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Using Public Procurement as an Instrument for Implementation of ITS in EU

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Abstract: There are not so many off-the-shelf ITS services and solutions which makes purchasing/implementing such services and solutions challenging for public procurers. Challenges public procurers face when purchasing ITS solutions range from uncertainty in costs and time, risks in failed commercialisation of innovation, to difficulties of reviewing or extending contracts. However, many of the challenges can be addressed by innovation procurement procedures such as Competitive Dialogues. City of Copenhagen has used various procurement procedures to implement innovative and sustainable transport solutions which has set an outstanding example to other cities and authorities of using public procurement as an instrument for implementation of ITS. Analyses of the cases of using various procurement procedures have been carried out in order to identify how the city overcome the barriers, and benefits and lessons learnt from the procedures. The analyses aim to provide comprehensive references to other public authorities.

Key words: Public procurement, public authorities, Public Private Innovation Partnership

1. Introduction

Traditional procurement procedure has been set to buy off-the-shelf products and services, often for a tender with the lowest price. Such procurement is based on short-term tactical purchasing considerations, and often prioritises cost over quality, as well places immediate outcomes above long term cost benefits. The traditional procurement procedure is not designed to purchase innovative and sustainable solutions and services which may be more expensive in short term but may deliver better quality, as well as resulting in long term benefits to environment and the society. The course of public procurement has been forced to adopt the fast pace of innovation together with increasing concerns on environment and sustainability has changed the course of public procurement. Public authorities may look into a wide range of selection criteria for any tender publications such as Life Cycle Cost (LCC). Using traditional procurement would delay implementations of innovative solutions and services using public funding. This issue is particularly crucial for the ITS sector since it is an innovation driven sector.

This issue has been well recognised by national government as well as by the European Union; hence, legal frameworks have been made to enable public procurers to use different procurement procedures for purchasing innovation. For example, the EU level public procurement directive, 2014/24/EU [1], give public procurers various procurement procedures for innovative and sustainable products and services such as Competitive Procedure with Negotiation, Competitive Dialogue, Design Contest, Preliminary Market Consultation etc. Although the legal frameworks are available, using such innovation procurement procedures are challenging for public procurers. The challenges and difficulties have been well recognized by policy makers. Thus, much effort into assisting public procurers has been made at national and EU levels. For

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example, EAFIP – European Assistance for Innovation Procurement [2], an important European initiative, started in 2015 in order to provide adequate supports to public procurers through knowledge transferring and experience sharing.

In the transport sector, several projects have carried out in order to assist public authorities to purchasing energy-efficient or low emission vehicles, e.g. the Clean Fleet [3], the COMPRO project [4]. The COMPRO also aimed to form common buyer groups that made several cities who had similar needs to publish tenders and carry market consultations together, resulting in saving costs, more efficient management of the tender process and attracting more suppliers to participating in the tenders.

In the ITS sector, much of the efforts has been made into procurement of Cooperative ITS (C-ITS) with two EC funded projects dedicated to the subjects, P3ITS and P4ITS. Both projects produced a number of guidelines [5][6] on how to procure Cooperative ITS (C-ITS). Many cities may not be ready to invest into implementation of C-ITS [7], since C-ITS have not yet established its commercial market. Despite that, some small scale trials and pilot projects on C-ITS have been carried out through PCP (Pre-Commercial Procurement) and PPI (Public Procurement Innovation) [8].

2. Key Challenges Public Procurers Face in the ITS Sector

Although the legal frameworks are available for implementation of innovative solutions, there are many challenges for any public procurers, since new products and solutions may lead to a certain level of uncertainties and thus bring potential risks to the public procurers. Moreover, public procurers and contract managers may intent to select those products and solutions they are familiar with. In the other word, there are many innovative solutions which can address challenges cities and transport authorities face, but they are not able to purchase such innovative products or solutions. This is mainly due to lack of knowledge and capacity on the appropriate procurement procedure to purchase such innovative products or solutions.

Specific challenges a public procurer should take into account are:

- Uncertainty of commercialisation and costs;
- Dealing with confidential information;
- Unknown consequential cost for adaption or updating of existing infrastructure;

Contract extension and review; Those challenges are explained in details below and potential strategies to deal with the challenges are also given.

2.1 Dealing with Uncertainty of Commercialization and Costs

In recent years, Apps for traveller information have been widely available to the public. Some Apps are done by private developers on their costs with their own business models. Public procurers also contract app developers to develop apps to provide services. The current trend is that public procurers use the budget for the app development to make their data open, e.g. the one transport project in UK [9] to developers and organise hackathons to enable app developers to use the open data to develop apps. Hackathon may be seen as a design contest which is a public procurement procedure defined by the directive 2014/24/EU. A potential risk is that the selected app does not have its own business model which can sustain the app, thus unable to be fully commercialised. Or the developer realises the cost to maintain and update the app is too high and decides to take the app out of the market. To address the risk, one of key selection criteria must be the business model and commercial plan. When organising such a hackathon, public procurers should specify the requirements of business models and communicate to developers in advance that business model is one of the selection criteria.

2.2 Dealing with Confidential Information

Market consultation is widely used by public procurers. Market consultation enables public

procurers become aware of latest technologies, thus helping them to publish tenders. When carrying out market consultation or innovative dialogues, public procurers and suppliers need to consider how much information to be allowed to give without risking leak of commercially confidential information. There is a balance on sufficient information for public procurers and protection of business interests of all suppliers. For the Copenhagen's ITS-program project that aimed to address the Copenhagen's political determined service goals for CO2 Neutral City by 2025, the public procurer first used market consultation through a close R&D cooperation with private stakeholders prior to the tender to help defining the objects of the tender and the overall methodology of the tender documentation. The PPI was carried out as a multi stage R&D project with private stakeholders in order for city to highlight and evaluate the opportunities and to be able to narrow down the scopes and start preparing the tender specification. The PPI was not a part of the tender itself, but it paved the way for determining the tender. The PPI process narrowed down eight potential focus topics to five – being the five contract topics to be tendered: Public procurers needed to pay attention to not give any competition advantages to any companies in the tender documentation.

2.3 Unknown Consequential Cost for Adaption or Updating of Existing Infrastructure

Consequential costs when buying new technology, e.g. a need for updating or expansion of existing infrastructure can be underestimated or overestimated. One barrier to prevent implementation of C-ITS is that public authorities or road operators have concerns on the cost of updating existing infrastructure. Although much effort has been made in disseminating benefits of C-ITS, there is lack of good practices on consequential costs and cost/benefits of C-ITS technology, particularly regarding adaption or updating of existing infrastructure. Hence, replicability and scalability are still big challenges.

2.4 Contract Extension and Review

When implementing ITS services and solutions, public procurers may often face issue of extension of a contract. Because innovation may lead to certain level of uncertainty, a project may take longer than expected and an extension is needed. When the extension occurs, a new party should enter the project as often the first contractor of the project will not be allowed even though the contractor has carried out the project well. Therefore, when selecting innovative solutions, potential risks must be sufficiently addressed together with potential suppliers and extension rules should be communicated at the tender publication stage. Meanwhile, public procurers should monitor project progress at different stages in order to evaluate if there is any risks of contract extension. Alternatively, certain criteria giving variants may be considered when purchasing ITS technologies, even though contract managers are often reluctant to allow variants. Good practices on how to contacts allowing variants would be beneficial to show public procurers how to deal with similar situations.

3. Case studies on various tenders in Copenhagen

Under the climate plan for Copenhagen the city aims to be the first CO2- neutral capital city in the world. To achieve the ambition, a number of projects aiming renewing the infrastructure to be more energy efficient and to reduce CO2 emissions have been carried out. To deliver such projects, innovative solutions are essential. Thus the city had applied various procurement procedures to enable innovative solutions to be selected.

By carrying out those projects, Copenhagen has established itself as a leading city in innovation procurement and there are many good practices. Three cases in the transport sector are selected and analysed in order to demonstrate how to use various innovation procurement procedure to address challenges and mitigate risks, as well to identify enablers and barriers. The cases are:

Table 1 Procurement cases from Copenhagen.

Name of the project	Main objectives	Procurement procedure used
Smart Street Lighting	Implementing more energy efficient street lighting, and a long-term service and maintenance contract.	Competitive Dialogues
Purchase of intelligent transport solutions	In the contract will form part of the future Smart City project of Copenhagen including: • Mobility and green transport • Traffic safety • Data and traffic management • Traffic information and services • Dynamic urban space • Operating and maintaining equipment and systems	Perform a PPI to narrow down the scope and investigate the market capabilities for delivering a right solution.
Copenhagen Street Lab	developing and gaining knowledge on innovative solutions within the use of digital technologies, network and sensors in the urban space	Public-Private Innovation cooperation (R&D-cooperation)

3.1 Smart Street Lighting using Competitive Dialogues

Why used Competitive Dialogues: The procurement procedure needed to be dialogue based as the contract included a very complex service in which the lighting, economic and energy conditions had to be determined and designed in a close dialogue with the suppliers. The technology also had to be adapted to the Cities needs and to the existing infrastructure. Therefore, an easy procurement via a "from the shelf solution" was not possible. It was also one of the goals of the dialogue to discuss the contract length, the best cooperation model (private and public stakeholders) and financing forms. The Competitive Dialogue was chosen as the procurement procedure for this highly complex project.

Selection criteria: A weighted sum of the following criteria:

- Solution itself
- The business case
- Innovation on Nordic-Design
- Service-level
- Price.

Advantages and disadvantages of using Competitive Dialogues: The main benefit of the procedure used in this procurement was the fact that a competitive dialogue gave the opportunity to discuss all possibilities, the needs of the City and technological requirement with the suppliers. The negative aspect was that the process was very time and resource consuming; it is costly for the procuring authority and the tenders.

Lessons learnt:

• Using the procurement procedure competitive dialogue is very resource demanding. It is more suitable for long-term contracts or contracts that have a high value.

• When procuring a new technology, which does not have a fitting of-the-shelf solution; a dialogue is needed.

• If the procedure is relatively new to the public procurer, as it was for the City of Copenhagen, it is recommended to hire external lawyers and add them to the tender preparation cost.

• Trying out a procedure that was new for the City of Copenhagen did lead to a significant positive outcome with regards to the knowledge that the city gained in how to deal with this kind of procurement.

• Through a good dialogue already from an early stage the city and the suppliers managed to end up with solutions that fit the needs of the city.

• Through the market dialogue the city and the suppliers got the chance to know each other's need, requirements and limitations better.

• The exchange within the market dialogue provided a good understanding that enabled the city to modify some of the classical frameworks which was hindering the market interest and innovation.

3.1 Purchase of intelligent transport solutions using PPI

Why used PPI: The tender described in this case should be a step stone to achieve the described climate goals. To reach the goals the City of Copenhagen

wanted to implement new intelligent transportation solutions. When planning the forthcoming tender, the project management concluded that the specifications for a new Traffic management system (CTMS) and systems for signal optimization might be specified in detail due to accessible knowledge of solutions already existing on market, including some off-shelf solutions and known practices. However, the other objectives of the ITS solutions needed were more abstract as no plug and play solutions existed on the market. As it was very difficult or impossible to describe the technical requirements and innovative aspects of a solution that does not yet exist – you do not know what the market could come up with or not – the city needed to clarify its needs and to gain insight into the market prior to drafting the tender documentation.

To handle these obstacles the City of Copenhagen carried out a Public Private Innovation project (PPI20) prior to tender in a view to narrow down, define, and specify the scope and specifications for the final contract to be tendered. The PPI process narrowed down eight potential focus topics to five – being the five contract topics to be tendered (refer Table 1.)

Using a prior R&D-process (PPI) involving private potential suppliers, universities and service users to help defining the objectives of the contract and technical specifications instead of using a dialogue based procurement procedure, e.g. competitive dialogue, is a way of utilising the legal framework for R&D-procurement and market consultations as a pre-phase of the procurement phase and overcoming the key barriers faced this tender.

Selection criteria: A weighted sum of the:

- 45% technical solutions
- 25% price
- 20% process and organisation
- 10% support and maintenance

Advantages and disadvantages of using PPI: Using the restricted procedure presupposes that the procuring authority is able to specify all its needs and is able to finalise the tender documentation to full extension as goes also for the open procedure. Thus, the restricted procedure is a relatively fast two stage procurement procedure, with only one bid phase. Contrary to open procedure the restricted procedure narrows down the number of tenderers – and thus reducing potential waste of resources at both supplier and procurer side by limiting the number of bids to be drafted and evaluated. Thus, the restricted procedure will – under normal conditions – be more attractive to potential suppliers as chances of winning are optimised. Like the open procedure, the restricted procedure does not open up for dialogue or negotiation – apart from the possibilities for the tenderers to ask questions in writing on the tender documentation. As a rule the restricted procedure is not an obvious procedure for innovation procurement although the procedure very well might support procurement of innovation if it includes sufficient open/functionally based specifications – and being supported by a throughout market investigation prior to the procurement.

Lessons learnt:

- The City was very precise about what exactly is needed. However, this also limits the room for adjustment or changes in future. It was considered to have a clarification phase in order make room for some modifications after the contract was signed.
- Another challenge is the extent of the required solution. Although the solutions were presented as a package, there was no single supplier who can deliver it all. Therefore, there was a need to establish a consortium of suppliers in order to be able to deliver the whole solution. This will furthermore add to the risk of the project, and it requires the main supplier able to ensure the coordination across the topics and various suppliers.
- Generally this is a very complex IT project with a number of innovative projects which also adds to the complexity with an inherent risk.

Major Barriers:

- At the time publishing the tender, it was not considered possible to use a dialogue based

procurement procedure (negotiated procedure or competitive dialogue) due to very strict interpretation of the former procurement directive. As a consequence hereof, either open or restricted procedure had to be used.

- Notwithstanding the PPI carried out prior to the tender, it was a challenge to define in detail all aspects of the tender and contract. This takes up some time and resources from the technical and legal expertise in order to prepare the tender material.
- Procuring innovation is always risky, as you are procuring a solution that does not exist. This will add significantly layers of risk. The PPI helped to investigate the market capabilities and ensure that the solutions are doable. This helped limiting the risk of the project.
- Finally it is worth mentioning that there is not much room for changes in this classical contract, and all the changes and adoptions are costly.

3.3 Copenhagen Street Lab using Public-Private Innovation cooperation (R&D-cooperation) to develop a Street Lab

Key Reasons for using the Private-Public Innovation cooperation: In 2015 the council of City of Copenhagen granted 460.000 EUR for the development of a test area for new technologies and smart city solutions for congested areas in Copenhagen. It was decided that the test area should be developed through a Public-Private Innovation cooperation (PPI), involving private actors to participate in creating new knowledge via their competences and equipment, hopefully including also new technologies. It was decided that Private co-financing was crucial for developing a test area on an international level, sufficiently scaled to test solutions in a realistic context.

The City of Copenhagen wanted to build a strong partnership with technology leading private partners for creating and finance a “state-of-the-art” Steet Lab for the purpose of developing and gaining knowledge on innovative solutions within the use of digital technologies, network and sensors in the urban space. As the cooperation and the financed activities, i.e. activities co-financed by the City of Copenhagen, entirely relates to research and development services, the cooperation could be established subject to the exemption rules of R&D services in the procurement directive. In addition to the public funds of co-financing research and development services, the private partners have contributed with private funds for e.g. works and technology procurement.

Advantages and disadvantages of using PPI: Having an equal share with private partners using PPP helps all the parties to have equality and reduce the chance of the failure. Maintaining a close dialogue with suppliers in order to investigate the possibilities is the market ready for the solutions is important. Determining the best contract method can be achieved via close dialogue with suppliers. The results insure scalability as the city has gained knowledge and expertise on the innovative solutions through the process.

One of the disadvantages of developing new solutions via a R&D cooperation, established without a commercial tender procedure (e.g. open procedure, competitive dialogue etc.) is, that the solutions created during the R&D project cannot be procured in a commercial scale from the R&D-partners without carrying out a tender. Furthermore, the public authority has to ensure, that i) it will be able to carry out a tender after finalising the R&D-project, including rights to disclose any IRP, and ii) that the private suppliers participating in the R&D-project are not disqualified in the later tender due to competitive advantages.

When defraying costs in a R&D-project with private participation the public authority has to safeguard that no state aid is involved. This includes completing a state aid report stating the values of each partner’s contributions including expected values of the outcome of the R&D project.

Lessons learnt:

- The Copenhagen Street Lab got a framework for actually collaborating. Deliverables might not be

something that ensures scalability, but it ensures that open dialog with companies that actually gave some knowledge as well.

- The best positive lesson from the PPI is that all parties want it to success as all parties have invested resources in the project.
- Legal experts are needed to draft provisions on IPR and to safeguard that the private participants will not be disqualified in a future commercial tender.

4. Conclusion

Traditional public procurement may not be suitable for purchasing ITS technologies as cost and cost/benefits of many innovative products and solutions may not be well defined. Although the current legal frameworks, such as EU Directive 2014/24/EU, give the legal framework for various procurement procedures for purchasing innovation such procedures have not yet widely used by public procurers for purchasing ITS technologies. There are of course many challenges and risks associated with purchasing ITS technologies using public fund. Because of the risks and challenges, it is not surprising that public procurers may be reluctant to use innovation procurement procedures. City of Copenhagen, in order to achieve its ambition to be the first CO2 neutral capital city, has used various procurement procedures to implement innovative and sustainable transport solutions which has set an outstanding example to other cities and authorities of using public procurement as an instrument for implementation of ITS. Those cases show that innovation procurement procedure can reduce risks and deliver solutions meeting requirements of the city. Through the procurement process partnership with private sector can be formed, thus ensuring scalability and long term success. Although there are some initiatives on assisting public procurers using innovation procurement procedures, there is still lack of expertise in innovation procurement in the public sector, resulting in longer time for tender process. Therefore, share experiences and best practices are urgently needed. In addition, capacity building and training on this subject should be provided to a wider range of public procurers.

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