



Article

Green Public Procurement for Accelerating the Transition towards Sustainable Freight Transport

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Abstract: Requests for emission reduction in the freight transport sector will be more intense in the coming years. One possible strategy to reduce emissions from freight transport is through utilising zero emission vehicles, which requires substantial investments both by transporters and by authorities. This paper examines how green public procurement (GPP) can be used to push the market in an environmentally sustainable direction. For this purpose, interviews with both public authorities and freight service providers are conducted. The results show that GPP is considered a useful tool for public authorities to both boost the uptake of zero emission vehicles and to share the investment costs with freight service providers. However, our study shows that there are differences between small and large municipalities. Moreover, to succeed with GPP, public authorities must prioritise such tasks in their daily routines through political decisions and strategies. Additionally, barriers related to financial possibilities are crucial to handle, as public support schemes are important to reduce costs for all involved stakeholders. Altogether, our paper shows that with the right tools and willingness among both public and private stakeholders, GPP can contribute to the use of more environmentally friendly solutions in the freight transport sector.

Keywords: freight; green public procurement; transport



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1. Introduction

Transforming an entire mobility system in a more environmentally sustainable direction requires attention to the many different domains that transport systems comprise. Transitioning personal mobility has already been well explored by scholars in regard to electric cars [1–3], while the hard-to-abate shipping sector has been increasingly recognised as a paramount research objective [4–6]. One transport domain still insufficiently recognised in research on sustainability transitions is road-based freight transport. Despite accelerated technological innovation within freight transport [7–9], it has yet to be explored as a transition site. This paper aims to contribute to enhance knowledge in this area by turning to the Norwegian freight transport sector.

The freight transport sector is characterised by a wide range of companies and operators, both international and domestic, targeting wider or more niche parts of the logistics market, and applying a variety of business models and contracts. On a national level in Norway, road transport in 2020 represented 17% of greenhouse gas (GHG) emissions. Heavy vehicles and vans accounted for 49% of these emissions. Other negative side effects of freight transport are traffic noise, congestion, air pollutions and traffic accidents, which are closely related to vehicle mileage travelled [10]. Like any other transport sector, freight transport poses a series of climate and environmental challenges, particularly in cities, that have increasingly compelled local authorities to incorporate freight into climate and planning strategies [11]. However, freight service providers are mainly aware of their own emission, and several large actors have incorporated their own goals for low or zero emissions operations within their self-defined time horizon.

The European unions' (EU) White Paper [12] and the following EU's working document entitled "A call to action on Urban logistics" [13] highlights the need to be aware of logistics and freight transport, thus being a part of public planning processes [14].

Green public procurement (GPP) is an instrument used by public actors to purchase goods and services with a lower environmental impact in their lifetime than goods and services otherwise bought. Green public procurement in the EU is not mandatory, but with several policies, the EU seeks to stimulate for the use of green procurement. In 2016, they launched the Handbook of GPP, which may be applied as a guide for buying green [15]. In Norway, however, green public procurement is one of several strategic instruments for reducing emissions and achieving Norway's environmental goals [16].

In the European context, public procurements have increased in the last 20 years, and now constitute 14% of the EU's gross domestic product (GDP) [17]. In Norway, public authorities spend approximately 600 billion NOK annually on public procurements, and the products and services procured by public authorities represent 16% of the national total emissions [16].

As procurers of large volumes of goods and services, public authorities are able to move the priorities of commercial freight service providers in a greener and more sustainable direction. Although ambitions have been defined at both an international and national level, procurement processes on regional and local levels play an important role in fulfilling the ambitions for sustainability transitions. Along Oslo's Climate strategy [18], the municipality has developed a procurement strategy, as they want to use public procurement as a powerful tool to accelerate the green shift, climate goals and circular economic thinking in accordance with ambitions of being an emission free city [19]. This requires procurement processes that strengthen the competitiveness of climate- and environmentally friendly solutions with a small environmental footprint, high expected quality, long service life and good recycling opportunities [20].

Norwegian green public procurement is anchored in national legislation (e.g., [21]) that obliges public administrations to establish procurement practices that enhance sustainability; for instance, by requiring specific technological solutions or setting specific emission limits for the products or services that are procured. Although green public procurement is increasingly emphasised as a climate measure, The Office of the Auditor General in Norway has concluded that current public procurement practices are not contributing enough to diminish GHG emissions and to provide the use of climate friendly solutions. They also point to a lack of holistic approaches for procurement, which are needed to take sufficient environmental actions [17].

The paper delves into the governance of sustainability transitions in freight transport by studying practices with green public procurement. Specifically, this paper explores preliminary experiences with green public procurement in freight transport and discusses how such practices should be developed to accelerate sustainability transitions in freight transport. The study focuses on procurements where freight transport is a result of the procurement, but not the main purpose. To do so, we study practices and perspectives among Norwegian freight service procurers as well as freight service providers through qualitative interviews and nation-wide surveys.

In the following section, we introduce green public procurement as a governance instrument for progressing sustainable technologies in freight and provide an overview of existing knowledge about green public procurement in sustainability transitions. We then account for the methods and data used to explore the research questions in Section 3. We present the results in Section 4, following a discussion based on the results in Section 5. Finally, we conclude in Section 6.

2. Literature Review

2.1. Transition through Green Public Procurement

The governance of sustainability transitions is an increasingly important research topic, as the pace of transition depends on the degrees to which transitions are managed or

incentivised [22]. Within the field of sustainability transitions, Transition Management has been particularly prominent in devising governance strategies for steering and accelerating transitions in different sectors [23,24]. Transition Management is a “prescriptive framework” that allows for creating “space for short-term innovation and develop long-term sustainability visions linked to desired societal transitions” [25]. Specifically, Transition Management points to particular governance activities (i.e., strategic, tactical, operational, reflexive) that allow for dealing with the complexity of sustainability problems and the societies that they are enmeshed in. Within the framework of Transition Management, green public procurement (GPP) could be an example of tactical governance activities, which intervene into established structures such as rules and regulations, routines, and institutions.

Within the scholarly field of sustainability transitions, green public procurement could be considered an expression of Strategic Niche Management. This field of research tends to focus on two ways in which emerging technologies and innovations can diffuse and become competitive in existing markets or become dominant in new niche markets. Scholars of Strategic Niche Management are thus concerned with how emergent innovations could be nurtured and matured in protective spaces that shield them from market competition until they are sufficiently competitive [26]. Thus, green public procurement could also be a fruitful strategy for accelerating transitions when following ideas of Strategic Niche Management. Green public procurement could nurture niche innovations by creating markets for specific technologies or for any technologies that reduce emissions. Green public procurement is therefore an example on how sustainable transitions could be steered on low-level governance.

The potential for stimulating sustainable innovations and technological changes by public procurement is high in the transport and logistics sector. The sector is undergoing rapid changes due to digitalization in the supply chain and forcing changes in the individual behavioural pattern such as increased online shopping, home delivery services, and new consumer patterns. It is therefore a golden opportunity to link green public procurement to the transport sector and identify its possibilities and challenges as a tool towards achieving CO₂-free city logistics by 2030 [13,18,27].

Ref. [28] has investigated the success factors in implementing GPP and identified four criteria to succeed with the implementation of GPP: (1) consistent and operational policy goals; (2) nation-wide campaigns for GPP; (3) ethics, professionalism, capacity, and knowledge among employers; and (4) systems for checks and balances among actors in the entire purchasing process. Ref. [29] has examined GPP in Swedish municipalities and observed that most previous measures to curb emissions from transport in urban areas focussed on passenger transport, and that urban freight has almost been forgotten. Ref. [29] also mentions that there are exceptions, and that knowledge from the few studied municipalities might be transferred to other municipalities to accelerate the transition towards more sustainable freight transport. Ref. [30] identifies significant differences in GPP uptake between countries and national levels: the countries working most with GPP are characterised by a large governmental sector, and municipalities and local administrations are more prone to work with GPP than authorities on EU and national levels.

Ref. [31] has developed a method for GPP, which was tested on public procurers of transport in Sweden. This method is a participatory method, seeking to enhance the procurer’s understanding and knowledge about practical needs. Their results emphasise that the participatory method and improved insight for the procurer’s contribute to broad environmental assessments, enhancing green procurements and to a more equitable assessment of alternative technologies. With Rotterdam and The Hague as examples, [32] studied public procurement as a driver for more sustainable freight transport. They state that it is hard to determine the exact number of trips that are generated from procurements, and that procurements are first applied as an administrative activity, and not as an activity to meet policy.

2.2. Green Vehicles in Freight

When choosing a vehicle, transporters consider criteria such as the size of the vehicle, its capacity, the range, fuel usage, etc. such that they match with their requirements. With the new technological advances, use of battery electric vehicles is supported as a measure to decarbonise freight transport, especially in urban areas in which transport is characterised by short distances, many stops and low driving speed [33].

Studies show that despite the high investment cost of battery electric freight vehicles, they are cost competitive with conventional diesel vehicles [34]. However, in some cases, transporters need to implement measures such as reducing the scope of service, mixing the fleet with conventional vehicles, using opportunity charging, etc., to increase the profitability of EVs as a compensation to high investment costs [35,36]. Moreover, external factors such as the availability of charging stations on public spaces [37] or exemption from paying road-toll or parking fees [38] are also recognised as influential factors in promoting the use of BEVs in urban freight transport.

Norway has been successful in introducing policies for boosting the uptake of EVs in passenger transport. However, the incentives such as financial support schemes administered by the public agency Enova are less comprehensive for the BEVs in freight. Exemption from value added tax and discounts for registration taxes are already offered for fossil fuel vehicles [39] and support for purchasing the vehicles of establishing charging infrastructure covers a subtle part of the investment costs [40].

Considering the limited options to offer as financial support for freight transporters in Norway, the role of Green Public Procurement is highlighted as a tool to accelerate the transition towards more sustainable freight transport. However, the barriers for effectively using the tool to promote zero emission vehicles into freight system is not well studied in the literature.

This paper aims to fill this research gap by investigating the potentials of green public procurement from both procurers and transporters points of view. It highlights the important factors to succeed with the GPP as a tool for transitioning towards more environmentally sustainable freight transport and how it is perceived both by public officials and transporters by providing empirical data.

3. Materials and Methods

This study is based on a combination of qualitative (interviews) and quantitative (survey) methods. Qualitative methods were used to shed light on the topic and gain deeper insight into whether and how environmental criteria are used in public procurements within the Norwegian municipalities today. Interviews were chosen because they allow us to interact with the informant and explore the reasoning behind their answers. Quantitative methods, here represented by surveys, allow us to examine if specific findings from the interviews are also viable in a broader context.

3.1. Interviews

Table 1 shows the number of interviews and respondents in the respective survey used in the further analyses. Two of the municipalities are regional centres and two are smaller municipalities. The interviewees from public procurers were staff responsible for procurement processes in the respective municipality. Two of the three interviewees from freight service providers operate in the business-to-business market, while the third also delivers to private households. The informants were persons with responsibilities for vehicle fleets, daily businesses, and submitting tenders for public procurements.

Table 1. Overview of data collection.

	Public Procurers	Freight Service Providers
Interviews	N = 4	N = 3
Survey	N = 71	N = 220

Interview guides were developed based on national documents [41,42] and the Public Procurement Act [43]. The interview guide for municipalities revolves around the following topics: (1) strategy and collaboration, (2) experience with public procurements, and (3) public support schemes and national goals. The interviews with freight service providers highlighted the following themes: (1) technology, (2) logistic solutions and (3) policy to explore drivers and barriers impacting the freight operators in the transition of urban freight. The interviews were conducted as digital meetings

The results from the interviews were further used as an input to design survey questions, as well as a basis for analysis in this study.

3.2. Surveys

Two separate surveys were designed and distributed among potential participants: (1) survey for public procurers distributed among municipalities' staff, and (2) survey for freight transport providers distributed among transporters. The design and distribution of the two surveys are briefly explained in this section.

The survey for municipalities is structured according to the same three main topics as in the interviews, while the questions are reformulated to fit into the format of a survey. Findings from the interviews were used to create response categories. The survey was distributed via e-mail to all 356 Norwegian municipalities with a request to forward it to administrative personnel responsible for or experienced with procurements. A reminder was sent out to non-response municipalities after two weeks. In total, we received 71 individual responses from 61 different municipalities, implying that the request had been forwarded to more than one person in some municipalities, and both had responded. However, as the roles and the answers from the same-municipality respondents are not identical, all responses are included in the analysis. There was no record of more than two answers from identical municipalities. Although only 46 participants responded to all the questions in the survey, all 71 responses were included in the analysis since those who were not able to complete the survey also provided useful information about why they did not include requirements for low or zero emission solutions.

Using the classification of municipalities by population size from Statistic Norway [44], and comparing to national statistics for 2022, we found that the smallest municipalities were somewhat underrepresented, and the largest somewhat overrepresented in the survey sample, while the remaining categories were proportionally represented (Table 2). The informants represent a range of roles related to public procurement (Table 3).

The survey among freight service providers was distributed to the members of the Norwegian association for lorry owners (NLF), targeting freight service providers at different levels. In the survey, we asked whether they submit tenders for public procurements, together with other questions about public procurements, how they relate to it, and their opinion on its effects on sustainable transitions. The survey was initially distributed to over 3000 members of the NLF, of which 220 responded.

Table 2. Categorization of included municipalities.

Population Size	Survey Sample		Norwegian Municipalities 2022 [45]
	N	%	%
Under 2000 inhabitants	8	12	22
2000–4999 inhabitants	18	26	27
5000–9999 inhabitants	13	19	20
10,000–19,999 inhabitants	10	15	13
20,000–49,999 inhabitants	11	16	12
50,000 or more inhabitants	9	13	6
Missing	2		
Total	71	100	100

Table 3. Respondent's role in municipality.

Role in Municipality	N	%
Responsible for procurement strategies	27	38
Advisor to procurers	20	28
Procurer	19	27
Other role related to procurement	5	7
Total	71	100

Roughly one third (39%) of the respondents provide services for the public sector, and one out of four (27%) are personally involved in tenders for the public sector (Table 4). The results presented in this paper are based on responses from companies which do provide services to the public sector (N = 87).

Table 4. Respondent's role in freight company.

Are You Involved in Tenders for Public Procurement?	N	%
Yes, I respond to procurement tenders	60	27
Yes, but someone else in our company is responsible	27	12
No, we do not provide services to the public sector	133	60
Total	220	100

4. Results

The results are presented in three sub sections. The first section presents existing requirements on public procurements and how they are currently used. The second section gives an overview of the municipalities' perspectives and their requirements on public procurements. The last section describes freight service providers' perspectives and their obligations for public procurements.

4.1. Existing Low and Zero Emission Requirements in Freight Transport

The in-depth interviews and comments in the survey show that there are differences, both in the types of requirements and how requirements are used in practice in the municipalities' procurement process. The most common requirement, related to transport in Norwegian public procurements for goods and service, is for the type of propulsion technology in the vehicles. One reason for this might be its simplicity to require and control, compared to requiring a specific emission level, which is the second most common requirement. Some municipalities also put restrictions on specific types of deliveries: for example, by demanding smaller vehicles, consolidation, or deliveries outside of rush hour. However, all such requirements are considered more demanding, both for the public procurer to control and the freight service provider to document.

There are also variations in which part of the transport leg such requirements apply. Although many goods are produced outside of Norway and therefore include transport activities abroad, the transport-related requirements are mainly only applied for the last mile in Norway. This might also be explained by the tendency to ask for requirements which are easier to monitor, as the transport activities outside of Norway are not under the control of a Norwegian distributor and there might be limited alternatives with low or zero emission options in the market abroad.

The third difference is whether the application of requirements depends on the value of the tender. The results are presented in Table 5.

Table 5. Municipalities practice in terms of threshold values for applying of requirements.

Are Environmental Requirements for Transport Included in Your Procurement Processes?	Municipalities by Population Size						Sum across Municipalities
	Under 2000 Inhabitants	2000–4999 Inhabitants	5000–9999 Inhabitants	10,000–19,999 Inhabitants	20,000–49,999 Inhabitants	≥ 50,000 Inhabitants	
Yes, always	13%	6%	31%	40%	36%	33%	25%
Yes, for purchases over 100,000 NOK	0%	17%	15%	30%	18%	44%	20%
Yes, for purchases over 500,000 NOK	13%	22%	15%	0%	9%	11%	13%
Yes, for purchases over 1 million NOK	0%	6%	0%	10%	18%	11%	7%
No, never	75%	50%	38%	20%	18%	0%	35%
N of respondents	8	18	13	10	11	9	71

The response categories (specifically values NOK 100,000 and NOK 500,000) are based on answers in the interviews. Although these limits are also viable for other municipalities, the majority using requirements always include them (Table 5). The motivation for applying value thresholds for including requirements is related both to the possibilities for monitoring what is delivered, and how large the emissions from the transport in that procurement is. The Public Procurement Acts says requirements should be in proportion to both costs and emissions.

4.2. The Perspective of Municipalities

The results are cross tabulated with the size of municipalities to see if there are any differences that may depend on the number of inhabitants in each municipality.

Observing the statistics in Table 6 reveals a relationship between adoption of strategies and number of inhabitants in the municipality. Municipalities with a large population are more probable to have an implemented strategy for promoting green public procurement (GPP). Political decisions seem to be more important than the Public Procurement Act from 2017. An important insight from the interviews is that in smaller municipalities, both political will and personal interest in the administrations play more important roles in success with GPP for freight transport.

Table 6. Which municipalities has a strategy and why.

Does Your Organisation Have a Strategy to Increase Share of Environmentally Friendly Transport in Procurement?	Municipalities by Population Size						Sum across Municipalities
	Under 2000 Inhabitants	2000–4999 Inhabitants	5000–9999 Inhabitants	10,000–19,999 Inhabitants	20,000–49,999 Inhabitants	≥ 50,000 Inhabitants	
Yes, as a result of a political decision	25%	18%	46%	50%	36%	78%	40%
Yes, according to the legislation for Public Procurements from 2017	13%	24%	15%	30%	27%	11%	21%
Yes, of other reasons	13%	12%	8%	20%	27%	11%	15%
No, the organization missing such a strategy	50%	41%	23%	0%	9%	0%	22%
Don't know	0%	6%	8%	0%	0%	0%	3%
N of respondents	8	17	13	10	11	9	68

Municipalities were also asked what kind of commodities and services they included as requirements related to sustainable transport. The responses show that requirements apply

for all kind of goods, but are more common for office supplies, furniture, consumables, and food.

As shown in Table 7, dialogue with freight service providers is the most common way to gain knowledge about low emission solutions or delivery alternatives. Responses summarised in Table 7 are based on a multiple-response question, therefore the total sum of responses is higher than the number of respondents. Percentages show the share of the respondents choosing each of the alternative responses.

Table 7. How municipalities gain knowledge.

Do You Acquire Information about Low Emission Solutions or Delivery Alternatives? (Multiple Responses Possible)	Municipalities by Population Size						Total
	Under 2000 Inhabitants	2000–4999 Inhabitants	5000–9999 Inhabitants	10,000–19,999 Inhabitants	20,000–49,999 Inhabitants	≥ 50,000 Inhabitants	
Yes, have employees who are constantly working to map the market	0%	0%	0%	0%	27%	56%	12%
Yes, in dialogue with freight service providers/vehicle manufactures	50%	33%	54%	80%	91%	56%	58%
Yes, participate in networks at local level (neighbouring municipalities)	13%	17%	31%	40%	18%	0%	20%
Yes, participate in networks at regional level	38%	17%	38%	40%	18%	33%	29%
Yes, participate in networks at national level	0%	6%	0%	10%	9%	33%	9%
Yes, in other ways	13%	11%	8%	0%	0%	0%	6%
No, do not actively seek knowledge	13%	39%	23%	0%	9%	0%	17%
N of respondents	8	18	13	10	11	9	69

The technological maturity for low and zero emission vehicles varies between large and small vehicles [46]. The technology for small vehicles is mature enough to compete with conventional vehicles regarding range and payload. For heavy vehicles, however, the new technologies could currently only be competitive within urban areas. Considering the significantly higher purchase price compared to vehicles with internal combustion engines, it is reasonable to expect that requirements for low or zero emission vehicles would negatively affect the tender price. Results presented in Table 8, however, show that the municipalities do not clearly acknowledge this. A large share of the respondents from municipalities state that they do not know the effect on prices, and the share stating that the price remains unchanged is almost the same the share stating that the price increases due to environmental requirements in tenders.

Table 8. Procurers' assessment of consequences for offered price in procurements.

Is the Offered Price Affected by a Requirement for Low Emission Transport?	N	%
Yes, the price will be higher	8	17
Yes, the price will be lower	1	2
No, the price remains unchanged	10	22
Don't know	27	59
Total	46	100

Different public support schemes to cover extra costs have been launched such as *Klimasats* by the Norwegian Environment Agency or support to infrastructure by the local municipality. This is because there is a difference in price for fossil fuelled vehicles and low or zero emission vehicles. The new Public Procurements Act also tries to speed up the transition in sustainable solutions when it asks public authorities to always examine possibilities to include requirements for low or zero emission solutions. For such support

schemes to be useful, they must be communicated to potential users, e.g., freight service providers. According to the responding procurers, the knowledge level among smaller actors must be enhanced (Table 9).

Table 9. Procurers' assessment of bidders' knowledge about legislation and public support schemes.

How Do You Experience Level of Knowledge of Legislation and Support Schemes among Bidders?	N	%
Overall good	5	11
Good among larger freight service providers	10	22
Bad	10	22
Don't know	21	46
Total	46	100

It is worth mentioning that Tables 8 and 9 are based on answers from respondents who include requirements for low or zero emission transport in their procurements. Therefore, the number of analysed respondents is lower than Tables 5–7.

4.3. The Perspective of Freight Service Providers (FSP)

When it comes to what affects the freight industry's acquisition of vehicles running on alternative fuels, environmental requirements in public procurement are assessed to be significant, although not the most important factor (Table 10).

Table 10. Freight service providers' (FSP) assessment of what affects the company's acquisition of alternative fuel-vehicles.

How Important Are These Issues for Your Company's Choice of Vehicles with Alternative Fuels?	Of Very Little Importance	Of Little Importance	Important	Very Important	N
Support for purchase of vehicles	16%	2%	10%	72%	83
Improved infrastructure for alternative fuels	27%	2%	13%	58%	83
Reduced road tolls	20%	6%	22%	52%	83
Requirements in public procurement	30%	10%	22%	39%	83
Priority at loading bays	51%	8%	12%	29%	83
Requirements from the private market	51%	11%	16%	23%	83
Access to streets/areas otherwise off limits for vehicles	53%	18%	10%	19%	83
Access to public transport lanes	49%	20%	11%	19%	83
Other	73%	14%	7%	5%	83

As shown in Table 11, findings from interviews with freight service providers indicate that an orientation towards public clients seems to both affect their experiences with procurements processes and their internal goals for low- and zero emission vehicles. Further findings from the interviews are embedded in discussions where it is appropriate.

Respondents directly involved in providing bids for GPP tend to consider the environmental requirements to represent a challenge for the industry with negative effects on price and quality of services offered, although they also tend to agree that such requirements have a positive effect on sustainable transition (Table 12).

Table 11. Findings from interviews with freight service providers.

FSP	Experience with Public Procurement	Goal
A	Experience a growing interest for FSP opinion/knowledge regarding requirements. Poor evaluation and monitoring of requirements.	Zero emission city logistics in 2026
B	PP is time-consuming; therefore, they concentrate on the private market.	Euro VI fleet
C	Experience a growing interest for FSP opinion/knowledge regarding requirements. Poor evaluation and monitoring of requirements.	Fossil free vehicles and buildings in 2025

Table 12. FSP's assessment of consequences of environmental requirements in public procurements.

How Do You Consider the Following Statements about Environmental Requirements Included in Public Procurement Processes?	Strongly Disagree	Disagree	Agree	Strongly Agree	N
The tenders include requirements which support sustainable transition	20%	20%	49%	11%	45
The requirements have a negative effect on price and quality of services	7%	18%	29%	47%	45
It is challenging for freight operators to meet the requirements	7%	4%	36%	53%	45

Findings from the in-depth interviews with freight service providers indicate that the largest drawback with low or zero emission vehicles requirements is how it affects the operational routines, and, consequently, the price and quality of deliveries. In addition, freight service providers are experiencing a growing interest for market dialogues with public procurers and are mainly positive to share their knowledge about possibilities and barriers in the market.

The interviews also include statements from the industry about the importance of follow-up routines after a tender has been awarded. Since offered solutions are part of the competitive basis in the procurement, it is important to make sure that the winner delivers according to the tender. If not, other bidders are able to deliver a more cost-effective solution. From the experience of the interviewees, today's follow-up practice has the potential to be improved.

5. Discussion

As findings from the surveys indicate, a large proportion of Norwegian municipalities are already working with green public procurement (GPP). Today's practices of GPP involving freight services have been presented above and the results indicate potential for further refining of the practices. Part two of our research question is «how should GPP practices be developed further to accelerate sustainability transitions in freight transport? This section starts with a brief overview of the most important issues recognised through the analyses as a basis for the following discussion, which also relates to other studies within the same field.

According to the results, factors such as political decisions, strategies, requirements, capacity/budget, competence, and methods for monitoring/follow-up are the most prominent issues in public procurements of goods and services for accelerating the transition towards a more sustainable freight transport. These issues are important for both public procurers and freight service providers, but in different ways.

Political decisions and strategies are identified as the most prominent reasons for municipalities to work with GPP in this sample. However, there are differences between the larger and smaller municipalities, where the smaller tend to be lagging behind regarding the implementation of GPP. One reason for not implementing the GPP in smaller municipalities could be related to the lack of competence and personal interest. Statements from interviews point to personal interest as often being essential when prioritizing different tasks if public procurements is one of several responsibilities of the respondent. In contrast, the larger municipalities can work with GPP in a more professional way, since they often have designated procurement departments, in line with studies where professionalism and knowledge are mentioned as success criteria in GPP [28].

It is worth noting that a large administration is not mandatory to succeed with GPP. One possibility for empowering the smaller municipalities and enhancing their involvement in GPP could be to increase their access to resources or more efficient use of existing resources, e.g., through inter-municipal collaboration in procurement processes. Some of the municipalities already use networks on a local and/or regional level as a source for acquiring information about low emission solutions and delivery alternatives. Enhanced collaboration through such networks could help smaller municipalities to increase their competency for implementation of GPP. As understood in [16,29], enhancing knowledge through transfer it between actors is important, especially in smaller municipalities. Easy access to or already acquired competence about GPP probably facilitates its inclusion in daily routines. Capacity can also be related to access of vehicles running on alternative fuels. This is mentioned by both freight service providers and small municipalities. Access to appropriate vehicles and corresponding fuelling/charging stations is crucial for succeeding with transitioning of the freight transport.

In addition, our results highlight the importance of dialogue between the freight industry and municipalities for enhancing procurers' knowledge about new solutions and alternatives. At the same time, the procurers indicate that there is room for improvement when it comes to the freight service providers' knowledge of legislation and support schemes. Utilising the dialogue between procurers and the freight industry to provide suppliers with information about legislation and support schemes could be worth exploring.

An active strategy is not merely important for municipalities. Setting strategies and aiming to achieve them requires generating requirements that both encourage and force freight service providers to develop solutions for meeting the requirements. Although the results here have shown that economic incentives are the most important parameter for freight service providers, findings from the in-depth interviews show that the freight service providers working for the public sector have the most ambitious goals for delivering low or zero emission solutions. This may not only be due to the orientation in the market affecting internal strategies, but also due to internal budgets and fleet sizes which reflect the capacity of the companies in terms of both financial and administrative capacity. To become an early adopter freight service provider, they need financial resources, just as municipalities. Requirements for low or zero emission vehicles may therefore favour larger freight service providers already in possession of adequate vehicles. Investments on new technologies or dealing with the risks involved for ordering new vehicles are easier to face for larger freight providers.

Thus, GPP could be combined with public support schemes to secure that both small and large municipalities and freight service providers can engage in the green shift. Public support schemes covering some of the extra expenses often associated with the introduction of new technologies are examples of strategic niche management, which has proved to be a useful tool in transition management based on both our study and previous findings [23,26]. However, many small municipalities state that the funding from current public support schemes is scarce and that it often includes cumbersome application processes. So, to accelerate the transition, and reduce the bias for larger actors, easier application processes, and more financial support to cover for both risks and extra work would be beneficial.

Otherwise, less competitions may contribute to a negative effect on price and quality when fewer bids are delivered, something freight service providers already have reported.

Finally, proper methodologies for monitoring the compliance of requirements are needed to ensure fair competition. It is important from a competitive point of view that the winning freight service provider deliver what is promised. The development of standardised monitoring methodologies may facilitate the engagement of smaller enterprises and municipalities as it reduces the need for follow-up resources. Moreover, increased use of value-based inclusion of environmental requirements, as many municipalities already apply, can also be a measure to accelerate more sustainable transport solutions associated with the larger purchases of goods and services.

The results presented in this paper confide to a Norwegian context, which is characterised by a large public sector, and therefore might not be transferable to other contexts without modification. However, this study sheds light on how municipalities and freight providers perceive GPP, and the success factors related to it. The results reveal that despite highlighting the topic by National legislation, local willingness is essential to effectively include GPP in public procurement. Similarly, there exist tools and networks in a wider perspective, such as the EU, though mixed national contexts. This study presents a useful approach to enhance knowledge about the topic, which can be further used in other contexts.

6. Conclusions

This study aimed to gain knowledge on GPP, its practices in Norwegian contexts and how it is perceived from both public procurers and freight transport providers. The results show that Norwegian municipalities in all sizes have already started to implement requirements for low and zero emission transport in their procurement of goods and services. However, there are still some barriers to overcome, especially in the smaller municipalities. Building and utilising networks to enhance and disseminate knowledge and resources among municipalities and between municipalities and the freight service operators should be further explored. Future research can probably contribute to enhance knowledge on how to establish attractive networks for smaller actors, providing them with relevant and practical knowledge about GPP. Moreover, carrying out research on GPP in countries with a smaller public sector will also be of huge relevance, since Scandinavian countries are characterized by a larger public sector than many others.

Finally, several barriers are directly or indirectly related to financial resources. Therefore, extended public support schemes adapted to the needs of the smaller actors, both private and public, should be considered to avoid only larger freight service providers being able to compete on procurements, including requirements for low or zero emission solutions. Other relevant measures include simplifying application routines to reduce the work related to the process of applying for financial support for extra expenses related to low or zero emission transport.

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