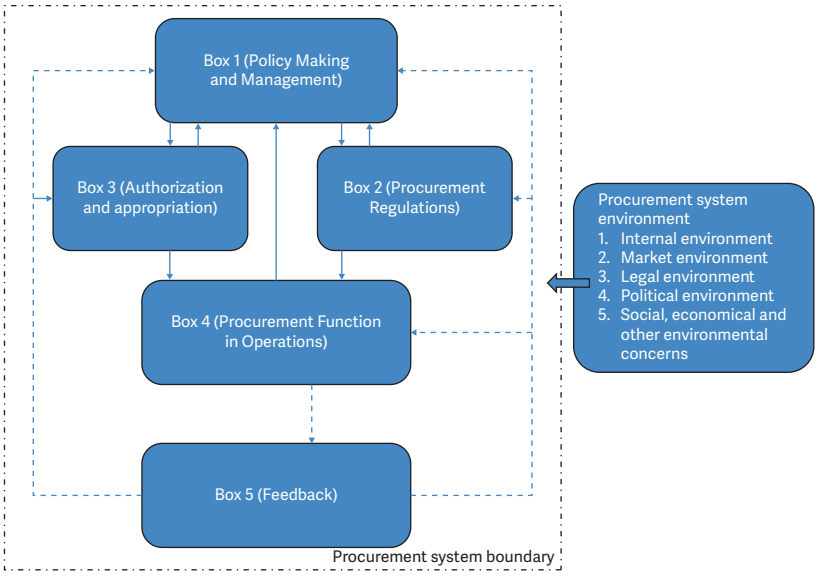


Figure 1. The Public Procurement System and its environments (slightly adapted from Thai, 2001, p. 18)

Fundamentally, Thai distinguishes between five subsystems within the public procurement system, each one referred to as a "box". Box 1 comprises policy making and overall management of the organization in focus; Box 2 covers the procurement regulations the organization is subjected to; Box 3 comprises the decisions related to providing funding and formally approving procurement projects; Box 4 contains the actual planning and execution of procurement processes, as well as the human resources and organizational

arrangements required, and finally, Box 5 comprises channels and systems for collecting and sending relevant information about the effectiveness of the procurement processes, the value of its outcomes and the effects of adjustments made in other parts of the system. The information again feeds into the other subsystems (boxes) as input for redesign and adjustments. In line with (complex) system thinking, the boxes are thought to operate autonomously to a certain degree, but they are linked to each other, creating a dynamic interplay.

Thai (2001) also specifies different environments that impose pressures and stimuli on the public procurement system, shown on the right-hand side of the model. Of particular interest to our study is the part of the environment called "social, economic and other environmental concerns" which deals with sustainable public procurement and, as a part thereof, social procurement.

The second "building block" in our study is a model developed in the research project FORAN in Norway (see Sætertrø et al., 2023) which is more specifically aimed at innovative public procurement and the resources and actors involved in these.

The FORAN model is shown in Figure 2 below.

As shown in Figure 2, the FORAN model consists of three interconnected levels: the innovative procurement process consisting of a number of consecutive stages, and two subsystems of actors (referred to as resources by the authors), the internal and external ecosystems. First, the procurement process unfolds through sequential stages, from need identification to implementation, shaped by interactions across the two ecosystems. The external ecosystem involves suppliers, research institutions, intermediaries, and other stakeholders, providing external expertise. In contrast, the internal ecosystem includes actors within the public organization, such as procurement professionals, end-users, and political leaders, who contribute institutional knowledge, operational knowledge and decision-making capacity.

Given the purpose of and intentions behind the models by Thai (2001) and Sætertrø et al. (2023), both models should be relevant for our (and others') study of social procurement projects in practice. Still, it does not seem immediately clear how the models can be combined, or how they relate and overlap with each other.

Hence, we see the need to consider how we could position the two models in a larger, unifying framework to more precisely see their relationships

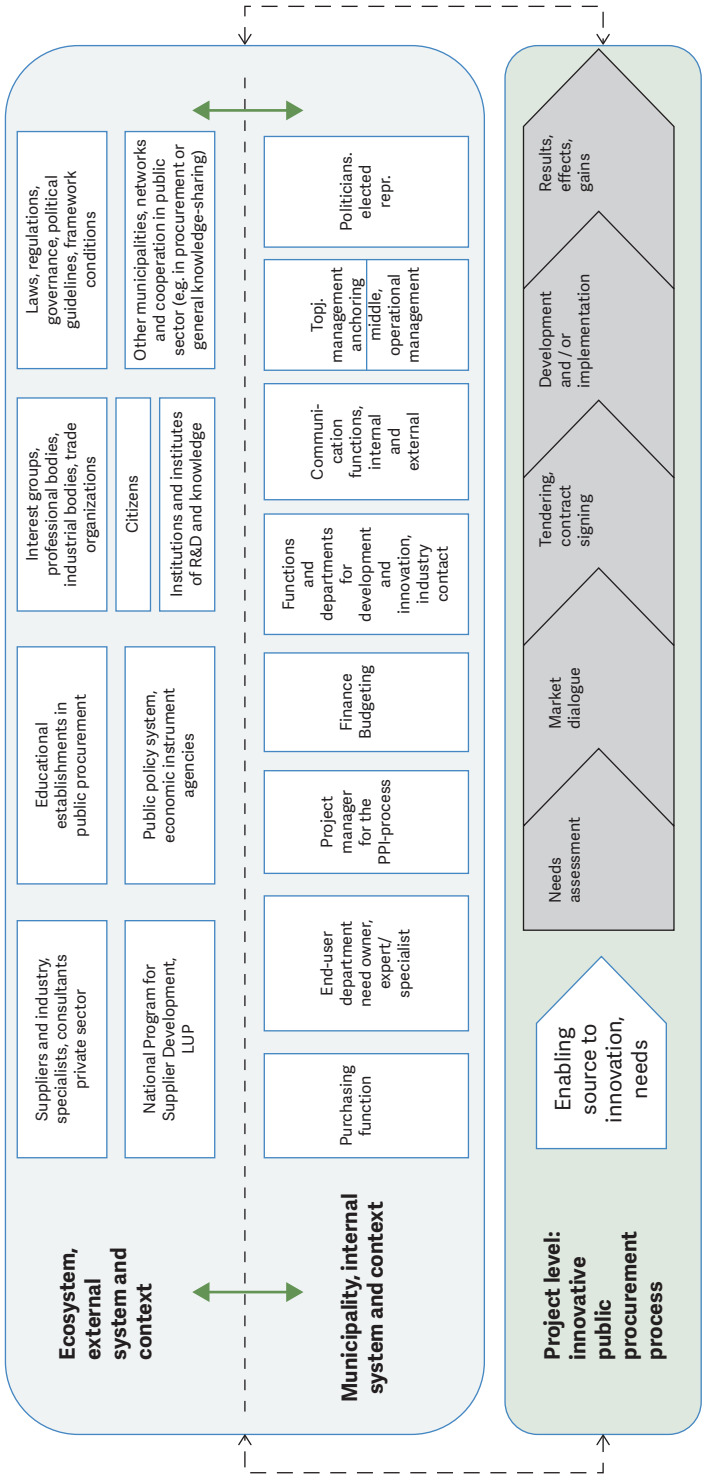


Figure 2. Resources and actors involved in innovative public procurement (Sætertrø et al., 2023)

and apply them together when analyzing empirical data (and for designing future empirical studies). This unifying framework, and the subsequent positioning of the models by Thai (2001) and Sætertrø et al. (2023) will be discussed in the analysis section, after we have briefly described the empirical case of social procurement in the municipality of Trondheim.

Methodology and empirical basis

As the empirical inspiration for our work, we follow the municipality of Trondheim in its efforts to create social outcomes through innovative public procurement. In this effort, Trondheim works together with the NTNU – Norwegian University of Science and Technology which has its main campus in Trondheim and the National Program for Supplier Development, ("Leverandørutviklingsprogrammet" in Norwegian) LUP. LUP is an intermediary organization, representing both the suppliers in Norway through Confederation of Norwegian Enterprise (NHO) and the municipalities and counties through the Norwegian Association of Local and Regional Authorities (KS). In addition, the Research Council of Norway and Innovation Norway are co-owners of LUP. LUP provides specialist knowledge on and experience with stimulating and facilitating interaction between public clients ("procuring units") and suppliers, as well as other relevant stakeholders.

Description of the data sources, methodological approach and epistemological basis

The data presented in this chapter are gathered from the first and third authors' observations, supported by analyzing joint meeting schedules in meeting systems such as Outlook and Google Meet which were used to plan meetings among the various participants involved from Trondheim municipality, NTNU and LUP. An overview of these meetings is provided in Table 1. Furthermore, the email correspondence prior to and after these meetings in which the first author was involved gave further details about the purpose of the various meetings. In addition, Trondheim municipality's newly adopted procurement strategy document[1], covering the procurement strategy for 2023-2030 was an important data source. Overall, the aim was to

1 This strategy document is available on the municipality's homepage (last accessed 05.05.2025): https://www.trondheim.kommune.no/org/miljo-naring-og-samferdsel/innkjopstjenesten/

capture part of the communication and collaboration processes among the various actors involved: essentially trying to answer the questions of who was talking to whom about what and at which point? However, the authors realize that the case description by no means is – or ever could be – a full account of all communication and collaboration happening between the actors. We see our approach as fitting very well with a critical realist (CR) perspective as explained and discussed by Aastrup & Halldorson (2006) and Easton (2010) in the sense of accepting that there is a reality independent from the observers (researchers), and that researchers' knowledge of this domain (their observations), however, always will be limited and shaped by theory. Case study research is well suited to help unravel complex causal relationships between actions, events and outcomes in the observed reality. Our study, admittedly, is still at a very early stage of such a process, but it does aim to provide an analytical framework and ontological approach for enabling the "…reasoning process moving back and forth between the actual and the real domain." (Aastrup & Halldorson, 2008, p. 756). Critical realism has also underpinned recent research on social procurement (Curtis, 2017).

Table 1. Overview of some of the meetings held in relation to the social procurement initiative in trondheim municipality

Date of meeting	Participants	Topic/purpose
12/12/2023	Head of Procurement, RU manager, NTNU researcher	Initial meeting to discuss a plan for implementing social sustainability in a procurement project
30/05/2024	Meeting of municipal network of procurement contacts, Head of Procurement (chairman), NTNU researcher, presentations by RU advisor and (local) LUP advisor	Creating awareness among the procurement contacts in the municipality about social procurement and innovative public procurement in general
08/08/2024 (digital)	Head of Procurement, 2 LUP advisors, RU advisor, NTNU researcher	Follow-up meeting, discussing how to proceed after the network meeting in May
24/09/2024 (digital)	Coordinator for collaboration project NTNU and Trondheim (TRD3.0), Head of Procurement, RU advisor, NTNU researcher	Meeting to discuss an application for receiving seed funding from TRD3.0 to support the initiative and develop an application for the Ministry of Labour and Social Inclusion
02/10/2024 (digital)	Coordinator for collaboration project NTNU and Trondheim (TRD3.0), Head of Procurement, NTNU researcher, (local) LUP advisor	Working meeting to further detail the seed funding application for TRD3.0

(Cont.)

Table 1. *(Cont.)*

Date of meeting	Participants	Topic/purpose
16/10/2024 (digital)	Coordinator for collaboration project NTNU and Trondheim (TRD3.0), Head of Procurement, 2 NTNU researchers, RU advisor	Working meeting to further detail the seed funding application for TRD3.0 and the application for the ministry
15/11/2024 (digital)	Head of Procurement, local LUP advisor, RU advisor, 2 NTNU researchers	Seed-funding application was accepted 28/10/2024, planning of an actual procurement project addressing social outcomes (cleaning services)
22/11/2024 (digital)	Coordinator for collaboration project NTNU and Trondheim (TRD3.0), Head of Procurement, NTNU researcher	Discussing possible additional support funding from the TRD3.0 project
06/02/2025 (digital)	Head of Procurement, NTNU researcher, NTNU master's student	Kick-off meeting to link a master's thesis project to the social procurement activities in Trondheim municipality
26/02/2025 (digital)	Coordinator for collaboration project NTNU and Trondheim (TRD3.0), Head of Procurement, NTNU researcher	Short meeting to discuss the status of the social procurement initiative
10/04/2025 (digital)	Head of Procurement, 2 LUP advisors, RU advisor, NTNU researcher, NTNU master's student, additional municipal officers	Updating each other on the activities carried out, including market dialogue meetings with suppliers of cleaning services, planning and discussing further activities (designing the tender documents, NTNUs research on the entire initiative)

Briefly about Trondheim[2]

Trondheim is the third largest city in Norway and has over 214,000 residents as per January 2024. The municipality employs around 15,000 people. The responsibilities for the different tasks in the municipality are organized in 7 main sections: (1) city development, (2) health care and care services, (3) culture, sports and recreation, (4) schooling and education, (5) finance, (6) environment, industry and public transport and (7) social services.

The main idea behind using innovative public procurement for social sustainability

The new strategy for procurement in Trondheim Municipality sets requirements for social sustainability in public procurement. The municipality

2 The numbers and the description of the municipality's organization in this subsection are based on the municipality's homepage: www.trondheim.kommune.no, accessed on 31/01/2025

is also facing challenges with rising unemployment and increasing social assistance costs. Hence, the question arises how an innovative procurement practice can be developed to contribute to social sustainability. "In an innovative procurement, one enters into dialogue with the market before the procurement, conveys the need and leaves the solution to the suppliers. This creates better and more sustainable products and services for the future." (www.lup.no)

The numbers from Statistics Norway (SSB) for March 2025 showed that the unemployment rate in Norway was at 4.1 percent of the labor force (SSB, 2025a). Looking at habitants in the age range of 20–66 in 2023, an analysis from SSB (SSB, 2025b) shows that 18.4 percent of the working-age population were outside employment, education, and labor market programs. Among Ukrainian refugees, the proportion was over 50 percent.

In chapter 3 of their Perspective report from 2024 (Meld. St. 31, 2024), the Norwegian government discusses the need to increase the labour force in the light of the deteriorating ratio between the number of people working and the number of people not working and above the age of 67. The welfare state will face challenges with higher spending on pensions and health services and lower income from income tax. There is therefore a need for labour.

Trondheim municipality has settled many refugees with the capacity to work. Numbers from the Ministry of Labour and Social Inclusion (IMDI, 2025) show, however, that in 2023, only 37.6% of them secured employment immediately after completing the one-year introduction program, and few obtained permanent positions. One could argue that 37.6% is a promising outcome after just one year in the country, especially given the time required to learn a new language. Also, after three years, 71% are in employment, education or other qualifying programs. Over 40 percent make it into education, or other qualifying programs at Nav (the Norwegian Labour and Welfare Administration). While in qualifying programs, participants get welfare benefits, so at this stage it is not contributing to taking down public costs. Still, building on basic insights from research going back to the 1980s (Linn et al., 1985), we may assume that, in general, unemployment leads to increased psychological stress and increased use and reliance on health services. Fundamentally, therefore, this makes the case for aiming to apply public procurement as a driver of creating work and education opportunities for disadvantaged groups, avoiding unemployment and its adverse effects on mental and physical health, and consequently, rising costs for the support systems.

The Refugee Unit (Flyktningenheten i Trondheim kommune) is responsible for settling refugees in the municipality. The Refugee Unit's (RU) task is to facilitate the integration of refugees in Trondheim into society and to help them become economically independent. RU provides housing and health follow-ups and coordinates the qualification of the municipality's newly settled refugees through the introduction program. RU collaborates with educational institutions, employers, public agencies and voluntary organizations in the work to qualify each participant in the introduction program. Settlement, qualification and health follow-ups are carried out in accordance with national laws, guidelines and local decisions.

A brief overview of how the collaboration between internal and external actors evolved

Trondheim Municipality, NTNU and LUP have been working together in research and teaching in public procurement for many years and in various contexts such as research projects, workshops, master's thesis projects, guest lectures and so on. Both Trondheim and NTNU are also formal partners in LUP. The project described in this paper, focusing on social sustainability, started in the autumn of 2023 and is still ongoing. Hence, this chapter covers the work carried out so far, until circa April 2025.

At the end of 2023 and following earlier discussions of the topic of social sustainability and public procurement, Trondheim Municipality, represented by the Procurement Unit and the Refugee Unit (RU), along with NTNU and LUP, set out to jointly investigate how public procurement could contribute to solving social challenges, with a focus on inclusion in working life.

More specifically, the project aimed to examine what social criteria could be and how they could be used in procurement, through an innovative procurement method. The municipality wished to explore whether it was possible to include social criteria in tenders. Social criteria could include requirements for internships and jobs for vulnerable people, as well as workplace adjustments, good training routines, work environment, and salary. The goal was to determine whether such an innovative public procurement could increase inclusion in working life. For example, could the municipality demand internships as part of the tender?

Through the project, we wished to examine whether including social criteria in the tender would ensure that suppliers were committed to

working on social sustainability, with the benefit being the chance to win a tender with the municipality. The inclusion of environmental (green) criteria had already become a well-established practice in the municipality's procurement projects, especially in relation to reducing GHG-emissions.

The team sought to identify suitable social criteria and what social challenges could be solved through socially sustainable procurement, and how.

Laundry and cleaning services were identified as potentially suitable areas for serving as a pilot for the municipality's continued work on social sustainability in public procurement. The pilot would target refugees and would provide the foundation for developing a template for how tenders could be designed to include social sustainability in public procurement in other areas as well. Therefore, in addition to internships, the team explored more social criteria that could contribute to increased social sustainability in public procurement. The long-term plan was to include more vulnerable groups and address other social challenges. NTNU and LUP followed the process to ensure research and development. This very chapter is part of that process, documenting and analyzing the efforts of the team so far.

The project received some support from the municipal leadership as part of the municipality's collaboration with NTNU as a university municipality (the so-called TRD3.0 project, also see Table 1). The collaboration on the university–municipality concept aimed to stimulate innovation in the public sector in cooperation with research and development. Trondheim Municipality also sought funding for the implementation of the project from IMDi, the Norwegian Directorate of Integration and Diversity, but this application was rejected. IMDi considered the project to not fit their strategic priority of method for integrating immigrants. The project group also looked for other funding from relevant organizations that could benefit from the project.

Our next step was to explore the topic with suppliers through a pre-tender market dialogue.

Market dialogue as a tool

In the work to include social award criteria in cleaning services for Trondheim Municipality, a market dialogue was carried out to better understand suppliers' opportunities and barriers in including refugees in internships or employment. The dialogue was carried out in March 2025 and provided insight into what is required to succeed with social

sustainability, both practically and economically, and is likely to inform the process of designing the criteria in the tender phase. Below we go through some important feedback from the suppliers and reflections from the dialogues with them.

Economic concerns – is the gain worth the cost?

Several suppliers expressed concern that training and follow-up of interns, especially those without industry experience, require extra time and resources and may affect efficiency and quality in the initial phase. This, in turn, can impact the suppliers' competitiveness and lead to increased service prices – a development that is understandable and to some extent acceptable. At the same time, it's important to avoid price increases to fund measures that several businesses undertake anyway, and have good onboarding programs for, as many already face a need for recruitment and training programs.

The municipality offers wage subsidies as support ("Lønnstilskudd" in Norwegian). This support is provided by NAV which is the Norwegian Labour and Welfare Administration. Nav gives the support for a certain extent of time to motivate employers to hire a refugee with extra needs. It is crucial that these are not used for longer than necessary before the person is hired on regular terms. Prolonged use of subsidies increases public expenses, which in the long run can impact other essential services such as education and healthcare. The municipality's financial flexibility is under pressure, and the government's *Perspektivmeldingen* (Meld. St. 31, 2024) shows how demographic changes are adding further strain to public budgets. This highlights the need for collaboration with the private sector in addressing societal challenges. The societal benefits of including more people in work are substantial: it increases tax revenues and reduces expenditures on social welfare and unemployment benefits.

It was also noted that requirements for cleaning to take place at specific times – often outside regular working hours – reduce flexibility for the suppliers. Several expressed a desire for more daytime cleaning, which could improve working conditions and reduce additional costs. Although this is not relevant for this specific tender, which concerns daytime cleaning in municipal apartments and buildings, it should be considered in future procurements as a potential way to economically offset social measures.

Who bears the cost – and should funds be redistributed?

Currently, the municipal unit that purchases the service also covers any additional costs related to social inclusion. There is a need to consider whether such costs should be more centrally funded – for example, through a municipal support scheme aimed at socially responsible procurement. This would make it easier for services to take social responsibility, while ensuring that the costs align better with the long-term social benefits. However, the persistent challenge remains that the public sector is under pressure to reduce its costs and think in new ways. Is the solution then to shift more responsibility to the private sector? Our project aims to explore this, as well as the collaboration between the public and private sectors and how we can work together – both practically and financially – to help more people into employment.

Impact measurement and uncertainty

Measuring impact is challenging. The number of internships and transitions to work are quantitative indicators, but much of the impact is long-term, qualitative, and difficult to document – such as improved collaboration between the municipality and NAV, strengthened supplier competence, and lasting labor market inclusion. There are also unforeseen costs and adjustment needs in contracts. The Refugee Unit will use a control group to compare results with participants not included in the project.

Future labor needs

One supplier pointed out that the cleaning industry might become more automated in the future, potentially reducing the need for labor. If this happens, it challenges the industry's role as a gateway into the workforce for vulnerable groups. This underscores the need for strategic procurement to adapt to changing needs and for ongoing dialogue with the market. It also raises the question of whether automation that displaces human workers should be regulated to avoid more people being excluded and becoming a greater cost for the welfare state.

Analysis and discussion

Against the empirical background described in the previous section, and building on the models by Thai (2001) and Sætertrø et al. (2023), which

both draw on insights from system theory, we now explore how we could apply system theory to more precisely link and combine the models. We will use the approach developed and discussed in Kickert & van Gigch (1979) which builds on earlier work by de Leeuw (1976). Adopting de Leeuw's terminology for defining a system as consisting of a set of elements with relationships between these elements (all elements having at least one relationship to another element), they distinguish between three ways of decomposing such a system (p. 1225, 1226):

(1) *Subsystem*: a subsystem consists of a subset of the total system's elements with all the original relationships between these elements.
(2) *Aspect system*: an aspect system consists of all elements of the total system yet with only a subset of all relationships.
(3) *Phase system*: a phase system is defined as a system identical to the original system, yet only during a specific time period.

Put in another way, and considering the total system as an organization, a subsystem may represent a department or unit in the organization and all the relationships between the elements in that unit. An aspect system may for example concern all communication within elements of the organization regarding a certain topic (only), for example purchasing. A phase system will consider the entire organization and all its relationships that occur within a certain time interval (only).

In the next step, we may consider how these lines of decomposition can be applied to a municipality (seen as a system).

Immediately, it seems that Thai's (2001) model provides a useful categorization of aspects (issues): policy and strategy, authorization and approvals, regulations, procurement operations and feedback. The model by Sætertrø et al. (2023) can be said to cover both phases (corresponding to the stages in the innovative procurement process) and relevant subsystems (consisting of the actors mentioned under the internal and the external ecosystem and context).

Figure 3 shows the resulting analytical framework identifying three dimensions (lines of decomposition) which can be used to systematically analyze empirical data gathered about public organizations' processes and efforts related to innovative public procurement. For the ease of illustration, the "subsystem" axis only mentions the internal and external ecosystems as

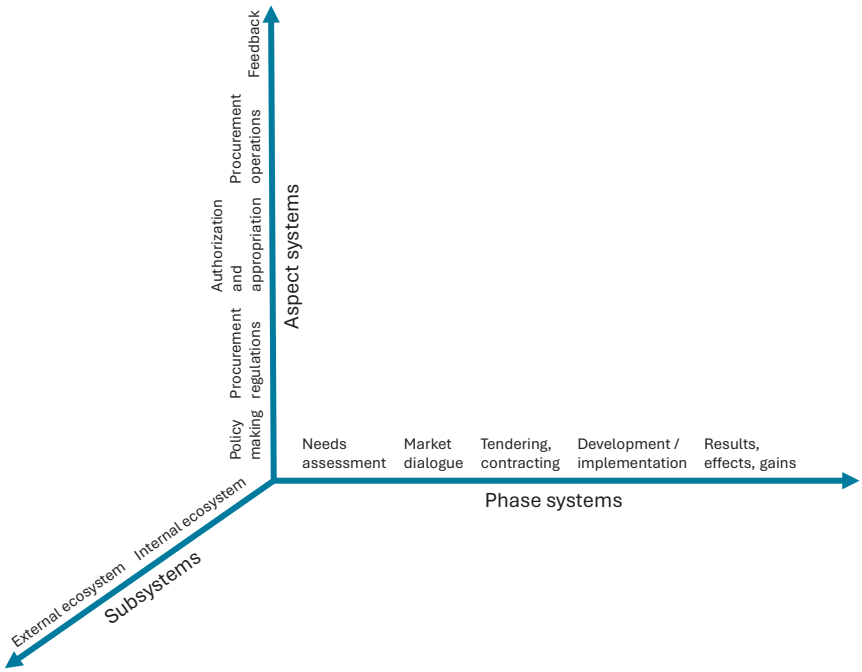


Figure 3. Analytical framework for analyzing innovative procurement projects combing the models by Thai (2001) and Sætertrø et al. (2023)

main headings. The various subcategories of each ecosystem are not shown in the figure due to limited space.

Following Kickert & van Gigch (1979) we could say that the carrying out of an innovative procurement process (as a particular type of organizational decision-making process) can be modelled as a path in the 3-dimensional space of the framework (p. 1226).

Furthermore, and perhaps more importantly, the framework provides a structure for designing more specific analyses, focusing on and combining only specific dimensions. For example, for each dimension (and position along that dimension) one can construct tables positioning the remaining dimensions towards each other. An example of such a table is shown below in Table 2. The entire table is assigned to assessing the aspect of procurement regulations (Box 2 in Thai's model) in a particular case. On the horizontal axis (columns) we see the different phase systems. On the vertical axis we have the different internal and external subsystems.

Table 2. Example of a more detailed analysis table derived from the framework – a tableau for mapping possible relationships between different subsystems regarding the aspect "Public Procurement Regulations" for each phase system

Aspect: public procurement regulations	Needs assessment	Market dialogue	Tendering contracting	Development and implementation	Results, effects and gains
Purchasing function					
End user department					
Project manager					
Finance, budgeting					
Development and innovation unit					
Communication function					
Top management					
Politicians					
....					
Suppliers					
LUP					
Educational actors					
.....					

For example, inspired by our case from Trondheim, it is likely that a purchasing department discusses the possibilities within the legal framework of using social criteria with the end user department (e.g. the RU in our case) and a third-party actor such as LUP. Furthermore, also horizontal relationships could be observed (not shown in the figure), i.e. relationships between different phases regarding procurement regulations for a certain subsystem.

Once Table 2 was completely filled out for our case, this would represent the aspect system "*public procurement regulations*" for the case. Somewhat ahead of the final part of the discussion, we draw attention to the use of the verb "would" in the previous sentence suggesting that it may not necessarily be feasible or even useful to aim at such a complete mapping.

Going back to Table 2 again, in a similar fashion, other aspect systems could be derived (public procurement policy, authorization and appropriation and so on) and tables could be constructed and filled out for each *subsystem* (mapping relationships between aspects for each phase).

All in all, as pointed out by Kickert & van Gigch (1979), six basic types of relationships can be identified given that there are three ways of

decomposing. Examples of what we could analyze and/or expect to find in our case (so far) are shown in Table 3 below.

Table 3. Basic types of relationships in the Public Procurement System (Extended from Kickert & van Gigch, 1979), p. 1226)

Basic relationship type	General interpretation	Likely examples in our case
Subsystem-subsystem	Interaction, power (dependency) communication	Interactions between purchasing department, end user department, LUP, NTNU
Aspect-aspect	Functional coordination, how do issues relate to each other?	Are there dependencies between, for example, procurement regulations and social policy goals?
Phase-phase	What is the sequence of phases, or how are phases otherwise related to each other?	How is the planning of the entire innovative procurement project dependent on the start or end of specific project phases?
Aspect-subsystem	Which actor deals with which aspect?	Which actors are responsible for or will provide feedback on (performance assessment) of the social outcomes?
Phase-subsystem	Which actor(s) act(s) in which stage?	In which stages is LUP mostly involved?
Phase-aspect	Which issues are dealt with at a particular stage?	In which stage(s) is the authorization or provision of supportive funding necessary or provided?

By considering the relationship types identified by Kickert & van Gigch we achieve more specific cross-sections within the "total" public procurement system as shown in Figure 3.

Table 4 shows a more specific example of how some of the relationship types from Table 3 could be further mapped and portrayed, and cross-sections could be obtained. It shows a tentative analysis (based on the data described in the Methodology and Empirical Basis chapter) of subsystems and aspect systems (and relationships between these) in the Trondheim case for "only" two phase systems: the needs assessment phase and the market dialogue phase.

In the table we indicate which subsystems, both internal and external, communicate with each other regarding one or more aspect systems. For example, under the aspect system "Policy" we consider the presentation of the municipality's procurement strategy, and its coverage of social sustainability with both internal departments and external collaboration partners such as NTNU and LUP. Under the aspect system "Appropriations and Authorizations" we consider the joint efforts by the municipality and NTNU

to obtain additional funding for the efforts, both regarding the social procurement activities as such and NTNU carrying out research on these activities. The subsystems approving (or rejecting) the applications are also included: the Economics department in the municipality, the NTNU cross-faculty initiative managing the TRD3.0 project and the Ministry of Labour and Social Inclusion. Under the aspect system "Operations" we consider the internal meetings between municipal departments (Purchasing, Refugee Unit, Real Estate Unit) reflecting on the suggestions and comments received from the suppliers in the supplier market dialogue. The feedback aspect system covers exchange of experiences and external knowledge between municipal units (Purchasing and the Refugee Unit) and NTNU, LUP and the suppliers.

Arriving at the closing discussion of our analysis, we wish to put forward three points.

Firstly, the three-dimensional framework of the public procurement system quite easily accommodates an immediate mapping of observed actors (subsystems), topics (aspect systems) and process stages (phase systems) in the context of public procurement aimed at social outcomes.

Secondly, and beyond capturing immediate observations, it also provides a comprehensive and rigorous structure and taxonomy for carrying out more elaborate mappings of the public procurement system. Taking a critical realism perspective (as discussed earlier in the chapter), it may act as a guideline for both practitioners and researchers to unravel causal relationships and mechanisms operating in the realm of the real, and which are critical for producing successful outcomes in the realm of the actual, and to avoid overlooking or underestimating certain subsystems, aspects or phase systems by guiding the search underlying the empirical realm.

Thirdly, however, despite our claim that the framework provides a comprehensive and robust framework for mapping a complex public procurement system, the project also simultaneously reminds us of the impossibility of achieving absolute completeness of the mappings and descriptions. Compatible with a critical realism perspective and our use of system theoretical models in constructing the framework, we suggest that the *performative, cybernetic ontology* outlined by Pickering (2010) provides a fitting and practical perspective for us to envisage how the framework can be used by practitioners and researchers, both individually and perhaps more importantly, jointly. Pickering proposes his performative ontology as an alternative to what he refers to as the *representational* idiom for thinking about science (Pickering, 2010, p. 19). A representational ontology is based on an ambition to first establish complete and precise descriptions

Table 4. Mapping relationships between subsystems and aspect systems

Needs assessment phase system *) Market dialogue phase		**Aspect systems**				
		Policy	**Regulations**	**Appropriations & Authorizations**	**Operations**	**Feedback**
Internal subsystems	Purchasing Dept.					
	Refugee Unit					
	Real Estate Unit					
	Economics Dept.					
	Cross dept. Purchasing network					
External subsystems	NTNU researchers					
	LUP					
	Suppliers of cleaning services*					
	Ministry of Labour and Social Inclusion					
	NTNU cross-faculty inititative					

of reality and then derive appropriate actions based on these descriptions. The key to a performative ontological approach, however, is simultaneously recognizing the need for models of reality and accepting the premise of the fundamental unknowability of that reality. Pickering speaks of a "forward looking search" (2010, p.18) implying that practitioners proceed by basing their actions on partial (simplified) models of reality, which in turn are refined and developed as a result of learnings and experience obtained along the way. Thereby accepting that the real world is never wholly captured, and that insights from empirically captured outcomes and the mechanisms that actually operated and produced them, may suffice to guide future action.

We suggest that the framework developed in the paper can serve as a designated (yet still open) space for public purchasers, guiding and informing their forward-looking search for improved social outcomes. The three dimensions and the subdivisions with each dimension may serve as

a starting point for a selective, initial mapping of the "entire" system, drawing attention to what could be essential subsystems, aspects and phases (Conant & Ashby, 1970), yet allowing for gradually refining, deepening and adjusting the model (mapping) of the system as practice evolves and lessons are learned. In this sense, the framework can also be thought of as a modelling platform for sharing and documenting knowledge and experiences across organizational boundaries, just as in our project, connecting different units within the municipality with external actors such as universities, knowledge intermediaries and suppliers. It could accommodate what Beer (1985) refers to as "system 4" in his Viable System Model (VSM) of organizations, performing the *necessary* (but not sufficient) role of providing the organization with a picture of itself and how it is embedded in its environment ("self awareness", Beer, 1985, p. 115). This picture should arguably be based on – or least be informed by – a mapping along the three-dimensional framework developed in this paper. Inspired by Beer's ideas about how one could envisage system 4 to be brought about, a very provisional sketch of a system 4 for social procurement is shown in Figure 4.

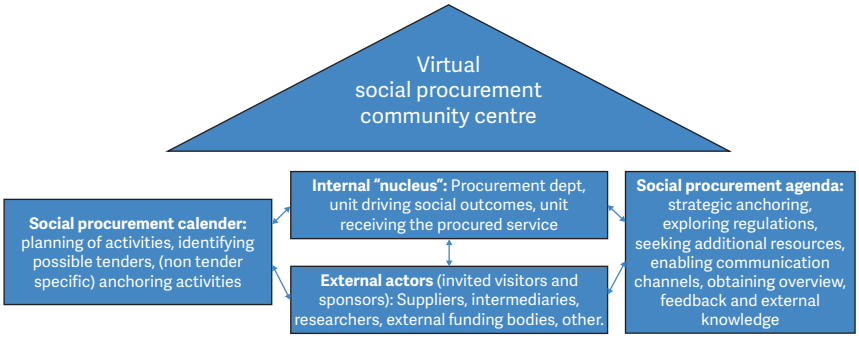


Figure 4. Embedding the three-dimensional framework in Stafford Beer's notion of an outward-looking and self-referencing system

Beer suggests that system 4 could take the shape of an "operations room" (Beer, 1985, p. 117). In our sketch, we imagine it could be conceived as a community center, perhaps virtual or hybrid. Essentially, it would be a meeting place for gathering crucial internal and external actors (subsystems), providing an overview of important issues on a social procurement agenda (aspect systems) and assisting in planning activities (phase systems). It could also be used for structuring case stories that can be shared and circulated within as well across public organizations that aim to instigate or augment social procurement as a practice.

Conclusion and further research

The models by Thai (2001) and Sætertrø et al. (2023) seem to complement each other rather well when positioning them in the more generic system-theoretical models of organizational decision-making developed by de Leeuw (1976) and further refined by Kickert & van Gigch (1979). A basic analytical framework for outlining and analyzing innovative public procurement was derived which can provide rigorous models of the procurement process in terms of three basic dimensions: subsystems (actors), aspect systems (topics, issues) and phase systems (stages in the procurement process).

Furthermore, we sketched how the possible relationships among these dimensions may be mapped systematically, albeit progressively and in the spirit of a performative ontology (Pickering, 2010). This sees the framework as a platform for ongoing and selective mapping of the large and complex public procurement system, rather than suggesting a complete description could (or should) be achieved. Using Trondheim municipality as an example, we illustrated how this may result in a first mapping of the system for the case of social procurement.

Clearly, many more facets could have been addressed in this chapter, which we aim to take on in future work. Following up on Koala & Steinfeld's (2018) plea for more theory-driven research in public procurement, an important task is to further explore the potential of the framework as a vehicle for further theory development when it is applied in cases such as the one we described in Trondheim municipality. Again, taking the critical realism perspective, we suggest the framework can serve as a common reference model for researchers investigating different cases. This may help researchers, practitioners and policy makers to identify and explicate underlying mechanisms that seem to determine which subsystems, aspect systems and phase systems (and interactions between these) are critical to successful, sustainable procurement outcomes and thus further development of social procurement practice.

Acknowledgements

The authors would like to kindly acknowledge Elisabeth Smith and Hanne Solgård-Øverlier from LUP for the valuable feedback and comments on earlier drafts of the chapter and in various meetings related to the project.

Author biographies

Luitzen de Boer is a professor at the Department of Industrial Economics and Technology Management (IØT) at NTNU – Norwegian University of Science and Technology. He teaches and conducts research in the areas of purchasing management, public procurement and logistics management, often with a focus on problems related to sustainability and innovation.

Sophie Hunt is a PhD candidate at the Department of Industrial Economics and Technology Management (IØT) at NTNU – Norwegian University of Science and Technology. She conducts research in the areas of social entrepreneurship and public procurement, and in particular explores the links between these areas.

Robert Grande is Head of Procurement for Trondheim municipality and unit manager for the Purchasing Service in the municipality. He has 34 years of work experience in private and public positions, of which 29 years in management positions within the areas of purchasing and logistics, development, production, communication and marketing.

Anna Knudsen has worked with diversity and inclusion in the public sector since 1997, among other things as project manager in the Groruddal initiative (Oslo municipality) and programme adviser and head of department in the Refugee Unit of Trondheim municipality. She has also been a professional advisor at NAPHA (NTNU Social Research), advisor in the municipal director's staff for Health and welfare in Trondheim municipality, and is now back in the Refugee Unit as management support.

Elsebeth Holmen is a professor at the Department of Industrial Economics and Technology Management (IØT) at NTNU – Norwegian University of Science and Technology. She teaches and conducts research in the areas of strategic management, innovation, procurement and supplier development, and inter-organizational interaction.

Jin Kristian Hurum has worked as a researcher on the FORAN project and in the spring of 2025 took on a research position at the Department of Interdisciplinary Studies of Culture (KULT) at NTNU, starting as a PhD candidate from the autumn of the same year. His research interests are aimed at the importance of technology in the public sector, with a particular focus on how innovation can be promoted and facilitated in practice.

References

Aastrup, J. & Halldorson, A. (2008). Epistemological role of case studies in logistics. A critical realist perspective. *International Journal of Physical Distribution & Logistics Management*, *38*(10), 746–763.

Beer, S. (1985) *Diagnosing the system for organizations*. John Wiley & Sons.

Brammer, S. & Walker, H. (2011). Sustainable procurement in the public sector: An international comparative study. *International Journal of Operations & Production Management*, *31*(4), 452–476.

Conant, R. C. & Ashby, W. R. (1970). Every good regulator of a system must be a model of that system. *International Journal of Systems Science*, *1*, 89–97.

Curtis, T. (2017). *Being and becoming a social enterprise: Isomorphism & social procurement. A review of the literature relating to "business-like" social enterprises and entrepreneurship.* Working paper, The University of Northampton.

de Leeuw, A. C. J. (1976). *The control paradigm as an aid for understanding and designing organizations.* (TH Eindhoven. Vakgr. organisatiekunde: rapport; Vol. 36). Technische Hogeschool Eindhoven.

DFØ (2025). Direktoratet for forvaltning og økonomistyring [the Norwegian Agency for Public and Financial Management], retrieved from https://dfo.no/nokkeltall-og-statistikk/innkjop-i-offentlig-sektor/utgifter-til-offentlige-innkjop.

Dubois, A. & Gadde, L. E. (2002). Systematic combining: An abductive approach to case research. *Journal of Business Research*, *55*(7), 553–560.

Easton, G. (2010). Critical realism in case study research, *Industrial Marketing Management*, *39*, 118–128.

Furneaux, C., & Barraket, J. (2014). Purchasing social good(s): A definition and typology of social procurement. *Public Money and Management*, *34*(4), 265–272.

Hunt, S., Haneberg, D. H. & de Boer, L. (2024). Conceptualising a chameleon: Social enterprise as a public provider. *Journal of Public Procurement*, *24*(1), 42–69.

IMDI (2025). Numbers from the Directorate of Integration and Diversity (IMDI), retrieved from (https://arkiv.imdi.no/om-integrering-i-norge/statistikk/K5001/kvalifisering).

Kickert, W. J. M. & van Gigch, J. P. (1979). A metasystem approach to organizational decision-making. *Management Science*, *25*(12), 1217–1231.

Knudsen, A. K., Hunt, B. S., & de Boer, L. (2021). Sosial verdiskaping i norsk arbeidsliv gjennom innovative offentlige anskaffelser. In T. Kongsvik, Ø. Moen, O.E. Vie, R. Bramming Jørgensen & E. Albrechtsen (Eds.) *Norsk arbeidsliv mot 2050: Muligheter og trusler.* pp. 343–365. Fagbokforlaget.

Koala, K. & Steinfeld, J. (2018). Theory building in public procurement. *Journal of Public Procurement*, *18*(4), 282–305.

Langseth, M. (2024). *Data-driven decision-making in the public procurement system: The case of Norway* [Doctoral dissertation, Norwegian University of Science and Technology]. Accessible on https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/3122919.

Linn, M. W., Sandifer, R. & Stein, S. (1985). Effects of unemployment on mental and physical health. *American Journal of Public Health*, *75*(5), 502–506.

McCrudden, C. (2004). Using public procurement to achieve social outcomes. *Natural Resources Forum*, *28*(4), 257–267.

Meld. St. 31 (2024). *Perspektivmeldingen 2024 [Long-term Perspectives on the Norwegian Economy 2024]* (Meld. St. 31 2023-2024). White paper published by the Norwegian Ministry of Finance. Retrieved from https://www.regjeringen.no/no/dokumenter/meld.-st.-31-20232024/id3049290/

Meld. St. 33. (2024). *En forsterket arbeidslinje – flere i jobb og færre på trygd* (Meld. St. 33 2023-2024). White paper published by the Norwegian Ministry of Labour and Social Inclusion. Retrieved from https://www.regjeringen.no/no/dokumenter/meld.-st.-33-20232024/id3052167/

Pickering, A. (2010). *The cybernetic brain. Sketches of another future*. The University of Chicago Press Ltd.

Sætertrø, H., Holmen, E. & Boer, L. de (2023). *Antecedents and enablers of innovation capabilities in public procurement of innovation processes.* Working paper presented at the 32nd annual IPSERA conference, 2–5 April, Barcelona, Spain.

SSB (2025a). Numbers published by Statistics Norway on their homepage, retrieved from https://www.ssb.no/arbeid-og-lonn/sysselsetting/artikler/arbeidsledighet-i-norge.

SSB (2025b). Numbers mentioned in a short article written by Malin Pettersen, published on the SSB homepage, retrieved 12/05/2025 from https://www.ssb.no/arbeid-og-lonn/sysselsetting/statistikk/tilknytning-til-arbeid-utdanning-og-velferdsordninger/artikler/18-prosent-i-yrkesaktiv-alder-er-utenfor.

Thai, K. (2001). Public procurement re-examined. *Journal of Public Procurement*, *1*(1), 9–50.

Public Procurement Pathways undersøker hvordan offentlige anskaffelser kan fungere som et strategisk virkemiddel for miljømessig og sosial bærekraft. En innledning og fem fagfellevurderte kapitler analyserer blant annet revisjon av etablerte teorier, kvantitative studier av grønne anskaffelser og kvalitative caser om lavutslipps og sosiale innkjøp i norske kommuner. Forfatterne diskuterer kompetansebehov, markedsrespons på miljøkrav samt organisatoriske og regulatoriske betingelser som påvirker resultatene. Boken er utviklet i samarbeid med Anskaffelsesakademiet, som fremmer kunnskapsbasert praksis gjennom forskning, undervisning og deling av erfaringsbasert kunnskap. Målgruppen er studenter, praktikere og beslutningstakere som ønsker et oppdatert faglig grunnlag for å forstå og videreutvikle offentlige anskaffelser som policyverktøy. Denne første utgaven etablerer samtidig en skriftserie som fremover vil belyse flere temaområder innen feltet. Samlet gir teksten et nyansert bilde av utfordringer og muligheter når offentlige innkjøp brukes til å realisere samfunnsmessige mål.

ISBN 978-82-02-89249-4

www.cda.no

CAPPELEN DAMM FORSKNING