



Socio-economic effects of opening government accounts payable (Leverantörsreskontra) data

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Executive summary

The objectives of this study were to analyse: (i) efficiency gains that a municipality would gain by publishing accounts payable data as open data; and (ii) socio-economic effects with a major focus on democracy aspects.

Summarising, we can state that potential efficiency gains related to opening accounts payable data can be significant, which was also confirmed by previous studies. Based on experience of Swedish municipalities publishing accounts payable as open data, we have made an estimation of potential efficiency gains due to reduced time to answer inquiries coming from citizens, journalists, and organisations. Based on these assessments, the potential efficiency gains may reach approximately 2 million kr per year for large municipalities. Additionally, availability of open data on accounts payable may result in further reduction of time needed to handle an inquiry due to opportunity to direct a person to the open data file, a more exact and specific question formulation, and reduced number of inquiries.

It was found that democratic aspects in publishing accounts payable were perceived as more important than potential time savings and efficiency gains. This is especially important for smaller municipalities, which do not get that many inquiries and cannot expect the same level of savings effect. Democracy aspects are closely related to transparency, openness, and opportunity to push procurement prices down. All this leads to even greater savings for municipalities. Another important aspect is finding mistakes and discovery of corruption cases. Elimination of such cases in the future would result in considerable savings at national level.

One of the important findings of this research is the fact that municipalities already publishing open data do not see any related risks, while municipalities that are only preparing to publish open data see a number of risks related to open data publishing. The major concerns are related to confidentiality, privacy, and secrecy risks, unclear quality of data, and increased workload for some units. We also make a number of recommendations from different perspectives, which could accelerate the process of open data publishing.

This analysis was carried out by Tatjana Apanasevic from RISE Research Institutes of Sweden as a part of Nationell Skalning Öppna Data (NSÖD) project, financed by Vinnova. The analysis is based on primary data collected through interviews with seven municipalities (the City of Gothenburg, the City of Lidingö, Skövde, Varberg, Karlskrona, Uppsala, and Skellefteå), a service provider, consultants working with open data, and three (data) journalists.

Stockholm, 2020-12-03

1 Introduction

Making data available is the key factor driving potential open data benefits for society and national economy. Open government data may lead to considerable time, resource, energy and money savings, contribute to a better decision making, result in improved public services, appearance of new services and products, and in this way facilitate data-driven innovation (Almirall et al., 2008, Capgemini, 2017; Ekström and Johannesson, 2020; European Data Portal, 2020; Kaplan et al., 2009; PWC, 2017).

Indeed, opening data in the public sector could result in socio-economic benefits with total value up to 1,1 – 1,7 milliard SEK in Sweden (Ekström and Johannesson, 2020). One of the valuable datasets in the public sector is information about purchases, procurements, and expenditures, also called accounts payable (*leverantörsreskontra*). This dataset is of a specific interest for society because its open publishing would lead to increased transparency of the public sector, decreased corruption, and time and efficiency savings related to handling of public inquiries about public procurement. Publishing of accounts payable dataset is in the very early stage in Sweden. Today, just a few municipalities open this data, and some are preparing to start.

Publishing of accounts payable as open data is within the scope of the Nationell Skälning Öppna Data (NSÖD) project. One of the project's objectives is to analyse socio-economic effects caused by opening accounts payable data. Specifically, we are focused on the analysis of:

- (i) Efficiency gains that a municipality would gain by publishing accounts payable as open data.
- (ii) Socio-economic effects with a major focus on democracy aspects.

In order to analyse efficiency gains, we evaluated time savings that municipalities may gain after publishing accounts payable data as open data. This is important, because handling inquiries regarding municipalities' expenditures and procurements usually requires a lot of time. In order to analyse democracy aspects, we asked qualitative questions to different actors, such as municipalities, service providers, consultants working with open data, and journalists.

We analysed seven case studies of accounts payable publishing as open data by Swedish municipalities. It was possible to quantify efficiency gains for those municipalities that are already publishing this dataset (i.e. The City of Gothenburg and the City of Lidingö). For municipalities that are preparing to publish this dataset (i.e. Skövde, Karlskrona, and Varberg) or are discussing the opportunity to start publishing (i.e. Uppsala and Skellefteå), it was only possible to estimate the current cost related to handling of public enquiries. The cross-case analysis helped to estimate commonalities and differences in potential benefits, democratic aspects, and risks of open data publishing.

The performed analysis reveals that opening data on accounts payable leads to significant potential savings for large municipalities that receive many inquiries (e.g. up to about 2,2 million kr per year for the City of Gothenburg). For smaller municipalities, the savings effect will be not so big. Potential efficiency gains in relation to available open data are an opportunity: (i) to direct a person to open data files, (ii) to receive narrower and more specific question requiring less time to handle, and (iii) to get a reduced number of inquiries. At the same time, majority of interviewees see democratic aspects related to opening access to accounts payable as more important than actual time and efficiency savings. When it comes to risks, municipalities already publishing open data do not see any risks, while municipalities that are only preparing to publish open data see a number of risks related to confidentiality, privacy, and secrecy risks, unclear quality of data, and so on.

The report is structured as follows. In the next section, we present a very brief overview of the background situation. This is followed by a description of the methodology used. Then we present our research findings and cross-case analysis. Finally, we summarise our findings and conclusions.

2 Socio-economic analysis of open data: The background situation

2.1 Socio-economic analysis in the area of open data

Socrata (n.a.) in its white paper specifies four types of value of open data: (i) citizen experience, (ii) data-driven decision making, (iii) operational efficiency, and (iv) economic impact.

There are a number of reports that are focused on evaluation of socio-economic effects and potential gains of open data publishing in different cases (Almirall et al., 2008; Capgemini, 2017; Ekström and Johannesson, 2020; European data portal, 2020; Koski, 2015; PWC, 2017). A brief overview of these reports is provided in *Appendix A. Overview of existing socio-economic studies on open data*. These reports seek to quantify efficiency gains related to different types of open datasets, for example, potential time or cost savings, minimised energy use, increased production, saved lives, and so on.

Only two reports (Almirall et al., 2008; Ekström and Johannesson, 2020) discuss such social effects as openness, citizen participation, and transparency. It is specifically noted that these effects are rather hard to quantify. Discussion of these effects is based on respondents' answers to qualitative questions.

2.2 Socio-economic analysis of accounts payable data

The ability to get access and see how the government, public organisations, and municipalities are using their budgets is critical to democracy and transparency. In the USA, a number of states started publishing data on their expenditures, so called Transparency 2.0 States (Kaplan et al., 2009). Benefits that state administrations gained are (Kaplan et al., 2009):

- *Increased civic engagement.* Citizens and businesses use open data portals a lot, for example, “the Missouri budget transparency Web site had received more than six million hits” (Kaplan et al., 2009, p. 9).

- *Monetary savings.* There are a number of saving sources: “more efficient government administration, fewer information requests, more competitive bidding for public projects, and a lower risk of fraud” (Kaplan et al., 2009, p. 9). For example, Texas could save \$2.3 million in total because of numerous efficiency and cost savings.

- *Increased support of a range of indirect public policy goals.* This allows more transparent processes in community investment and affirmative actions.

- *Better coordination of government contracts.* This allows sharing information with other public organisations on good deals, avoiding duplication of bidding through centralized process, getting better pricing conditions and contract terms, and savings in the areas where greater resources are spent (Kaplan et al., 2009).

- *Low cost of online transparency.* The support of online web sites has a low price, for example, “Missouri’s Web site – which is updated daily and allows its residents to search state spending totalling over \$20 billion a year – was mandated by executive order and was created entirely with existing staff and revenues” (Kaplan et al., 2009, p. 10).

One good example is the case of California’s transparency website. The web site was an efficient and cheap tool that cost “California only \$21,000 to create, and it will cost under \$40,000 annually to keep the site accurate and up-to-date. Californians are using the site daily – over a million hits were logged in the site’s first six months online – and it has already helped the state save money. Visitors to the site noticed an audit that showed that many of the vehicles in the state’s fleet were not needed, and the state will be reducing the fleet by 15 percent as a result, saving the state \$24.1 million” (Kaplan et al., 2009, p. 4).

Resource *open-contracting.org* is publishing success stories related to opening procurement data. One of the recent examples is the case of Portugal. Opening procurement data resulted in “total savings of up to 12%, price reduction of up to 20%, and increased efficiency and effectiveness” (Granickas, 2020).

3 Research approach and methodology

3.1 Research approach

In this study, we are focused on the analysis of: (i) *efficiency gains* that a municipality would gain by publishing accounts payable data as open data; and (ii) *socio-economic effects* with a focus on democracy aspects.

In order to do this, we use both quantitative and qualitative approaches. The quantitative approach is used to quantify efficiency gains. A qualitative approach is used to explore benefits related to democracy.

For this study, we applied a multiple case study approach. This approach allows cross-case comparative analysis, identification of common patterns, and more accurate generalisation (Eisenhardt, 1989; Yin, 2009).

In order to classify discussed benefits of open data, we used the open data value framework, proposed by Socrata (n.a.): (i) citizen experience, (ii) data-driven decision making, (iii) operational efficiency, and (iv) economic impact. The framework is provided in Table 1.

Table 1. Socrata open data value framework (Source: Socrata, n.a.).

		Outcome dimensions			
		Citizen experience	Data-driven decision making	Operational efficiency	Economic impact
Defining activities	Citizen participation in government decisions		Systematic approach to defining and tracking goals	Consolidation and re-use of apps, data, and services	Ability to deliver reduced data transaction costs for businesses
	User-friendly digital services on web, mobile, and machine-to-machine interfaces		Interactive public dashboard to show performance data	Retirement of aging systems, and the ability to scale programs more easily	Embrace ‘catalyst’ role in the emerging data economy; help in incubating civic startups
	Government services via location-aware mobile apps		Data visualization and employee-facing analytics apps to extract insights	Reduction of labor-intensive information requests through self-service tools	Access to data that supports academic research, driving new discoveries
	Integration with consumer web services like Google Maps, Yelp, and Zillow		Sophisticated data collection capabilities, including crowdsourcing and sensor networks	Economies of scale through outsourced data storage	Public-private data exchanges
	Active promotion of data transparency efforts		De-siloed systems and centralized, web-based access to data	Shift from custom-built systems and databases to service-oriented architecture (SOA)	Cross-departmental and inter-government data federation

3.2 Analysis of efficiency gains

In order to quantify efficiency gains of publishing accounts payable data as open data, we followed the following approach (Koski, 2015):

$$Cs = \Delta t \cdot k_{P,d} \tag{1}$$

where Cs is cost savings, Δt is the change in labour hours, and $k_{P,d}$ is the hourly cost of personnel.

The hourly cost of personnel is calculated as:

$$k_{P,d} = Lm \cdot (1 \cdot 77\%) \cdot 12 / (226 \cdot 8) \tag{2}$$

where Lm is the monthly salary, 77% is the overhead cost to the salary, and 226 working days are used as the standard value for a year.

The data on the monthly salary is taken from SCB’s salary statistics¹:

¹ SCB, n.d. *Lönesök – Hur mycket tjänar...?* [online] Available at:

Relevant categories could be:

- Ekonomi- och finanschefer nivå 1: 67 500 kr/mån totalt/offentlig sector
- Ekonomi- och finanschefer nivå 2: 54 700 kr/mån, totalt /offentlig sector
- Ekonomiassistenter: 28 500 kr/mån, totalt /offentlig sector
- Redovisningsekonomer: 30 500 kr/mån, totalt /offentlig sector

$$K1 = 67\,500 \cdot (1 \cdot 77\%) \cdot 12 / (226 \cdot 8) = 67\,500 \cdot (1 \cdot 77\%) \cdot 12 / (1808) = \sim 900 \text{ kr}$$

$$K2 = 30\,500 \cdot (1 \cdot 77\%) \cdot 12 / (226 \cdot 8) = 30\,500 \cdot (1 \cdot 77\%) \cdot 12 / (1808) = \sim 640 - \mathbf{650 \text{ kr}}$$

In our further calculations, we use value **650 kr** as the average hourly cost of the personnel.

3.3 Socio-economic effects

Publishing of procurement and payment invoices is strongly related to democratic effects. Due to the fact that it is difficult to quantify them, we have collected qualitative data. It is presented as a descriptive text for each of the analysed case studies.

3.4 Data collection

In order to analyse both efficiency gains and socio-economic effects, we collected primary data via semi-structured interviews. The interviewing procedure involved a number of steps:

(i) Development of the interview protocol. The interview questions were formulated in line with the research aims. A sample protocol is provided in *Appendix B. Sample interview protocol*. Discussed topics were related to:

- Factors driving publication of accounts payable as open data.
- The context and specifics of accounts payable administration BEFORE its publishing as open data and time used for answering citizen questions.
- Differences in work with accounts payable AFTER its publishing as open data with the focus on possible time savings when answering citizen questions.
- Other potential benefits, possible risks, and benefits related to democracy aspects.

(ii) Conducting interviews. Majority of interviews lasted about one hour. Two researchers participated in interviews. One of the researchers was taking interview notes.

(iii) Transcription of interview records. The majority of interviews were recorded and later transcribed. Notes of the interviews that were not recorded were reviewed by the interviewees when possible.

In order to understand different perspectives on open data, we have interviewed different types of actors. These are municipalities, a data management platform provider, a consultancy company, a project related to accounts payable data publishing, and a data journalist. A list of interviewed actors is summarized in Table 2.

Contacted interviewees represent specialists and managers from financial and IT departments, who directly work with accounts payable data in municipalities; specialists and consultants working with business and technical aspects of open data; and journalists with long term experience of work with different authorities in the public sector. All interviewees were qualified as industry experts having relevant knowledge for our research.

The interviews were conducted in the period from April to October 2020. The total number of conducted interviews is 13. The total number of interviewed experts is 22.

<<https://www.scb.se/hitta-statistik/sverige-i-siffror/lonesorok/Search/?lon=ekonom>> [Accessed 13 July 2020]

Table 2. Interviewed actors.

Actor	Type of actor	Interviewee	Interview date
The City of Gothenburg	Municipality	- Development leader of digital service	20 April 2020
The City of Lidingö	Municipality	- System administrator for the business system - IT solution architect	12 June 2020
Skövde	Municipality	- Deputy chief financial officer - Head of IT and Business development	30 April 2020
Varberg	Municipality	- IT developer	4 June 2020
Karlskrona	Municipality	- Responsible for the financial system - Responsible for digitalisation	10 June 2020
Uppsala	Municipality	- Accounting group manager - Accounting economist 1 - Accounting economist 2 - IT strategist	24 June 2020
Skellefteå	Municipality	- Chief financial officer - Accounting manager	3 September 2020
TietoErvy	Consultancy	- Company's consultant 1 - Company's consultant 2	23 June 2020
Metasolutions	Platform provider	- Top-level manager	23 June 2020
Open Knowledge Sweden	Project	- Co-chairman, researcher - Project manager	22 June 2020
Journalists	Open data user	- Data journalist (KS) - Data journalist (PJ) - Data journalist (PH)	17 August 2020 25 September 2020 2 October 2020

4 Findings

In this section, we provide the overview of the analysed case studies. The process of opening of accounts payable data is at a very early stage. Currently, there are a few municipalities that are regularly publishing this data openly. There are a number of municipalities that are preparing to start doing it, and some are starting a discussion about the possibility to publish. Accordingly, we have interviewed municipalities in each of the mentioned categories (see Table 3).

Table 3. Classification of interviewed municipalities by their readiness to publish accounts payable data as open data.

Municipality	Readiness level
The City of Gothenburg	Publishes for number of years
The City of Lidingö	Publishes for number of years
Skövde	Prepares / Is ready to start
Varberg	Prepares / Is ready to start
Karlskrona	Prepares / Is ready to start
Uppsala	Discusses the opportunity to start publishing
Skellefteå	Discusses the opportunity to start publishing

4.1 Municipalities publishing accounts payable data as open data

The City of Gothenburg and the City of Lidingö are two municipalities that have been publishing accounts payable data as open data for a number of years. The published open data file represents metadata on each invoice. If someone wants to have a look at the picture(-s) of certain invoice(-s), s/he should request this via provided e-service.

The case of City of Gothenburg

Overall context. Since 1999, the city administration has been receiving an increasing number of different questions from journalists, companies, and citizens regarding public procurement and expenditures. Answering these questions required a lot of time and resulted in a high cost. Another key motivation to publish accounts payable data was the transparency aspect. The City of Gothenburg publishes accounts payable data as open data for three years now (as of 2020).

The number of people working with accounts payable is big, because the city provides many services and has many divisions and entities.

Situation BEFORE publishing open data. According to the regulation (allmän handling), any citizen or a company can request information from a governmental organization. Previously, there was no specified process for handling public inquiries in the municipality. Answering one question required at least 2 hours per person (sometimes two persons), with the cost 800 kr per hour per one person. It was estimated that during three (3) months all 36 entities have got approximately from 5 to 15 queries.

Situation AFTER publishing open data. The City of Gothenburg has changed its economic system to a newer version, which allowed easier and seamless data extraction for publication. Another key aspect was introduction of a structured inquiry receiving process via dedicated e-service. When a person has gone through the open dataset and got interested in a specific invoice and would like to get more information about it, then by using this e-service a person can fill in a request and select which entity he wants to address, and whether he wants an invoice in a paper form or in a digital format. This way, the invoice requesting procedure became more streamlined. It is noticed that what-type questions became replaced by how- and why-type questions.

Today, in the City of Gothenburg, data publishing from all entities takes 30 min per month (which is 400 kr/h) and is a part of regular work routine. Open datasets are published on a monthly basis. Responding to one inquiry takes about 5 minutes (instead of 1-2 hours that were needed before). Based on statistics for the period from the 1st of January to the 14th April 2020, there were 27 requests for the actual invoice picture through the e-service. However, there still might be inquiries sent by email directly to entities. There are from 300 to 600 downloads of the spreadsheet with data on accounts payable per month.

Efficiency gains of the City of Gothenburg related to reduced inquiry answering time are presented in Table 4.

Table 4. Potential efficiency gains of The City of Gothenburg.

Parameters	Calculations	
The number of queries	5-15 queries (10 at average) from citizens coming to 36 entities per 3 months (360 inquiries per 3 months) 120 inquiries at average per all 36 entities per month	
The hourly cost of personnel	650* kr	
	Before publishing open data	After publishing open data
Hours of work per query	2 h	5-10 min of work (10 min = 0.167 h)
Cost of answering 120 questions by all 36 entity per month	$120 \times 2 \times 650 = \mathbf{156\ 000\ kr}$	$120^{**} \times 0.16667 \times 650 = \mathbf{13\ 000\ kr}$
Efficiency savings per month	$156\ 000 - 13\ 000 = \mathbf{143\ 000\ kr}$	
Efficiency savings per year	$143\ 000 \times 12 = \mathbf{1\ 716\ 000\ kr}$	

* In the calculations, we use the hourly cost of personnel K2 = 650 kr. See Section 3.2 for more details.

** We assumed that the number of inquiries per month per all entities has remained the same as there was no exact statistics about the current situation. However, people working in the finance department notice that they receive less questions after opening the dataset.

Potential savings for the City of Gothenburg if the municipality saves time by having no need to answer 300 to 600 additional questions corresponding to a number of open dataset downloads are in Table 5.

Table 5. Potential savings of The City of Gothenburg.

Parameters	Calculations
References to open data file	There are from 300 to 600 references to the open data file per month This is about 450 references at average per month
Hours of work per query	5-10 min of work (10 min = 0.167 h)
Potential savings per month (If the municipality does not need to answer 450 questions per month)	$450 \times 0.167 \times 650^* = \mathbf{48\ 847\ kr}$
Saving per year	$48\ 847 \times 12 = \mathbf{586\ 164\ kr}$

* In the calculations, we use the hourly cost of personnel K2 = 650 kr. See Section 3.2 for more details.

Other benefits and effects:

- There is a structured data publishing process.
- Easy to publish open data.
- There is a more structured and streamlined process of getting inquiries and questions from the public via the e-service.
- Questions became narrower and more specific. It is easier to choose a person to handle an inquiry.

Benefits related to democracy perspective:

- Transparency. One of the key issues to open data on accounts payable data was a wish from the city administration to be transparent. Being “transparent in democratic sense is to “show me the money and show me the trail where it goes” (representative of the City of Gothenburg).
- Finding mistakes and questionable purchases. “Then they [citizens] ask for the invoice picture. And then they see 3 000 kr paid for 59 hamburgers. Is this relevant?” (representative of the City of Gothenburg).
- Internal use of published and structured data on purchases, looking for better contract conditions in invoices of suppliers of other entities. This means that the potential savings could be even higher if a certain entity finds through the open data that another entity has a supplier providing the same service but with a lower price.
- Driving a dialog with the public (triple helix) by organising a Forum för Öppna data och Innovation in order to educate those who are interested in open data.

Driving factors for open data publishing to reach a larger scale:

- Data visualization “could be an important step for that [for open data publishing to reach a larger scale] combining different datasets” (representative of the City of Gothenburg).

The case of the City of Lidingö

Overall context. The City of Lidingö is publishing accounts payable data as open data since 2017. The open data publication was driven by an IT strategist, who previously worked in the municipality and who wanted to show that with small cost it was possible to gain great benefits. In addition, the municipality had a system allowing data extraction and publishing in an easy way.

The municipality gets a lot of inquiries about invoices mainly from competing suppliers and journalists. Some of these inquiries are very specific and ask for information that is not available as open data. Today, there is a general increase in interest to invoice information of the public sector. Additionally, there are a number of statistic companies that want to get information on purchases on a regular basis.

Situation BEFORE publishing open data. Inquiries about invoices from companies, citizens, and journalists were coming via inquiry/request management system. Personnel working in the accounting department had to prepare reports in response to these inquiries. Answering one question required about one hour and a half.

Situation AFTER publishing open data. Technology has evolved and it became easy to produce and publish this type of data by just pressing a button in the financial system. Open data is published once per year. First, all invoices for the previous year are published as a file. Then the confidentiality assessment is made, and sensitive data is removed. This way, a standard file is produced and is ready for publishing.

The inquiry receiving process remained the same. However, now the personnel can refer to open data. This allows spending time because the accounting department does not get as many requests as it should have received otherwise (but this is difficult to estimate). Additionally, the total time to find information has reduced.

Some types of questions have decreased because of the published open data on invoices (accounts payable). Interested in this information can retrieve all supplier invoices ourselves. The open data represents metadata records about invoices. When people are requesting pictures of invoices, processing of such inquiries takes time about the same time, one hour and a half per inquiry.

During the previous year, there were about 40-80 references per month to the file with open data on invoices and about 500 references in total. This is about 50 references at average per month. Municipality considers these 50 references per month as potential savings (see Table 6). However, it is not known if anyone of these 50 persons has sent a request after looking at the open data file.

Table 6. Potential saving of The City of Lidingö.

Parameters	Calculations
The number of queries	There were about 500 references to the file with open data on invoices during the previous year .
The hourly cost of personnel	650 kr*
Hours of work per query	1-1,5 h
Potential savings per year (If the municipality does not need to answer 500 questions per year)	$500 \times 1,5 \times 650 =$ 487 500 kr
Efficiency savings per month	$487\ 500 / 12 =$ 40 625 kr

* In the calculations, we use the hourly cost of personnel K2 = 650 kr. See Section 3.2 for more details.

Other benefits and effects:

- Easy to publish open data. This works as a standard report in the financial system.
- Creation of a standard report button for repeating questions. For example, there are questions that are repeated every quarter. The report is generated by clicking on a corresponding button.
- Reports published as open data. The municipality is preparing reports as open data and uses them as a standard way to handle requests.
- There is a structured process of getting queries and questions from the public via e-service (inquiry/request management system).
- Publicity. The municipality has got an award as one of the best municipalities working with open data.

Benefits related to democracy perspective:

- Good control over procurement and an internal web-shop for e-purchases with electronic orders. This came from another perspective. The municipality worked hard with procurement with a strong focus that all purchases should be done “from right suppliers. That we get the right prices and ensure continuous follow-ups on following our framework agreements” (representative of the City of Lidingö). This results in additional savings because purchases from new suppliers require a lot of internal administrative work. And if the municipality is not following framework agreements, it may get fines.
- Events for citizens. Organising an *Innovation week* for people interested in open data two years ago.

Risks related to open data publishing:

- There are no major risks at present.
- No risks with data quality.
- Before starting open data publishing it is important “to do a confidentiality assessment <...> in order not to publish wrong information that has a risk to reveal sensitive information” (representative of the City of Lidingö).

4.2 Municipalities preparing or starting publishing accounts payable data as open data

Skövde, Varberg, and Karlskrona are municipalities that are preparing or starting publishing accounts payable data as open data. In these cases, we could quantify costs related to inquiry handling and discuss expected benefits in relation to open data.

The case of Skövde

Overall context. The municipality accepts supplier invoices in different electronic formats and on paper. The information from accounts payable is processed in the purchasing analysis tool. The purchasing statistics is analysed in terms of what was bought, in which volumes, from which supplier. This way it is possible to follow up expenditures.

Supplier invoices are handled centrally. Work with accounts payable is handled by two full-time employees. Financial department works very hard to secure a proactive internal control of the process. Then municipality managers of respective units access data on accounts payable to follow-up the expenditures. The municipality is receiving inquiries from: (i) public organisations, journalists e.g. from *Dagens Samhälle*, which informs the citizens about municipality’s expenditures; (ii) citizens; and (iii) suppliers, who are interested in information on purchases from other suppliers.

Situation BEFORE publishing open data. The municipality receives about 30 inquiries per year. It takes about 75 minutes at average to answer one inquiry. This includes e-mail communication, confidentiality management, creating a compilation of invoices, checking the material, archiving, contacting the lawyer, and so on. However, the time may vary a lot depending on the request. Today, the inquiry handling process is fully manual. It is not structured or defined and needs to be built from the beginning every time.

There are also different reports prepared in the financial system that are based on previous inquiries having a repeating nature. These reports can be sent out on demand.

Expected situation AFTER publishing open data. When the municipality starts publishing accounts payable data as open data, it plans to publish open data on a monthly basis. It is expected that the number of inquiries may increase after publishing and decrease in the long-term period. The municipality is also expecting that the number of working hours needed to handle inquiries will reduce. However, this may not have that big effect because the number of inquiries is small.

Costs related to inquiry handling in the case of Skövde are presented in Table 7.

Table 7. Costs related to inquiry handling, the case of Skövde.

Parameters	Calculations
The number of queries	There are about 30 inquiries per year
The hourly cost of personnel	650 kr*
Hours of work per query	75 min (1,25 h)
Cost of work with inquiries per year	$30 \times 1,25 \times 650 = \mathbf{24\ 375\ kr}$
Cost of work with inquiries per month	$24\ 375 / 12 = \mathbf{2\ 031\ kr}$

* In the calculations, we use the hourly cost of personnel K2 = 650 kr. See Section 3.2 for more details.

Other expected benefits and effects:

- Structured way to receive inquiries with the help of dedicated e-service.
- Structured way and common routines to handle inquiries that are requesting an invoice image. This will ensure convenience.
- The same standards and easy procedure to send in inquiries for all stakeholders.
- Increased quality of internal data when more people can review data and working routines are defined.
- Strengthened municipality's brand.
- Internal benefits of using open data, for example, using this data in collaboration with other municipal units and administrations in a case of a common platform.
- Opening accounts payable data may result in reduced procurement time.
- In the future, open data publishing may result in a creation of new services based on it.

Benefits related to democracy perspective:

- Transparency. This leads to strengthened trust in the municipality.
- Openness. Anyone is able to increase knowledge about the municipality's finances.
- Municipality can make a comparison with other municipalities publishing the same data.

Expected risks related to open data publishing:

- Risks related to uncertainty and unsafety of people in the existing ways of working.
- There are some concerns that opening data may create more work for certain units.
- Unclear quality of existing data. For example, there is a certain routine to manage confidentiality issues. Currently, confidentiality assessment is performed every time when disclosing information.
- There are concerns regarding detecting mistakes and errors. A process for their handling is unclear.

The case of Karlskrona

Overall context. The municipality of Karlskrona is planning to start publishing accounts payable as open data in the autumn 2020. This will be done after the introduction of a new invoice management system.

A team in the financial service department is performing invoice administration centrally. There are three types of invoice flows: electronic invoices, electronic invoices outside e-commerce, and paper invoices. All of them come to accounts payable accounting.

Confidentiality of paper invoices is assessed manually. Currently, there is no opportunity to perform confidentiality classification of electronic invoices directly in the financial system. In the new system, this will be done automatically, but the personnel will need to check if there is any confidential data in the invoice or not.

Situation BEFORE publishing open data. At average, suppliers, journalists and citizens sent in about 3-5 inquiries about invoices per month. The municipality receives these inquiries centrally. Some certain questions are asked regularly, for example, every quarter. There might be much more inquiries being directly sent to administrations of corresponding services, but their number is not known.

Questions sent by citizens are not very complicated. Usually, it takes about 0,5-1 h to answer them and does not require extended search. Answers are prepared by a corresponding administration.

Suppliers or journalists are usually interested in certain contracts. Their questions can be about the scope of a certain procurement or how much money was spent on something. Sometimes, municipality's own suppliers want to follow agreements or purchases from other suppliers. The municipality has many contracts. That is why, handling this type of inquiries requires a different procedure and answering them may sometimes take days.

Expected situation AFTER publishing open data. The process of invoice handling will remain the same after starting opening accounts payable data. For the municipality, it is important to find a right strategy for open data publishing. This includes a development of a clear administration process; more structured way of work; possible introduction of e-service for a structured administration and handling of incoming inquiries; ensuring quality of published data; and using the new system, which will simplify accounts payable data management. However, it is expected that answering more complicated and time-consuming questions will not be solved with open data.

The major value related to publishing accounts payable as open data is in democratic aspects, increased transparency and trust. Open data publishing requires a cultural shift in the organisation.

Cost related to inquiry handling in the case of Karlskrona are presented in Table 8.

Table 8. Costs related to inquiry handling, the case of Karlskrona.

Parameters	Calculations
The number of queries	There are about 3-5 inquiries per month (4 at average) (4 x 12 = 48 inquiries per year)
The hourly cost of personnel	650 kr*
Hours of work per query	1 h
Cost of work with inquiries per year	48 x 1 x 650 = 31 200 kr
Cost of work with inquiries per month	31 200 / 12 = 2 600 kr

* In the calculations, we use the hourly cost of personnel K2 = 650 kr. See Section 3.2 for more details.

Other expected benefits and effects:

- E-service as a more structured way of getting inquiries. “It would have been interesting to have an e-service to collect inquiries in the right way” (representative of Karlskrona).
- Structured open data publishing process in the municipality. “It is possible to publish it in a structured way and have a clear administration. This could help us to save money” (representative of Karlskrona).
- Better service. “A little bit faster and easier way to get an answer” (representative of Karlskrona).
- Use of open data internally. “The open data that we will publish, we will use ourselves in order to gain our own benefits” (representative of Karlskrona).
- Increased quality of published data. “A man makes the quality of processes higher because he knows that someone will look at it. Man should think one more time, because the data will be published” (representative of Karlskrona).
- Cultural shift in the organisation. “<...> the organisation [needs to] understand that it is important to manage and structure data in a way that it can be used internally first, and then open it. There are great internal benefits in changed thinking and internal processes. The organisation must be mature enough to share” (representative of Karlskrona).
- New services based on accounts payable data, reuse of open data. “Maybe it are local businesses or companies that can use this and make a website or an app” (representative of Karlskrona).

Benefits related to democracy perspective:

- Democracy and transparency. “Opening accounts payable data is about democracy. A public organisation must be able to show documents that are not confidential” (representative of Karlskrona).
- Trust. “The perspective of citizens. Otherwise, there are not that big gains in general” (representative of Karlskrona).

Expected risks related to open data publishing:

- Confidentiality and security classification related risks. “<...> that you do not remove things that are classified as confidential” (representative of Karlskrona).

- Increase in administrative work. “It can also lead to a certain increase in administration as transparency can lead to more inquiries” (representative of Karlskrona).

The case of Varberg

Overall context. The municipality of Varberg is preparing to publish accounts payable as open data. One reason for that is the PSI directive, and another is possible time savings for the municipality. Citizens, journalists, and suppliers are interested in accounts payable data. Supplier invoices are handled by economists working with accounts payable and responsible account managers.

Situation BEFORE publishing data as open data. External inquiries may come in some ways. If an enquiry comes directly to the finance office, it is directed to the accounting department and someone is appointed to respond to it. An external inquiry may also be sent to the email of administration of a corresponding service and be handled there, because all economists have access to the system. In this case, the finance office is not informed about that enquiry. Finally, inquiries may also be sent to a procurement department.

About 20 enquiries are sent directly to the finance office. Administrations of corresponding services and their financial units receive between 20 and 30 questions. In sum, it would be about 40-50 enquiries per year. Some enquiries might be very time-consuming and answering them may take a few days. Some questions are easy and can be answered within 30 minutes from the question receiving time. This includes looking for an answer in the system, finding a file, and sending it out. At average, inquiry handling takes two hours.

Expected situation AFTER publishing open data. Everything will depend on the implemented solution. But there will be a person, who will compile a file and save it in a certain format (e.g. Excel) every month. May be this will be done automatically. Currently, the municipality is looking for a solution to remove personal data from invoices.

The aim of open data publishing is to reduce working time spent on answering inquiries. The number of questions may also decrease. A person having open accounts payable data may order only those invoices that he is specifically interested in (for example, two instead of 30). This is where the time saving for the municipality is. It will be possible to order invoices through a dedicated e-service. However, there is a need to review invoices before sending them out due to confidentiality reasons. Other expected benefits would be development of internal work processes and enhancing their quality.

Costs related to open data publishing are associated with minimum operational costs of the technical solution; IT department costs related to software licence, rebuilding the capacity of the server, handling information security, maintaining the solution, etc. The effort for the finance office will be minimal.

For the municipality, it is important to be transparent and open access to well-structured data having a good quality.

Costs related to inquiry handling in the case of Varberg are presented in Table 9.

Table 9. Costs related to inquiry handling, the case of Varberg.

Parameters	Calculations
The number of queries	There are about 40-50 inquiries per year (45 inquiries per year)
The hourly cost of personnel	650 kr*
Hours of work per query	2 h
Cost of work with inquiries per year	$45 \times 2 \times 650 = \mathbf{58\ 500\ kr}$
Cost of work with inquiries per month	$58\ 500 / 12 = \mathbf{4\ 875\ kr}$

* In the calculations, we use the hourly cost of personnel K2 = 650 kr. See Section 3.2 for more details.

Other expected benefits and effects:

- New ideas of services and reuse of open data. “I hope that with opening data we will get new innovation and new ideas” (representative of Varberg).

- More specific enquiries. “If we publish the entire data on accounts payable, you do not have to request the same big number of invoices, maybe two will be enough (instead of 30). Here we can also save time” (representative of Varberg).
- Enhanced quality of internal processes. “If citizens ask, ‘Why are you doing this?’, this is more a business development question. In the long run, it contributes to the quality-enhancing effect of the municipality’s internal processes” (representative of Varberg).
- Good quality of published data, structured data. “Providing datasets requires that data is structured and organised, and has a good quality, which is positive for the municipality to keep track of its data” (representative of Varberg).

Benefits related to democracy perspective:

- Openness and transparency. “Municipality shows openness, shows transparency” (representative of Varberg).
- Collecting open data on one portal. That would give an opportunity to see what is demanded in other municipalities and how data is used.

Expected risks related to open data publishing:

- Bad data quality. “There is a high risk that there is a poor data quality” (representative of Varberg). But this is not the major risk.
- Confidentiality and security related risks. “The big risk is that personal information (e.g. name, bank account) will be included in open data” (representative of Varberg).

4.3 Municipality discussing the opportunity to start publishing accounts payable data as open data

Skellefteå and Uppsala are municipalities that are discussing the opportunity to start publishing accounts payable data as open data. In these cases, it was complicated to quantify costs specifically related to handling of inquiries. We focused on the discussion of expected benefits, effects, and risks in relation to open data.

The case of Skellefteå

Overall context. The municipality of Skellefteå is discussing the opportunity to start publishing accounts payable as open data. This is important for municipality due to two reasons. First, publishing open data on accounts payable would help to reach a higher level of transparency in the municipality’s work. As a consequence, citizens can have a better understanding and be better informed about things and areas that are important for municipality and in which areas it purchases the most. Second, the business sector could benefit from open data and offer new services or products based on it.

Accounts payable are handled centrally in the municipality’s financial system. There are specialists handling invoices in different organisation’s units. Additionally, a contracted company is helping the municipality in the area of internal control and takes part in handling accounts payable.

Currently, there are a few groups of stakeholders that are very interested in accounts payable data. These are competing companies, service providers, that, for example, want to know about existing agreements between the municipality and a certain supplier, how much was paid to that supplier, and so on. Another big group represents journalists and media that can be interested in certain types of costs, for example, travel, renting of premises, representation, etc. Finally, these are statistics agencies and consultants having a task to collect certain information.

Situation BEFORE publishing data as open data. In the municipality, there is one full-time employee who is handling public and media inquiries regarding information from the financial system.

The municipality receives about one inquiry per week. The municipality representatives confirmed that the inquiry handling time is very short, and the answer is sent immediately out in most of the cases.

When responding to inquiries regarding invoice copies, the municipality prefers to send invoice copies in PDF format. This is because of previous bad experience when accounts payable data sent out in Excel files was distorted and misinterpreted.

Expected situation AFTER publishing data as open data. The municipality representatives believe that there will not be much changes in the work process after starting publishing accounts payable as open data. The system that is used today structures invoices and allows a fast search and withdrawal of invoices of a certain supplier for a certain time period. Due to the fact that answer to inquiries are provided rather quickly today, there are no expectations that this process will become more efficient and will allow any time saving. Contrary, the municipality representatives foresee an increase in numbers of inquiries after publishing open data. The expected questions are related to requests to explain the open data and why-types of questions, for example: “Why do we need this in the municipality?”

The municipality representatives would like to publish pictures of actual invoices as open data and not just a metadata file.

Other expected benefits and effects:

- Better informed procurement unit. “Another advantage could be for our procurement unit. There can certainly be more points of view on framework agreements, etc.” (representative of Skellefteå).
- Easy to direct or refer to open data file. “There may be an advantage in being able to refer to the dataset” (representative of Skellefteå).
- Creation of new services based on open data. “We believe that the business community can feel good about it. There can be new services and products that can be developed” (representative of Skellefteå).
- Correct representation of the municipality. “It is important that the data is published correctly and not distorted. This also gives the municipality an opportunity to be presented in the right way, instead of sending separated data out to journalists” (representative of Skellefteå).

Benefits related to democracy perspective:

- A democratic process and openness. “I see it [open data] as a democratic process, that we become more transparent and open to our citizens” (representative of Skellefteå).
- Increased transparency. “It is important to increase transparency towards our citizens. <...> One can see what is important for municipality, in which areas it purchases a lot, etc. This is important information, important knowledge to have” (representative of Skellefteå).
- Better informed citizens. “It [open accounts payable data] is good because it will make it easier for citizens to find out who the municipality is procuring from, what is it buying” (representative of Skellefteå).

Expected risks related to open data publishing:

- Risks related to privacy and confidentiality. “But we have information in accounts payable that is sensitive, including confidential information, and we can not release it to anyone. <...> The challenge is confidentiality management” (representatives of Skellefteå).
- Increase of work due to increased amount of questions. “There will be more inquiries and we will need to clarify more things. <...> It may be worth doing more to increase transparency for our citizens” (representatives of Skellefteå).
- Distortion of the information. “There is a risk that the information ends up in the wrong hands, the information may be distorted, or performed analyzes are incorrect, and drawn conclusions are not true, and, thus, makes a bad image of the municipality. <...> [T]here always is a risk of misusing the information” (representatives of Skellefteå).

The case of Uppsala

Overall context. The municipality of Uppsala is discussing the opportunity to start publishing open data. Making the municipality's data available for external use to the greatest possible extent is one of the highest priority measures in the Digital Action Plan (Uppsala kommun, 2020). Now, responsible managers are assessing which data could be of interest to the public, look into examples of other municipalities, e.g. Gothenburg, Örebro, and others.

Accounts payable are handled centrally, and quite many people are involved in the invoice handling process. About 70% of received invoices are e-invoices. There is a scanning service that handles and scans paper invoices. IT and the system administrators are involved in getting all these invoice files. Then the accounting unit handles any deviations and sends invoices to the corresponding unit for review and accounting.

The municipality receives inquiries about accounts payable from other suppliers, journalists, and students. In addition, certain municipal organisations collect data on purchases on a yearly basis.

Situation BEFORE publishing data as open data. One person can work between 50% and 75% to handle public inquiries regarding accounts payable. There are big waves of inquiries during spring and autumn. These often are suppliers, who are interested in data, when they are in a procurement process. Inquiries can be different. Some want invoice copies; some would like to receive an Excel file. Some want just a few invoices, which can quickly be done. And some request invoices in large volumes, for example, all invoice copies from a specific supplier during a specific time period. This takes a very long time to produce. This way, inquiry handling may take from several hours (to send up a thousand invoices) to a few minutes. Usually, invoices printed in paper are sent by post in order to be able to get paid for them. Used financial system allows large document withdrawals, but manual work and time is needed to print large volumes, e.g. a thousand invoices. In addition, there is no automatic way to delete personal data from printed invoice copies prepared to send out. Personal data is masked manually, which is also a time-consuming process.

There are quite many people involved in the process of inquiry handling. This is the accounting unit. The procurement unit is involved because certain suppliers have confidentiality on their prices. In some processes, lawyers and the IT unit need to be involved.

Expected situation AFTER publishing data as open data. It is expected that after opening accounts payable data there will be some time savings, because people will be able to search in open data for information that they are interested in instead of sending inquiries to the municipality. But in the case of requests of invoice copies printed on paper, the process will remain the same and will involve manual handling. Sending invoice copies digitally may save time, and it is not allowed to charge for digital copies.

Other expected benefits and effects:

- Internal use of data on suppliers. “It looks pretty smooth if you can go in and look at suppliers you buy from” (representative of Uppsala).
- Clearer and more specific inquiries. “This can lead to clearer inquiries, which, in turn, simplifies the work of extracting invoice copies. For example, if they can go in and search themselves, they can see what is on this supplier and then choose that they want copies of 10 invoices. It is easier for us if they specify what they exactly want” (representative of Uppsala).
- Data re-use at national and international level. “We would like to have it [open data] presented on other platforms, and that it is not only used by people living in Uppsala but also used nationally or internationally in the EU” (representative of Uppsala).

Benefits related to democracy perspective:

- “The democratic perspective outweighs the time savings” (representative of Uppsala).
- Openness and transparency. “Then we become transparent and I think more people can go in and look at this data and maybe hesitate to send emails and ask about certain things. There may also be an increase in those who want to take out invoice copies” (representative of Uppsala).

“The big advantage is that we should be open and make it easier for the public to apply” (representative of Uppsala).

- Informing citizens about open data, for example, “with a press release that we have now launched on our website uppsala.se” (representative of Uppsala).
- Dialog with the wider public. “It is also important to have contact with organisations, researchers, students, who are interested in using the datasets that have been published and get their input on these datasets” (representative of Uppsala).

Expected risks related to open data publishing:

- Risks related to GDPR regulation. “Things that should not be opened should not appear there” (representative of Uppsala).
- Risks related to confidentiality. “Confidential information should not be disclosed” (representative of Uppsala).
- Risks related to quality of data. “There may be a risk with data quality, but you have to ensure that the data is of the right quality before it is available on the web” (representative of Uppsala).

4.4 Findings from interviews with other stakeholders

TietoEvrý

Overall context. The company’s representatives have a broad technical and strategic business competence in the area of open data and are helping to work with specifications in the NSÖD project. They work with many municipalities and have a good overview of a ‘big picture’ related to accounts payable publishing.

When it comes to accounts payable, the company representatives noted that major open data users are journalists.

Major identified risks and obstacles for open data publishing are: (i) a lack of incentives to implement changes that are needed to start publishing; (ii) a fear to publish confidential data or data that should not be published; (iii) possible poor quality of data and mistakes in the data.

Major savings related to accounts payable is related to time needed to handle inquiries.

Discussed benefits and democracy aspects are:

- Common routines and structured way of work. However, the disadvantage here is the fact that the majority of open data projects are driven as separate projects and are not linked to a general information management project in a municipality. But if the information management process would be the core focus, it would include mapping of all work routines and processes in such a way that open data publishing would become an integral part of this process. In this case, it is possible to get control over data publishing, automation of processes, and organise all information flows and information management processes in a very smooth way. A lack of this more comprehensive view causes a lot of challenges.
- Economy growth, innovation, and new services. “There are also innovation and growth benefits when others can create value, develop services and innovations” (representative of TietoEvrý).
- Democratic aspects, openness and transparency. “There are a thousand reasons to open data. One of the most important is the aspects of democracy. Openness, transparency are close to this” (representative of TietoEvrý).
- Transparency, which helps to find inaccuracies, mistakes, and cases of corruption. “Transparency can contribute to efficiency, counter corruption. It can help finding mistakes and errors” (representative of TietoEvrý).

In order to facilitate innovation and open data reuse by citizens, a low threshold is needed. It could be visualisation services, for example, directly on the national open data portal, and links to educational YouTube videos.

Metasolutions

Overall context. The company has experience and competence related to data management and data structuring. It helps municipalities to start open data publishing in the NSÖD project.

Major identified challenges and obstacles for open data publishing are: (i) the political part; and (ii) a risk related to publishing data containing any confidential information. In addition, the process of open data publishing requires certain changes in the organisational culture of municipalities. Hence, there is a need to appoint people who will implement these changes. With time, more and more units of municipality will be involved in the open data publishing process. And there is a need to increase the competence.

Major savings. At the organizational level, opening procurement data results in time savings, when personnel do not need to manually provide information to incoming inquiries from authorities, media or other stakeholders.

Discussed *benefits and democracy aspects* are:

- Internal use of open data leading to increased quality of service. A good example is the contact centre in Gothenburg. Employees there use accounts payable data to respond to citizens directly during a phone call. It is the internal use of open data that helps to increase the quality of citizen service in the municipality.
- Democratic aspects and transparency.
- Eliminating corruption. “There are some situations, where public organisations get involved in expensive agreements. Some prices can be extremely high. Keeping the accounts payable open can help to find these corruption cases and involved suppliers” (representative of Metasolutions).
- Finding mistakes, something that can be done by journalists.
- To push procurement prices down. When more municipalities start publishing open data, there might appear new services that will make a better comparison between municipalities and see why some municipalities pay more. This would make it easier to push prices down and reduce costs in the procurement department.

At the moment, there is a lack of data visualisations because only a few municipalities are publishing accounts payable data. More data of the same type is needed for data analysis and visualisations.

Project: Open Knowledge Sweden

Overall context. The project aims to build a service, a platform, for open data, namely, accounts payable. The platform will gather open data published by different municipalities and allow its further re-use, visualisations, and creation of possible new services.

(Data) Journalists

Overall context. Journalists and data journalists represent one of the major groups that is requesting different types of data from the public sector for analysis. From this perspective, it is valuable to know what kind of experience journalists have when working with open data and public records (*allmän handling*). Within the project, we have interviewed three (3) (data) journalists having a long-term experience of requesting data from different public organisations. The interview summary is below.

Context in the light of regulation. There are a few important principles, rules, and laws that regulate the access to public data in Sweden. One is the principle of openness (*offentlighetsprincipen*) stating that the citizens should get insights into the activities of the public sector. A consequence of the principle of openness are public records. This is defined in the Swedish Freedom of the Press Act (*Tryckfrihetsförordningen*) stating that any citizen or a company can request information from a governmental organisation if it does not contain confidential information. There is the European Union’s Public Sector Information (PSI) directive, which is focused on open data re-use by citizens. From another side, there are laws regulating the use and management of confidential and personal data, which restrict open publishing of personal and confidential data. The examples are the General Data

Protection Regulation (GDPR) and the Public Access to Information and Secrecy Act (*Offentlighets- och sekretesslagen*, OSL).

Effect of the PSI directive. The PSI directive did not make any notable effect on the open data publishing process in Sweden. It is mainly guiding public organisations and authorities about which data needs to be open. Public organisations have a freedom to decide which datasets they would like to open and in which format. In journalists' opinion (**PJ**), the PSI directive is missing a clear definition of public data requesting process and a clear process describing how to appeal if your request is rejected.

Journalism vs. data journalism. The difference between journalism and data journalism actually makes the data that is used as a source and basis. In data journalism, structured data becomes the core of the storytelling (Thienthaworn, 2019). Data journalists are expected to use a structured data management and analysis method, which may also lead to building services and visualisations. Some good examples in Sweden are created by SVT (**KS**, **PJ**). Data journalism is a very good approach to apply in investigative journalism, where data can be used as a source helping to identify major patterns, to make quantitative analysis, and so on (**PJ**).

However, data journalism has been disappointing so far because it did not make any wider impact in Sweden (**PJ**). The problem is that it is rather expensive and complicated to create data visualisations and presentations that would be interesting for others (**PJ**). At the same time, it is very unlikely that open data could generate an article on its own (**KS**). It is more usual to use open data in combination with other data sources, for example, statistics or data that a journalist has collected, discovered, or found (**KS**).

Open data vs. public records. All interviewed journalists see a big difference between open data and public records. Public records involve a process of requesting a document from public organisations and authorities. Open data is the data that public organisations and authorities decided to open and publish due to different reasons. Open data means that public organisations should be proactive and publish data on their own initiative. While in the case of the principle of openness and public records, public organisations and authorities have a passive role to accept and process inquiries. This is the difference and possible explanation to rather slow development of open data because public organisations are not used to publish data and wait for requests of public records (**PH**).

Currently, the majority of journalists work with the principle of openness and request public records. All interviewed journalists confirmed that the process of public records requesting is functioning very well in Sweden. Journalists are used to request documents, and public organisations are used to process requests. According to journalist (**PH**), requesting public records is better than open data because open data does not contain personal data and sensitive information, which are important for investigative journalism. In the case of disclosing public documents based on the principle of openness, public organisations make a confidentiality assessment in relation to the person requesting the documents, his purpose and role. In this case, there is an opportunity to get more data.

Challenges related to work with open data and requesting public records that journalists encounter are listed in Table 10.

Table 10. Summary of challenges related to public records and open data.

Type of challenges	Reference
Not willingness of public organisations to disclose data as public records	PJ, PH
Unclear and too broad definition of concepts of 'personal data' and 'confidentiality'	PJ, PH
Work with public records can take a very long time	KS
A lack of uniform standards applied to the same datasets	KS, PJ
A lack of a common agreement on used data formats	KS
A need to access additional types of data as open data (e.g. diaries, data from issue/request tracking systems, decisions of different top managers, etc.)	KS, PJ, PH
Journalists lack knowledge needed to work with certain open data formats (e.g. JSON, XML, graphic APIs)	PJ
Metadata is lacking	PJ
A lack of information that certain data exist	KS

The major challenge for journalists is the fact that *public organisations do not want to disclose data as public records (PJ, PH)* and complicate the process by:

- (i) Demanding a payment for information search.
- (ii) Sending an Excel file in PDF format.
- (iii) Printing public documents on paper and requiring 2 kr per sheet of paper motivating this by the fact that the Freedom of the Press Act does not require to publish this data digitally. If the database in Excel file contains 2000 lines, then it is a lot of money and a lot of paper, which is difficult to handle.
- (iv) To use the concepts of 'personal data' and 'confidentiality' in a very broad sense when applying norms of GDPR and the Public Access to Information and Secrecy Act (see *Example 1* and *Example 2*) and by this restricting access to data.

Example 1. Transportstyrelsen data from Strada (PJ)

The Swedish Transport Agency's database *Strada* contains very important data on all traffic accidents in Sweden. Data is retrieved from police and hospital reports. It contains geo position, road conditions, time, degree of damage. Personal data is cleaned from the database.

In 2013, the journalist requested data on all motorcycle accidents from this database, made a large analysis of development of accidents over time in four counties in Central Sweden, and developed an interactive map. Motorcyclists could use the map themselves and see what accidents happen, on which roads, what proportion of accidents happened due to poor road maintenance, etc. That database was planned to be made available to researchers, other authorities, and to Swedish motorcyclists (Swedish MotoCyklister, SMC, <https://www.svmc.se>), journalists, and other stakeholders.

In 2018, the same journalist wanted to request a dataset from *Strada* for analysis again but did not get it due to "Statistical confidentiality", regulated in OSL 24.8. However, at the same time, the agency tried to sell the same data to motorcyclists and other organizations.

The Court of Appeal also considered that "Statistical Confidentiality" should apply for this data.

More discussions is in the debate article by Jonriksson et al., 2020. "*Så missbrukas GDPR-sekretessen av myndigheter*"

<https://www.dagensjuridik.se/nyheter/debatt-sa-missbrukas-gdpr-sekretessen-av-myndigheter/>

Example 2. Polismyndighetens data (PJ)

The police authority has a database containing all police reports called the KO-diary (older name Rational Reporting Routine, RAR). Previously, crime reporters used to receive a fax with all police reports every morning, which included data about all the police reports in a certain county, record number, type of crime, if there is a suspect, which unit is investigating this case. This job required a lot of resources. Now, journalists get an Excel file, which does not contain a record number. This is because the Data Inspection has claimed that record numbers can be used to access personal data.

In addition, today all police authorities regularly remove certain reports that they do not want to be known to the public (for example, the cases of murder, rape, etc.) from their diary. This is contrary to the Public Secrecy Act on how diaries should be presented (Chapters 5-6 in OSL).

In the opinion of journalists, the Police Authority could create an API where journalists could choose their county, municipality, period of time, type of crime, etc. And every morning, crime reporters could check this API. The police would certainly save large amount of time and money on a yearly basis in relation to reduced personnel costs throughout the country by making the police diary accessible in this way.

It takes *months to just collect all needed documents* through requesting public records from all municipalities and requires a lot of resources (**KS, PJ**). Another problem is that *every municipality organizes data in its own way*. Historically, municipalities have built up their databases themselves. That is why the same database of different municipalities may look differently, contain different variables, be coded in different ways (**KS, PJ**). This means that it is not possible to make a comparison. As a result, journalists need to additionally contact municipalities in order to get needed answers. Finally, *data comes in variety of formats*. Some municipalities send Excel files, others – PDF, and third sends via post documents printed on paper (although in most cases municipalities use the same systems).

All this makes it difficult to use, analyse, investigate data, and make an investigation at the national level. In order to perform an analysis, journalists need to create their own Excel files manually.

Journalists are usually making investigations and for that reason they are also very interested in *additional types of data* related to requested public records (**KS, PJ, PH**). Open data that journalists are lacking is data from issue/request management system, data showing how public records are being produced by a public organisation (e.g. diaries, all decisions made by managers of different levels and their actions). Taking an example of account payables, it might be diaries with cost lists about related documents coming in and out of an authority, exchange of communication and e-mails, and specific invoices. It is also important for journalists to know who the decision makers are. Without this information it is rather problematic for journalists to make their investigative analysis and see the transparency in the work of public organisations.

There are no issues to work with Excel files, but journalists *may lack knowledge needed to work with certain open data formats*, such as JSON, XML, etc. In addition, it is hard to understand graphic APIs on open data portals.

There are cases where *metadata is lacking*. Then it is difficult to understand how data was produced and its validity.

A huge problem is that local journalists and students *do not know that data exist* and how to get it (**KS**).

Accounts payable data as open data/public records. Two out of three interviewed journalists have been requesting accounts payable. Their experience was extremely good because the financial departments are usually very good at understanding needs and explaining things. Moreover, with time, it is possible to establish good contacts and to know who to ask and what to ask for. Economists normally want everything to be right and that money is used in the right way. That is why they do not see problems if journalists find mistakes. While managers who have a responsibility for the business development and who attest the costs might be afraid that their mistakes will be discovered. That is why if one contacts a wrong person, requesting of public records may not work in a smooth way.

Accounts payable is a valuable dataset. Information about framework agreements with suppliers, accounts payable, and actual invoices represents the most important data source for journalists to investigate. Analysis of actual invoices allows: finding questionable costs, for example, by investigating and analysing cost for temporary or supply staff (*vikariekostnader*) in elderly care; analysing the amounts of sick leave payments in the municipality; identifying suspicious suppliers that have high prices or offer product or services of low quality; making comparison across different municipalities, for example why one municipality pays less than another for certain products or services; making visualisation on a map; etc (**PJ, PH**). Accounts payable dataset is also used to reveal relations between a municipality and specific persons or companies. In addition to invoices, journalists request, for example, exchange of communication via mails between municipalities, persons, and companies (**KS**). The problem is that price information is sometimes confidential, for example, hourly rates paid by municipalities. And if there is something interesting in open accounts payable data and someone wants to request public records, the data might be confidential (**PH**).

Benefits of open data on accounts payable. Direct economic benefits should not be the only motivation for public organisations to publish open data (**PH**). Benefits that cannot be quantified are also very important (see Table 11). The most important benefits are *democracy* and *transparency* in public sector spending (**KS, PH**). Analysis of open data on accounts payable may reveal relationships between a certain supplier and a decision maker at a municipality. For example, after revealing very serious cases of corruption in Gothenburg (e.g., Milder, 2013), it became clear that municipalities should be transparent and open its data because this is the demand from the society. As a result, Gothenburg created a very good service.

Open data is also about *competition*. There should be equal conditions for different companies to take part in the public procurement and submit tenders, and see which companies have business relation with the public sector (**KS, PH**).

Table 11. Summary of benefits related to open data on accounts payable.

Type of benefit	Reference
Transparency / Prevention of corruption	KS, PH
Democracy	KS
Competition	KS, PH
Saving time due to more specific inquiries after looking at open data	KS, PH
Finding suspicious suppliers	PH
Better quality of open data	KS

Having a look at open data can help journalists *to formulate more specific inquiries* regarding which data to request as public records (**KS**). Municipalities can process such inquiries easier and much faster.

There is an opportunity *to find suspicious suppliers* that are engaged in criminal activities or have a connection to crime and to make this research using data from all Swedish municipalities (**PH**).

If the information about procurement, invoices, and companies working with the public organisations is open and freely available to everyone, all these procurement processes will be taken more seriously. Then it will be more important to increase the *quality of this data* (**KS**).

Proposals, way forward, wishes for the future. Journalists think that the national governance, *Open by default* approach, standardisation of open data, use of unified standards, and a national database or open data aggregating service will change open data usage in Sweden.

1. If there would be an *Open by default* approach, then all data that is produced by public organisations would be open except data that is confidential and needs to be closed (**KS**). Then certain documents would be available automatically. In open data, not everything is open automatically. Currently, Swedish municipalities are deciding which data to open and which system to use to handle it.

2. The national governance and decisions in the area of open data could make the process of open data publishing faster. Right now, it is up to each municipality to decide which datasets to publish, in which way to publish, in which system, and using which standard. This is an obstacle. Availability of the national governance and *Open by default* (proposed by DIGG) together with existing regulation and reviewed PSI directive would create a national framework in the area of open data (**KS**).

4. *Standardisation* of different types of open data (e.g. accounts payable, geo-data, etc.) and metadata is critical because data conversion from one format to another or creation of own database from unstandardised and not unified data takes a lot of time (**KS, PH, PJ**). A lack of standards in some cases makes a comparison across different authorities impossible.

5. Currently journalists (**KS, PH, PJ**) are lacking *a common national database* with standardized datasets or *a service aggregating open data* from all municipalities. Open data should be unified, standardised, and searchable. For example, in an open database with accounts payable, journalists would be able to check metadata when looking for something interesting and then to request a specific document, or an invoice, or a certain transaction from specific municipalities in the same service. It is desirable to get access to additional data, such as diaries of municipalities and authorities; lists of documents, incoming/outcoming emails and communication. The option to search for a specific word, a specific supplier, a specific person or an organization that has submitted documents is also appreciated. Using a common database would allow huge time and resource savings when collecting needed data. For example, it could take 10-15 minutes of search compared to today's six months of work for five people. Analysis of such data would allow to identify a pattern in the country, to compare data across municipalities, and to analyse differences. This data would have a big value even if personal data is removed.

Journalist are lacking *easy informational services*. When it comes to everyday work, journalists need to get information about new cases, e.g. from police. One easy way could be to create an API, where everyone could search needed updated information from police diaries (**PJ**). Usually, journalists need to follow up a certain case or if a certain decision has been made in order to report about it in the news. For that reason, they call the authorities at least once a week. Authorities and journalists could save a

lot of time if there would be a *dedicated service* (e.g. an option of an automatic notification or email *informing* about made decisions, and that now they are available for requests as public records **(PH)**.

Journalists see a need to *update the principle of openness* **(PJ)** in order to enable open data processes within authorities not wishing to disclose data (e.g. The Swedish Transport Agency (Transportstyrelse), the police authorities, etc.). The major issues are the following:

1. Currently, the Swedish Freedom of the Press Act (*Trygghetsförordningen*) does not force authorities to disclose data in any format other than printed **(PJ)**.

2. The Fee Regulation Act (*Avgiftsförordningen*) needs to be modernized by removing a limitation of formats to just PDF or paper **(PJ)**. PDF is not suitable for numeric datasets, and PDF printed on paper means a lot of manual work for journalists. For analysis of long datasets, Excel is the most preferred format because of opportunities to filter and structure data **(PH)**.

3. The definition of the term 'personal information' proposed by the Data Inspection (*Datainspektionen*) to authorities is incredibly broad **(PH, PJ)**. It should be discussed "*What is private data?*" in order to find a good balance between risks to identify individuals and benefits offered by open data. In the opinion of journalists **(PH, PJ)**, certain datasets should contain some personal data to be interesting for analysis. One example is STRADA, a database of traffic accidents of The Swedish Transport Agency (Transportstyrelse). Another example is accounts payable where all sensitive information (e.g. names of people, names of companies, names of persons who have certified the invoice, etc.) is represented by codes. However, the name of the person who certifies the invoice is a very important variable for journalists, and it would be good to have it in open data in order to assess the quality of his work **(PJ)**.

Some journalists notice that public organisations often see no direct benefits with increased transparency in their business activities **(PH)**. They see it rather as increased workload due to a need to handle increasing number of inquiries from journalists. A *cultural change* is needed, and public organisations should consider the value of transparency as their core task.

Journalists would like *to get access to more interesting data* that the public sector has **(KS, PH, PJ)**. As already discussed, data from issue/request management systems of authorities, diaries of municipalities and authorities; lists of documents, and all incoming/outcoming communication is very interesting. Of special interest would be reporting system of the emergency services with data about all alarms. Each record in this database has a long range of variables, e.g. house fire, car accident, drowning, chemical emissions, etc. Opening access to this data or even real-time data and opportunities to filter it (on time, municipality, etc.) would enable interesting and valuable analyses. For example, research on how many fire cases happened in December in recent years, analysis of trends over recent years leading to discussion of this topic with the fire chief, citizens **(PJ)**.

5 Cross-case analysis

5.1 Analysis of efficiency gains and time savings

Analysis of efficiency gains and time savings correspond to operational efficiency (following Socrata (n.a.) framework. Based on results of our research, efficiency gains are related to:

- (i) Opportunity to direct a person to open data files allows considerable time savings when answering inquiries coming from citizens, journalists, and organisations.
- (ii) Narrower and more specific question formulation require less time to handle (see also subsection 5.2).
- (iii) Time savings related to reduced number of inquiries. Municipalities get less inquiries because people can access and check open data file themselves.

Representatives of both municipalities that publish accounts payable as open data (the City of Gothenburg and the City of Lidingö) confirmed considerable time savings and efficiency gains. Due to

increasing people's interest to account payable, the municipalities that are publishing open data get considerable savings (see Table 12).

Table 12. Potential efficiency gains and time saving.

Municipality	Efficiency gains (per year)	Potential savings (per year)	Potential total savings (per year)
The City of Gothenburg	1 716 000 kr	586 164 kr	2 302 164 kr
The City of Lidingö	not available	487 500 kr	487 500 kr

At the moment, it is only possible to estimate costs related to work with inquiries on accounts payable for municipalities that are preparing to publish open data or are considering it (see Table 13). Some municipalities (Sjövde, Varberg, Uppsala) expect that publishing open data on accounts payable will allow certain time savings either due to decreased number of inquiries or due to reduced inquiry handling time. Some municipalities (Karlskrona and Skellefteå) expect that inquiry handling, especially more complicated ones, will require the same amount of time.

Table 13. Current cost related to work with inquiries on accounts payable.

Municipality	Cost (per year)
Skövde	24 375 kr
Karlskrona	31 200 kr
Varberg	58 500 kr
Skellefteå	Full-time employee working 100% of time
Uppsala	Full-time employee working between 50% - 75% of time

It might be argued that savings for smaller municipalities will be not so big because they do not get that many inquiries. However, this analysis is focused on only one dataset. If a municipality is going to publish more datasets in a structured way, the total efficiency and time savings will be greater at the municipality level. In addition, the interviewed representatives of municipalities stated that democratic aspects in publishing accounts payable are more important than potential time savings and efficiency gains.

5.2 Analysis of other benefits and effects

In the interviews, municipalities and other actors have mentioned a number of benefits that are related to accounts payable data publishing openly. We classified them following Socrata framework (n.a.) (see Table 14). With a dot sign (•), we have marked benefits that were brought up by the corresponding actors during the discussion.

The mostly referred type of other benefits (with occurrence rates #5 and #4 out of 9) are internal benefits of using open data, structured inquiry getting process with the help of an e-service, structured data publishing process, and creation of new services based on open data that would drive data-driven innovation and contribute to the growth of the national economy.

i) *Operational efficiency*. Discussion of other benefits of opening accounts payable data involved an extended list of benefits related to operational efficiency. This involves internal benefits for municipalities, a structured process of getting inquiries via e-service, a more structured data publishing process, increased quality of internal/ published data, and enhanced quality of internal data management processes. Due to open data, interested stakeholders can formulate more specific and narrower questions, which are easier to answer, and this saves time. Time savings are also related to easy open data publishing process, reduced procurement time. Creation of standard reports for repeating questions and publishing them as open data also helps to save time.

ii) *Value related to citizen experience*. Benefits in this category involve opportunity to provide better services for citizens. It is easier for citizens to reach accounts payable open dataset for further reuse. All stakeholders are served using the same standards and procedures.

Table 14. Summary of other benefits and effects.

Type of benefit	Publish		Prepare			Discuss		Tie	Met	Σ
	Got*	Lid	Skö	Kar	Var	Ske	Upp			
<i>Operational efficiency</i>										
Internal benefits of using open data	•		•	•			•		•	5
Structured process of getting inquiries via e-service	•	•	•	•	•					5
Structured data publishing process	•		•	•				•		4
Increased quality of internal/ published data			•	•	•					3
Enhanced quality of internal processes					•					1
Narrower and more specific questions	•				•		•			3
Easy to publish open data	•	•								2
Reduced procurement time			•							1
Creation of standard reports for repeating questions		•	•							2
Publishing reports as open data		•								1
<i>Value related to citizen experience</i>										
Better service for citizens				•					•	2
Reuse of open data					•		•			2
Same standard and easy procedure to send inquiries for all stakeholders			•							1
<i>Data-driven decision making</i>										
Cultural shift in the organisation				•					•	2
Better informed procurement unit						•				1
Good control over procurement		•								1
<i>Economic impact</i>										
Creation of new services based on open data			•	•	•	•		•		5
<i>Perception of municipality in society</i>										
Publicity		•								1
Strengthening of municipality's brand			•							1
Correct representation of the municipality						•				1

* Used abbreviations: Got – The City of Gothenburg; Lid – The City of Lidingö; Skö – Skövde; Kar – Karlskrona; Var – Varberg; Ske - Skellefteå; Upp – Uppsala; Tie – TietoEvry; Met – Metasolutions. Sign Σ means the frequency or occurrence rate of one or another answer.

iii) *Data-driven decision making*. Value that can be related to this category is a cultural shift within the organisation, which is needed in order to provide open data. This includes the introduction of a general data management process in the municipality. Analysis of procurement and invoice data allows a good control over procurement in municipalities.

iv) *Economic impact* benefits are related to new services and products that will be created based on open data.

v) *Perception of municipality in society* is a category of discussed values that did not fit any Socrata framework (n.a.). Some interviewees mentioned that open data publishing led to gaining publicity and different awards. Openness in combination with public recognition will strengthen the municipality's brand. Open data would make a correct representation of a municipality in media.

5.3 Analysis of benefits related to democracy perspective

The vast majority of interviewees noted that democracy perspective is more important than time and efficiency savings. The summary is presented in Table 15.

Table 15. Summary of benefits related to democracy aspects.

Type of benefit	Publish		Prepare			Discuss		Tie	Met	Σ
	Got*	Lid	Skö	Kar	Var	Ske	Upp			
Transparency	•		•	•	•	•	•	•	•	8
Openness			•		•	•	•	•	•	6
Trust			•	•						2
Pushing procurement prices down	•	•							•	3
i) Finding suppliers offering lower prices	•								•	2
ii) Comparison with other municipalities			•		•				•	3
Findings mistakes, questionable purchases, cases of corruption	•							•	•	3
Dialog with the public / Events, press releases	•	•					•			3
Citizens are better informed about municipality purchases						•				1

* Used abbreviations: Got – The City of Gothenburg; Lid – The City of Lidingö; Skö – Skövde; Kar – Karlskrona; Var – Varberg; Ske - Skellefteå; Upp – Uppsala; Tie – TietoEvry; Met – Metasolutions. Sign Σ means the frequency or occurrence rate of one or another answer.

Democracy aspects are very closely related to *transparency* and *openness* (occurrence rates #8 and #6 out of 9), and *trust* (occurrence rate #2 out of 9).

The consequence of transparency results in *pushing procurement prices down* (occurrence rate #3 out of 9). Open data on invoices allows pushing procurement prices down because, from one side, people within the same municipality can check procurement prices in other units and *find suppliers offering lower prices*. From another side, when more municipalities publish datasets on accounts payable, it will be possible to make a *comparison across different municipalities* and find out why some are paying more and others less. This means that the potential total savings at municipality level could be even higher due to better contract conditions and lowered purchasing prices.

Transparency and open data are closely associated with data journalism. Analysis of open data by citizens and journalists may help *finding mistakes, questionable purchases, and cases of corruption* (occurrence rate #3 out of 9). Transparency leads to elimination of corruption and means considerable savings at national level.

A number of municipalities engaged in open data publishing seek to establish a *dialog with the public* via organised events and published press releases (occurrence rate #3 out of 9). Citizens are better informed about municipality purchases and expenditures (occurrence rate #1 out of 9).

5.4 Analysis of risks related to opening accounts payable

One important finding is that municipalities publishing open accounts payable data today specified that there are no risks in it, while municipalities that are preparing to publish and discussing opportunities to publish hesitate about a number of risks. Summary is provided in Table 16.

Majority of concerns are related to *confidentiality, privacy, GDPR regulation, and secrecy issues* (occurrence rate #6 out of 9) and unclear quality of data (occurrence rate #4 out of 9). There is a concern that after publishing open data *workload for some units will increase* (occurrence rate #3 out of 9). Other mentioned risks are related to a lack of processes to *handle detected mistakes and errors, uncertainty of people in the existing ways of working*, and distortion or misuse of data.

Table 16. Summary of identified risks related to publishing accounts payable.

Type of risks	Publish		Prepare			Discuss			Σ	
	Got*	Lid	Skö	Kar	Var	Ske	Upp	Tie		Met
Risks related to confidentiality, privacy, GDPR regulation, and secrecy				•	•	•	•	•	•	6
Unclear quality of data			•		•		•	•		4
Increase of workload for some units			•	•		•				3
Undefined process of handling of detected mistakes and errors			•							1
Uncertainty of people in the existing ways of working			•							1
Distortion/misuse of data						•				1

* Used abbreviations: Got – The City of Gothenburg; Lid – The City of Lidingö; Skö – Skövde; Kar – Karlskrona; Var – Varberg; Ske - Skellefteå; Upp – Uppsala; Tie – TietoEvry; Met – Metasolutions. Sign Σ means the frequency or occurrence rate of one or another answer.

6 Conclusions

6.1 Summary of results

More and more municipalities in Sweden make their data available. One of the datasets that is classified as a valuable open dataset is accounts payable. In this study within NSÖD project, we have analysed:

- (i) Efficiency gains that a municipality would gain by publishing accounts payable data as open data.
- (ii) Socio-economic effects with a major focus on democracy aspects.

Municipalities get a lot of inquiries from different stakeholders and answering these questions requires a lot of time. For this reason, we quantified efficiency gains by evaluating time savings gained by municipalities after publishing accounts payable as open data. Democracy aspects were analysed by asking qualitative questions.

We collected primary data by interviewing different types of stakeholders. Their number involves seven municipalities (the City of Gothenburg, the City of Lidingö, Skövde, Varberg, Karlskrona, Skellefteå, and Uppsala), a service provider, consultants working with open data, and (data) journalists. Interviewed municipalities were classified in three groups by readiness to publish accounts payable as open data. Research was carried out as a multiple case study, which gives more evidence and allows cross-case comparison.

Based on the findings of this study, the sources of potential efficiency gains are:

- (i) Opportunity to direct a person to open data files allows considerable time savings when answering inquiries coming from citizens, journalists, and organisations.
- (ii) Narrower and more specific question formulation require less time to handle.
- (iii) Time savings related to reduced number of inquiries. Municipalities get less inquiries because people can access and check open data file themselves.

Potential savings for municipalities already publishing accounts payable as open data can be considerable (up to about 2,2 million kr per year for the City of Gothenburg and about 0.5 million kr per year for the City of Lidingö). This is in line with existing analyses focused on open data benefits (Almirall et al., 2008; Capgemini, 2017; Ekström and Johannesson, 2020; European data portal, 2020; Kaplan, et al., 2009; PWC, 2017). For municipalities that are only preparing to publish open data or are discussing the opportunity to publish (Skövde, Karlskrona, Varberg, Skellefteå, and Uppsala), we could only estimate costs related to work with inquiries on accounts payable. However, there is a potential to reduce this cost to some degree after starting publishing open data.

During the interviews, interviewees have also discussed other benefits related to accounts payable publishing as open data. These benefits were classified using Socrata framework (n.a.) into benefits related to: (i) operational efficiency; (ii) citizen experience; (iii) data-driven decision making; and (iv) economic impact. The mostly referred categories of benefits became:

- *Operational efficiency* with specified (i) internal benefits of using open data, (ii) structured inquiry getting process with the help of an e-service, and (iii) structured data publishing process.
- *Economic impact* with creation of new services based on open data.

Additionally, within this research we have specified benefits related to improved perception of municipality in society.

For the majority of interviewees, democracy aspects are more important than direct gains and possible savings, and are closely related to transparency and openness, opportunity to push procurement prices down. All this leads to even greater savings for municipalities. Another important aspect is finding mistakes and discovery of corruption cases. Elimination of such cases in the future would result in considerable savings at national level. At the same time, for a number of municipalities it is important to establish a dialog with the wider public, people who are interested in open data, via organised events and publicly spread information.

One of the important findings of this research is the fact that municipalities already publishing open data do not see any related risks, while municipalities that are only preparing to publish open data see a number of risks related to open data publishing. The major concerns are related to confidentiality, privacy, and secrecy risks, unclear quality of data, and increased workload for some units. Other risks caused less concerns.

6.2 Recommendations

A few recommendations that could drive the process of open data publishing. First of all, many municipalities are concerned about the quality of data that they are going to publish. There is a wish to improve the quality of data first, before publishing it. This delays the data opening process and works as a serious obstacle. However, there is an example of Great Britain that followed the principle: “Raw data now!” (Rothenberg, 2012). This means that the data was published in whatever format it had. After the data is published, it got reviewed by open data users and data journalists.

Secondly, a more comprehensive view is needed on the general information management process in a municipality. Ideally, information management processes should help to take control over data publishing, automation of processes, and to organise all information flows and information management processes in a very smooth way. As a consequence of it, open data publishing would become an integral and natural part of this process.

Thirdly, a number of things are needed in order to facilitate a wider use of open data, appearance of expected new data-driven services for citizens and engaging data visualisations. And here are two perspectives of open data publishers and open data users. From one side, expected large-scale open data re-use will appear only when more and more municipalities start publishing the same dataset because big data analytics, AI, and visualisations require more data being published. A use of *Open by default* approach, “a push” from the government and the national governance of open data publishing could accelerate the open data publishing process by public organisations. A cultural change mentioned by many interviewed experts is needed. Indeed, considering the value of transparency as their core task could additionally strengthen motivation of public organisations to open their data. From another side, standardisation of different open data sets, use of agreed standards, appearance of a single national database or a service aggregating open data from all municipalities, easy informational services targeting public sector data users would drive open data re-use, analytics and data journalism.

Finally, in order to make open data more interesting for re-use and analysis: there might be a need to review and re-define the current definition of ‘private data’, which is considered by journalists as very broad. Hence, there is a need to find a good balance between risks to identify individuals and benefits

offered by open data. In addition, journalists would like to get access to other types of data that the public sector has.

6.3 Research limitations

This research has a number of limitations. First of all, just a few municipalities are publishing open accounts payable data now. For more exact generalisation of results, we would need to discuss the experience of open data publishing with more municipalities.

Secondly, some data needed for analysis is missing and we needed to make a number of assumptions for analysis and calculations. For example, sometimes the exact number of inquiries coming to municipalities is unclear. Municipalities know the number of inquiries coming centrally through issue/request management systems. However, if an inquiry is sent directly to a certain unit, it is not counted. Another example is related to number of references and downloads of open data files. It is difficult to know which effect this has: (i) if it reduces the number of queries; (ii) if municipalities get more queries because more people get access to open data; or (iii) which number of queries would municipalities get if there would not be an open data file. All assumptions are explained in the text.

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Appendix A. Overview of existing socio-economic studies on open data

Variables used for socio-economic research of open data in existing researches

Research source	Variables considered
Koski, H., 2015. <i>Socio-economic analysis of open data value.</i> Ministry of Finance publications, Finland	<p>Public sector Public organisations form an important sector in which the impact of open data should be assessed. The opening up of public data has impacts on both the organisations opening up such data and those using it. The potential costs savings and productivity gains that may be achieved through the use of open data are particularly interesting. The productivity of the public administration is measured by the quantity of services produced relative to the inputs used for producing them. In order to assess such impacts, there is perhaps a need to develop a technical solution for measuring, as cost-effectively as possible, the offering and use of data and other services by public administration organisations (at least key ones), and the resources they use in providing such services (Koski, 2015, p.20).</p> <p>“Open data is often both offered and used by the same public organisation. One way to measure the use of data resources in the public sector would be to examine the amount of data shared by public administration organisations. The impact of open data could also be assessed by monitoring, as automatically as possible, the extent of data use and the data flows between public organisations” (Koski, 2015, p.22).</p> <p><u>Approach:</u> 1. Cost savings = Change in labour hours x [multiplied by] Labour cost per hour 2. Productivity = Service output in relation to the resources used</p>
Koski, H., 2015. <i>Socio-economic analysis of open data value.</i> Ministry of Finance publications, Finland	<p>Citizens - Time and money saved</p> <p><u>Approach:</u> 1. Time and money saved = Amount of free data used x [multiplied by] Earlier price 2. Estimated time savings</p>
European data portal, 2020. <i>The economic impact of open data.</i>	<p>Open data market size, Estimation of demand - Market size of products, services and content improved/enabled by open data (€) - Derived from GDP, expressed in (€)</p> <p><u>Approach:</u> 1. Reviewing and reusing data from relevant literature. 2. Translation of results into share of GDP. 3. Equalizing the results from literature to make them comparable. 4. Calculation of the current open data Market size. 5. Forecast of the open data market size 2025 using different growth scenarios.</p>
European data portal, 2020. <i>The economic impact of open data.</i>	<p>Open data employment, Estimation of number of jobs created in the field of open data <u>Indicator:</u> Estimation of number of employees employed due to open data <u>Approach:</u> 1. Estimating a share of people employed in Spain 2. Adjust this parameter to countries with different level of open data maturity 3. Estimate for EU</p>
European data portal, 2020. <i>The economic impact of open data.</i>	<p>Open data potential per sector <u>Indicator:</u> Value creation per employee</p>
European data portal, 2020. <i>The economic impact of open data.</i>	<p>Efficiency gains, indirect economic benefits The aim of efficiency is to improve resource allocation so that waste is minimised, and the outcome value is maximised <u>Indicators that can help to quantify efficiency gains, e.g.:</u> 1. The potential number of lives saved 2. The potential amount of time saved (in public transport, in traffic, at work) 3. Reduced air pollution, energy used 4. Increased knowledge transfer (better quality of research due to access to data)</p>

European data portal, 2020. <i>The economic impact of open data.</i>	<p>Saving costs <i>Indicators:</i></p> <ol style="list-style-type: none"> 1. Cost saved by publishing open data (increased quality due to feedback, lowered administrative and compliance costs) 2. Cost saved by acquiring open data for free or at marginal cost 3. Cost saved through increased efficiency (more efficient operation, reduced energy consumption, increased use of renewable energy sources, etc.)
Capgemini, 2017. <i>The open data economy.</i>	<p>Data availability Countries' emphasis on sharing comprehensive information <i>Indicators:</i></p> <ol style="list-style-type: none"> 1. Breadth and granularity of data 2. Latest/Refreshed data 3. Ease of re-use of data
Capgemini, 2017. <i>The open data economy.</i>	<p>Political leadership Political support for open data initiatives <i>Indicator:</i></p> <ol style="list-style-type: none"> 1. Government initiative and support
Capgemini, 2017. <i>The open data economy.</i>	<p>Data portal usability Data uptake, a reference to the number of downloads from users, depends on the ease with which it can be sourced from the Open Data portals. <i>Indicator:</i></p> <ol style="list-style-type: none"> 1. User interface 2. Search functionalities 3. Participation from User community
Ekström & Johannesson, 2020. <i>Värdet av öppna data.</i> Damvad, Lantmäteriet.	<p>Offentlig sektor I den case-baserade nyttoanalysen identifieras ett lägre värde för offentlig sektor <i>Indicators:</i></p> <ol style="list-style-type: none"> 1. Effektiviserad administration (effektivare hantering av datainköp, minskad antalet av IT-system för att hantera informationsmängder (t.ex. genom API)) 2. Bättre AI-applikationer (för externa och interna användningar, innovativa start-ups grundades) 3. Effektivare krishantering (ökad civilsamhällets förmåga att stötta vid allvarliga kriser) 4. Minskade datainköp kostnader
Ekström & Johannesson, 2020. <i>Värdet av öppna data.</i> Damvad, Lantmäteriet.	<p>Gröna och sociala effekter Minskad miljö- och klimatpåverkan, främjande av biologisk mångfald, effektivare användning av resurser samt ökad transparens <i>Indicators:</i></p> <ol style="list-style-type: none"> 1. Minskad energianvändning och förnyelsebar energi (nya applikationer där hushåll och verksamheter tillåts jämföra energikostnader och energiförbrukning mot jämförbara byggnader. Detta ökar transparensen och ger hushåll och företag med förhållandevis hög energiförbrukning nya insikter och incitament till att minska denna. Dessa data kan även användas för att beräkna ekonomiska vinster av att byta till alternativa energikällor. Detta skulle öka tillgänglig information om installationskostnad, sänkt kostnad för energiförbrukning samt hur lång tid det tar innan en investering lönar sig ekonomiskt.) 2. Biologisk mångfald och optimerad användning av skogens resurser (genom att använda data för att markera ut områden efter egenskaper och därmed förenkla arbetet med att lokalisera områden och arter av särskilt intresse. Dessutom tillåts fastighetsägarna att på egen hand identifiera särskilt värdefulla områden i sin ägo. Detta bidrar till arbetet för att bevara biologisk mångfald samtidigt som arbete i skog och mark effektiviseras.) - kvalitativ 3. Rekreation och friluftsliv (att underlätta planering av friluftsliv, släktforskning, historiska vandringar samt jakt och fiske för hela samhället.) - kvalitativ 4. Ökad kund- och konsumenttransparens (Fastighetsdata och företagsdata kan i kombination med miljödata som luftföroreningar, vattenkvalitet och miljöskyddsåtgärder ge en bild av vilka företag och aktörer som har bidrar till negativ miljöpåverkan samt påverkans effekter och storlek) - kvalitativ 5. Datajournalistik (Genom tillgängliggörande av föreslagna datamängder ökar förutsättningarna för datadriven journalistik. I takt med att datainsamlingen ökar och blir tillgänglig har datajournalistik, där granskning sker genom analys och visualisering av stora datamängder, blivit allt vanligare) - kvalitativ
Almirall et al., 2008. <i>The socio-economic impact of the spatial</i>	<p>Political and social impact, p. 46 Based on the answers to the qualitative indicator questions, as well as on observations and commentaries made during the study:</p>

<p><i>data infrastructure of Catalonia.</i></p>	<p>1. Socio-political impact areas of IDEC affect a broad array of users, the entire community benefits from access to information and spatial data 2. Opening up a large portion of its cartographic database and has passed laws which name IDEC as an official source of information - this could be considered an initial area of socio-political impact, since the availability of this information facilitates transparency, improves democratic actions, enables citizens to participate, and expands knowledge and training. 3. In small municipalities open data contributed in reducing the digital divide – These municipalities can provide a range of services not possible before 4. Initiates a shared work by local authorities, supporting relation and communication among them <u>Indicators for democracy:</u> <u>Openness and transparency</u> 1. Interactive services and web-access (number) 2. Available metadata records (number) <u>Participation</u> Complaints, queries, suggestions, errors, etc. transmitted electronically (number/month)</p>
<p>Almirall et al., 2008. <i>The socio-economic impact of the spatial data infrastructure of Catalonia.</i></p>	<p>Economic impact, p.43 <u>Indicators:</u> 1. Estimated hours saved 2. Time saved in internal queries 3. Time saved in internal processes 4. Time saved in serving the public 5. Time saved by citizens 6. Time saved by companies</p>
<p>Ekström & Johannesson, 2020. <i>Värdet av öppna data.</i> Damvad, Lantmäteriet.</p>	<p>Areella näringar, indirect economic benefits Störst samhällsnytta går dock att utvinna genom mer effektiv användning av jord- och skogsbruksmark där datamängderna ökar möjligheter för sambruk, markbyten och fastighetsaffärer <u>Indicators:</u> 1. Ökar automatisering (i form av optimalt nyttjande av fält samt minskad förbrukning av tid, bränsle och insatsvaror som gödsel, besprutning och utsäde) 2. Ökad produktion (genom tillgång till bättre data kan odlingar förvaltas mer effektivt genom ökad möjlighet till inköp av specialiserade externa tjänster; olika typer av åtgärdsbehov kan identifieras varpå träffsäkrare analyser om kortsiktiga behov och långsiktiga investeringar möjliggörs; öppna data kan även användas för bättre analyser kopplat till val av grödor och träslag) 3. Större marknad (fler företag kan verka över hela landet, kunder och tjänsteleverantörer kan matchas bättre, tillväxt bland SME) 4. Effektiviserad markanvändning (minskade transportkostnader, minskade arbetsinsatser, effektivare markanvändning)</p>
<p>Ekström & Johannesson, 2020. <i>Värdet av öppna data.</i> Damvad, Lantmäteriet.</p>	<p>Informations- och kommunikationsteknik Det finns stora värden kopplade till förbättrade analysmöjligheter och effektivare drift av IT-system <u>Indicators:</u> 1. Simulering (datamängder kan leda till snabbare och mindre kostsamma utvecklingsprocesser. Bättre data sannolikt leder till bättre produktdesign. Ökad datatillgång kan också minska riskerna vid investeringar i små teknikbolag.) 2. Korrekta uppgifter (ökad kvaliteten av framtida analyser och prognoser) 3. Effektiv IT-drift (arbetsbesparingar inom IT-system uppdatering genom API-tillgång, mindre manuellt arbete) 4. Vidareförädling (utveckling av nya tjänster)</p>
<p>Ekström & Johannesson, 2020. <i>Värdet av öppna data.</i> Damvad, Lantmäteriet.</p>	<p>Finans och försäkring Föreslagna datamängderna bedöms av branschaktörer med stor sannolikhet medföra nytta och effektivitetsvinster om de kan erhållas utan kostnad <u>Indicators:</u> 1. Effektiviserat bedrägeriarbete (effektivare arbetsprocesser, förbättrad analys, analysautomatisering) 2. Förbättrade riskanalyser (zero kostnad för data, korrekta data och mer korrekt bedömning av risk) 3. Effektivare administration (minskad tidskostnad för kunder) 4. Underlättande av regelefterlevnadsarbete/ compliance cost (minskat dubbelarbete, automatisering i stället av manuellt arbete)</p>

<p>Ekström & Johannesson, 2020. <i>Värdet av öppna data</i>. Damvad, Lantmäteriet.</p>	<p>Samhällsbyggnad Öppna data möjliggör för nya, mer effektiva analysmetoder vilka effektiviserar planeringsprocesser, nya analysverktyg leder till optimering av investeringar, ökad kunskap om potentiella kunder och kringliggande byggnader leda till optimering av fastighetsmarknaden, byggnader blir bättre energioptimerade</p> <p>Indicators:</p> <ol style="list-style-type: none"> 1. Effektivare marknad (minskade friktionerna på fastighetsmarknaden, marknaden kan bli mer efterfrågestyrd, marknadsriskerna minskar) 2. Effektivare planering (effektivare beslutprocesser, mindre tid allokeras, bättre beslut, mer effektivare nya analysverktyg som kan skapas) 3. Behovsstyrd planering (förbättrad planeringen, högre marknadsvärden på byggnaden, förre vakanser) 4. Energoptimering
<p>PWC, 2017. <i>The impact of the open geographic data - follow up study</i>.</p>	<p>The economic benefits from releasing data were evident when the address data in the Building and Dwelling Register was released in 2002. According to an analysis, benefits for society in the period 2005 to 2009 amounted to DKK 471 million. The public sector saved DKK 38 million alone on not having to negotiate purchase agreements, manage rights etc.</p>

Appendix B. Sample interview protocol

Intervju frågor: Leverantörsreskontra

Kommunen som publicerar leverantörsreskontra som öppna data

1. Övergripande sammanhang

- Varför är det viktigt för kommunen att tillgängliggöra data om leverantörsreskontra?

- Finns det intresse för denna data:

> för dig (din avdelning)?

> från andra avdelningar i din kommun?

> från andra kommuner/offentliga organisationer?

> från leverantörer?

> från medborgare /journalister? etc.

2. Datahantering av leverantörsreskontra INNAN publicering som öppna data

- Hur hanterades data om leverantörsreskontra innan ni började publicera dessa data som öppna data?

> Hur organiserades arbetsprocessen? Vem är ansvarig? Vem är inblandad?

> Vad gör ni med den här data? Hur används den?

- Vilka var relaterade kostnader?

> Total arbetstid (total persontimmar, antal personer) relaterade till arbetsprocessen och administrationen av data innan ni började publicera den som öppen data?

3. Situation EFTER publicering som öppen data

- När började ni publicera?

- Hur hanteras *leverantörsreskontra* data nu när den publiceras som öppen data?

> Hur är arbetsprocessen organiserad nu?

> Fanns det hinder för att öppna datapublicering? (

> Hur väl passar det in i organisationens arbetsprocesser?

- Vad är annorlunda jämfört med tidigare processen vad gäller datahanterings kostnader och besparingar:

> Total arbetstid (total persontimmar, antal personer) relaterade till arbetsprocessen och administrationen av data efter ni började publicera den som öppen data?

- Är det möjligt att uppskatta kostnaderna för införing av publiceringsprocess av öppna data?

- Vilka andra direkta fördelar / nyttor ser ni med leverantörsreskontra publicering som öppen data?

- Vilka indirekta fördelar / nyttor ser ni?

- Vilka risker inser ni?