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# Socio-economic effects and the value of open data: A case from Sweden

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## Abstract

Governmental and public organisations have historically been generating and accumulating vast amounts of data which could provide many potential benefits for society and national economies. One example of an important dataset is accounts payable providing information about purchases and expenditures of the governmental sector.

Academic research in the area of open data is rather new and fragmented. There is a gap in understanding socio-economic impact of open government data *ex post* at organisational level. This research aims to understand what kind of socio-economic impact a municipality gains by publishing accounts payable as open data, and how municipalities perceive the major benefits, challenges and risks related to open publishing of this dataset.

For analysis, we use the example of Swedish municipalities that are already publishing or preparing to publish accounts payable dataset as open data. We discuss costs related to open data initiative, and benefits related to open publishing of analysed dataset. We also provide more insights into benefits and challenges perceived by municipalities in relation to open publishing of accounts payable.

*Keywords: open data, open government data, municipality, socio-economic analysis, accounts payable*

## 1 INTRODUCTION

Governmental and public organisations have historically been generating and accumulating vast amounts of data. Today, the process of open government data is taking off, and, as a result, increasing numbers of open datasets become available at European Union, national, municipal, city, and organisational levels.

Open government data has many potential benefits for society and national economies. It is expected to increase transparency of governmental processes; to enhance effectiveness of the public sector by considerable time, resource, energy, and money savings; to contribute to a better decision making; to enable new services and products, and in this way to facilitate data-driven innovation (Almirall et al., 2008; Capgemini, 2017; Ekström and Johannesson, 2020; Huyer and van Knippenberg, 2020). Huyer and van Knippenberg (2020) have evaluated that open government data may result in 0,25 – 1,48

billion EUR of cost savings in the public sector in the European Union. A socio-economic analysis implemented by Lantmäteriet (the Swedish Mapping, Cadastral and Land Registration Authority), has identified four valuable datasets in the Swedish public sector, which are geospatial data, address data, company data, and geological data (Ekström and Johannesson, 2020). The total value of socio-economic gains related to opening these datasets can reach between 10 and 21 milliard SEK per year.

One of the important datasets in the public sector is accounts payable providing information about purchases, procurements, expenditures, and resource allocation of the governmental sector. Open publishing of this dataset results in different types of gains. For example, in the USA, benefits of opening information on expenditures of a number of states (also known as Transparency 2.0 States) are: (i) increased citizen engagement; (ii) significant monetary savings due to a “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 USD in total; (iii) increased support of a range of indirect public policy goals, which resulted in more transparent processes in community investment; (iv) better coordination of government contracts and sharing information with other public organisations on good deals and getting better pricing conditions and contract terms; and (v) low cost of supporting online transparency and online websites.

Academic research in the area of open data is rather new. For that reason, it has been fragmented and addressing different areas. There are studies focused on open data classification (Kalampikis et al., 2011; Shadbolt et al., 2012); open data ecosystems (Zuiderwijk et al., 2014); open data policies, regulation, and strategies (Bertot et al., 2011; Janssen, 2011); business models (Zeleti et al., 2016). A number of previous research has been looking into technical, economic, and social benefits (Huijboom and Van den Broek, 2011; Janssen et al., 2012; Jetzek et al., 2012; Kalampokis et al., 2011; Lassinantti et al., 2014; Shadbolt et al., 2012; Zotti and La Mantia, 2014; Zuiderwijk et al., 2018) and challenges related to open data (Barry and Bannister, 2014; Conradie and Choenni, 2014; Janssen et al., 2012; Hossain et al., 2016; Martin et al., 2013; Zhang et al., 2005; Zuiderwijk, et al., 2014). However, there is a lack of studies focused on socio-economic analysis, and aiming to understand the economic model of open data. In addition, there is a lack of knowledge “about the underlying economic and organisational mechanisms and implications of open data use at the organisational level or at the level of economy as a whole. Various reports have evaluated the economic impacts of open data *ex ante* but the literature lacks *ex post* analysis focusing on the materialised economic impacts” (Koski, 2015). To address these research gaps, this study aims to contribute to the discussion and deepen the understanding of socio-economic impact of open data at organisational level and proposes the following research questions:

- (1) What kind of socio-economic impact does a municipality gain by publishing accounts payable as open data?
- (2) How do municipalities perceive benefits related to open publishing of accounts payable dataset?
- (3) How do municipalities perceive the major challenges and risks related to open publishing of accounts payable dataset?

In order to do this, we have explored socio-economic impact and related risks of publishing accounts payable as open data. For analysis purposes, we use empiric data collected during interviews with Swedish municipalities already publishing or preparing to publish accounts payable dataset as open data. Based on related literature, we have summarised the core categories of costs, benefits, and risks, and used them for analysis purposes. In this research, we use both qualitative and quantitative approaches.

This study makes a number of contributions. We contribute to academic research by addressing the existing gap in the open data research and performing both *ex ante* and *ex post* socio-economic analysis of publishing open data at organisational level and further elaborate how open data contribute to reducing the level of information asymmetry, and which factors lead to time savings and efficiency gains at the organisational level. Furthermore, we contribute by providing more insights about both benefits and obstacles perceived by the municipalities. Finally, this research provides important practical insights for practitioners working with open data.

## 2 LITERATURE REVIEW

The major idea behind open data is to encourage public sector organisations “to release objective, factual, and nonperson-specific data that are generated or collected through the delivery of public services, to anyone, with a possibility of further operation and integration, without any copyright restrictions” (Dawes and Helbig, 2010, p.14-15). Regulation that has been introduced today at the European Union and national levels mandates governmental organisations to open their data and make it available for further re-use and distribution.

Academic research in the area of open data represents an emerging research area (Hossain et al., 2016). There is a significant amount of studies focusing on technical aspects of open data (Janssen et al., 2012; Kalampokis et al., 2011; Shadbolt et al., 2012); regulation, legal, and policy aspects (Conradie and Choenni, 2014; Golub and Lund, 2021; Janssen, 2011; Janssen et al., 2012; Vancauwenberghe and van Loenen, 2016; Zuiderwijk and Janssen, 2014); analysis of business models and ecosystems in relation to open data (Janssen et al., 2012; Janssen and Zuiderwijk, 2014; Kassen, 2019; Zeleti et al., 2016); and organisational ability to publish or adopt open data (Conradie and Choenni, 2014; Golub and Lund, 2021; Janssen et al., 2012).

### 2.1 Socio-economic impact and value of open government data and open municipal data

In academic literature, there are a few studies focused on socio-economic impact of open government data. Jetzek, Avital, and Bjørn-Andersen (2012, 2013, 2014) in a set of articles have proposed and developed a strategic analysis framework for open government data initiatives using social and economic perspectives. In the proposed two-by-two matrix, value is classified into value driven by the action of the public and the private sectors. Considered types of value proposition are: (i) transparency, (ii) participation and collaboration, (iii) public sector efficiency and effectiveness, and (iv) creation of new businesses and services.

There are a few quantitative studies. Castelein et al. (2010) have measured the value of Dutch geo-information sector in terms of its turnover, employment, and activities in the market. The study showed that the geo-information sector is a fast developing sector and its value was estimated to be 1.4 billion EUR, or 0.25% of the national GDP. Welle Donker and van Loenen (2018) have investigated the relationship between the actual cost and societal benefits of publishing open data in the Netherlands. The researchers have implemented Societal Cost Benefit Analysis (SCBA). The research results show that the use of high-value open data datasets by both the public and the private sectors is significant; efficiency and effectiveness gains are the major benefits; benefits of recently published datasets have yet to emerge. Loss of revenues is balanced by lower administrative costs.

Zuiderwijk et al. (2018) have studied motivation for municipalities to open up their data. Researchers have identified three perspectives:

(i) The advocating municipality is a municipality that sees numerous benefits of open municipal data including political, societal, and reputational. By opening data, this type of municipality wants to be open and transparent. The advocating municipality believes that many benefits will be created for the society by new innovative services built using municipal data. This type of municipality does not have any problem or sees risks with opening up data (for example, drawing incorrect conclusions) and wants to facilitate use of open data for new applications.

(ii) The careful municipality is a municipality that sees many benefits of open data, including political and social (higher democratic legitimacy, increased accountability, transparency, openness), and reputational. These benefits are incentives to open up data. However, the careful municipality wants to work carefully with the data, ensure that open data is correct, and that its meaning is easily understandable for users. This is in order to avoid drawing incorrect conclusions from the data. Therefore, a metadata clearly describing a dataset is provided. Other risks that the careful municipality wants to avoid are data misuse, using data for espionage, privacy risks. Using municipal data for commercial purposes is not in favour for such a municipality.

(iii) The conservative municipality believes that some organisational processes should not be changed. This kind of municipality wants to avoid unnecessary risks. Opening up data is perceived as related to certain risks (for example, risks of sharing incorrect data, using data for espionage). Stimulating the use of open data is not seen as a task of the municipality because this is an additional task for municipal employees who should focus on more critical tasks. The conservative municipality agrees that transparency and openness are important, but believes that the municipality is already very open and there is no need to open up more municipal datasets. This municipality sees a number of obstacles to open up data including data protection legislation. It is noted that this perspective is dominant among small-size municipalities, which may not have sufficient knowledge or resources to open up data.

A study performed by Lassinantti et al. (2014) has investigated municipalities' interpretations of opening data. It was identified that one group of municipalities see open data as a platform for techno-economic growth, expect new innovative services and products. These municipalities use top-down approach, target revenue-driven developers and established companies, see data users as clients, organise hackathons, address problems with aging IT infrastructure. Transparency and democracy aspects were recognised but not prioritised when making decisions. Another group of municipalities has used open data as a platform for so-creation of societal growth, empowerment of citizens, and openness. These municipalities target the younger generation, address problems with aging IT infrastructure, use an inclusive approach internally to work with open data initiatives. Due to resource shortage, they tend to cooperate with other municipalities and co-create value together. Economic growth is perceived as a major effect, which is a part of a broader societal growth.

There are many international studies made by different consultancy companies that assess the effects of open data. Welle Donker (2018) has performed a review of nearly 70 international cost-benefit studies focused on impact of open government data. Majority of these studies assess effects on a macroeconomic level before open data are made available. These studies only consider the potential benefit of open data and do not consider investment cost. That is why there is a risk of over-estimating potential benefits. A number of studies assess the impact of already published open data on a dataset level or per organisation, i.e. micro-economic studies. These studies provide information into the actual benefits and costs, however, scaling up of micro-economic studies may risk underestimating the open data benefits.

It is possible to conclude that there is a lack of research focused on socio-economic analysis and more understanding of the economic model of open data is needed (Hossain et al., 2016). In addition, there is a lack of knowledge about socio-economic impact of open data *ex post* at the organisational level.

## **2.2 Value of open government data**

Research findings suggest that open data itself can generate more value than providing this data for a fee (Janssen et al., 2012). There is a stream of research focused on social and economic effects and value of open data, related benefits, and challenges. Based on the analysed literature, it is possible to specify the following categories of open data benefits:

(i) Increased democratic control. Open data contributes to transparency and democratic accountability of the public sector (Dawes, 1996; Janssen et al., 2012; Shadbolt et al., 2012; Zotti and La Mantia, 2014; Zuiderwijk et al., 2018). Such datasets as government spending, financial statements and statistics contribute to enhanced transparency (Kalampokis et al., 2011). This means that, from one side, open data “enables better government through transparency of government activities and processes” (Jetzek et al., 2012, p.5). From another side, this means less information asymmetry from economic perspective, which results in the reduced level of corruption (Jetzek et al., 2012) or better awareness and less asymmetry between different market actors (for example, sellers and buyers) (Zotti and La Mantia, 2014). Scrutinisation of data and equal access to data also contribute to elimination of corruption or “the misuse of public power for private benefits” (Janssen et al., 2012, p.5). In turn, this strengthens trust in governmental organisations (Janssen et al., 2012; Jetzek et al., 2012) and improves their image and reputation (Zuiderwijk et al., 2018).

(ii) Political participation. The publishing of open data contributes to political participation and self-empowerment of citizens (Janssen et al., 2012; Jetzek et al., 2012; Huijboom and Van den Broek, 2011; Lassinantti et al., 2014). This is because now people can scrutinise and analyse data, monitor government performance and public resource allocation, and challenge the government (Huijboom and Van den Broek, 2011; Janssen et al., 2012; Jetzek et al., 2012). Citizens can also discover mistakes and gaps and correct incorrect data (Shadbolt et al., 2012). This leads to more transparent policy-making processes (Huijboom and Van den Broek, 2011; Janssen et al., 2012). Open data may also motivate citizens in the process of law enforcement (Huijboom and Van den Broek, 2011). Participation and collaboration are related to the engagement of citizens and their help to government organisations through, for instance, crowdsourcing activities (Jetzek et al., 2012).

(iii) Social value. A number of social benefits are related to improved existing and appearance of new governmental and social services for citizens, improved citizen satisfaction (Huijboom and Van den Broek, 2011; Janssen et al., 2012). For example, social value to citizens can be provided by datasets describing the location of schools, bus stops, hospitals, available social workers, etc., and appearance of services helping to increase the quality of everyday life (Kalampokis et al., 2011). For instance, services for patients with a specific disease enabling them to share their experience would considerably improve life of such patients (Kalampokis et al., 2011). Another example is when citizens can take part in improving the social environment, for example, “(unsafe roads, crime reports, drugs reporting) and monitor what actions have been taken by government and if the situation improves” (Hossain et al., 2016, p.29).

(iv) Operational efficiency and effectiveness. These benefits are related to economic value creation by the public sector (Jetzek et al., 2012). The efficiency is achieved by streamlined data management (Dawes, 1996), which means avoiding duplicate data collections and results in ‘improved information infrastructure, inter-agency coordination and better financial controls’ (Jetzek et al., 2012, p.6). Operational benefits are also related to optimisation of administrative processes, fair decision-making by enabled comparison, external quality checks of data, etc. (Janssen et al., 2012; Jetzek et al., 2012). In order to ensure increased efficiency caused by open data, there is a need to implement a more comprehensive approach to organisational data management process, adopt common data standards, ensure quality, accuracy, and timeliness of the data, to consider security issues, processing and correct handling of confidential and personal data, data governance aspects, etc. (Jetzek et al., 2012; Zhang et al., 2005). Finally, the ability to merge, integrate, and mesh both public and personal data is an important source of social value (Janssen et al., 2012).

(v) Economic growth. Open government data is expected to stimulate innovation, and to promote economic growth (Huijboom and Van den Broek, 2011; Janssen et al., 2012; Jetzek et al., 2012; Kalampokis et al., 2011; Lassinantti et al., 2014; Zuiderwijk et al., 2018). In this case, the private sector creates economic value by offering new innovative services and products and creating new jobs (Janssen et al., 2012; Jetzek et al., 2012; Lassinantti et al., 2014; Zotti and La Mantia, 2014). Networked value creation and co-creation are the major driving forces fostering innovation (Janssen et al., 2012; Jetzek et al., 2012). It is important to highlight that there is no way to predict the return of investment (ROI) for open data initiatives as it is difficult to predict the potential ‘killer’ application (Janssen et al., 2012). Open data has no value in itself. It only becomes valuable when used, and this is the biggest challenge (Janssen et al., 2012). In addition, it is cheaper and more cost-efficient for governmental organisations to release open data through open data portals than publishing this data in the form of reports (Hossain et al., 2016, p.29).

Table 1. Categories of open data effects.

Category	Effect	Reference
Increased democratic control	Transparency	Janssen et al., 2012; Jetzek et al., 2012; Huijboom and Van den Broek, 2011; Kalampokis et al., 2011; Shadbolt et al., 2012; Zotti and La Mantia, 2014; Zuiderwijk et al., 2018
	Democratic accountability	Dawes, 1996; Janssen et al., 2012; Shadbolt et al., 2012
	Trust in government	Janssen et al., 2012; Jetzek et al., 2012; Zuiderwijk et al., 2018
	Scrutiny of data and equal access to data	Janssen et al., 2012;
	Less information asymmetry, reduced level of corruption, better awareness	Jetzek et al., 2012; Zotti and La Mantia, 2014
Political participation	Participation, and self-empowerment of citizens	Janssen et al., 2012; Jetzek et al., 2012; Huijboom and Van den Broek, 2011; Lassinantti et al., 2014
	Scrutiny and analysis of data	Janssen et al., 2012; Shadbolt et al., 2012
	Monitor government performance	Huijboom and Van den Broek, 2011
	Help to government organisations	Jetzek et al., 2012
	Transparent policy-making	Huijboom and Van den Broek, 2011
	Law enforcement	Huijboom and Van den Broek, 2011
Social value	New governmental services for citizens	Janssen et al., 2012
	New social services for citizens	Janssen et al., 2012
	Improvement of governmental services for citizens	Janssen et al., 2012
	Improved citizen satisfaction and improved everyday life	Janssen et al., 2012; Hossain et al., 2016; Kalampokis et al., 2011
Operational efficiency and effectiveness	Streamline data management process	Dawes, 1996; Janssen et al., 2012; Jetzek et al., 2012; Zhang et al., 2005
	Optimisation of administrative processes	Janssen et al., 2012; Jetzek et al., 2012
	Improved decision-making	Janssen et al., 2012; Jetzek et al., 2012
	Increased efficiency	Jetzek et al., 2012
	Re-use of both private and public data	Janssen et al., 2012
Economic growth	Economic growth and stimulation of competitiveness	Janssen et al., 2012; Jetzek et al., 2012; Huijboom and Van den Broek, 2011; Kalampokis et al., 2011; Lassinantti et al., 2014
	Stimulation of innovation	Janssen et al., 2012; Jetzek et al., 2012; Lassinantti et al., 2014; Zuiderwijk et al., 2018
	Development of new services and products	Huijboom and Van den Broek, 2011; Janssen et al., 2012; Jetzek et al., 2012; Shadbolt et al., 2012; Zotti and La Mantia, 2014
	Networked value and co-creation	Jetzek et al., 2012
	Cost-efficiency for governmental organisations	Hossain et al., 2016

### 2.3 Challenges, barriers, and risks related to open government data

An open data provider experiences a number of challenges, barriers, and risks related to open data publishing. Many researchers sought to identify and classify them (Barry and Bannister, 2014; Conradie and Choenni, 2014; Hossain et al., 2016; Janssen et al., 2012; Martin et al., 2013; Zhang et

al., 2005; Zuiderwijk et al., 2014; Zuiderwijk et al., 2018). Based on the literature review, it is possible to specify five wide categories of risks and barriers related to open data (see Table 2).

(i) Organisational barriers. A number of barriers are related to organisational culture:

- Public organisations do not expose an entrepreneurship approach and have a higher degree of red tape. That is why they tend to have a risk-averse culture (Janssen et al., 2012; Hossain et al., 2016). New ways of thinking require radical process and behaviour changes for individuals in an organisation (Zhang et al., 2005). This leads to resistance to change because of “structural conflicts, managerial practices, and evaluation and incentive system that discourages” new processes (Zhang et al., 2005, p.4). Hence, the attitudes of top managers are vital for development and implementation of open data initiatives (Hossain et al., 2016). Another aspect is how the organisational culture and accepted values (for example, secrecy and defensiveness) influence the level of openness of an organisation (Barry and Bannister, 2014). Organisations may perceive a potential loss of control over their data as a loss of power, which becomes a barrier to data publishing (Barry and Bannister, 2014; Hossain et al., 2016; Martin et al., 2013).
- There is a lack of uniform policy and guidelines for open data publishing (Janssen et al., 2012; Zuiderwijk et al., 2014). There is a lack of systematic analysis about “which data should be allowed to be published and what users expect from open data” (Janssen et al., 2012, p. 263).
- There are certain barriers related to integration of different expertise from both technical staff and functional department staff (for example, IT department staff lacks knowledge in financial area, and finance department staff lacks knowledge on IT side) (Zhang et al., 2005; Zuiderwijk et al., 2014). This may have a negative effect on the success of the initiative (Zhang et al., 2005).
- There is no process for dealing with user input, and the quality of this input is questionable (Janssen et al., 2012).
- There is a lack of focus on outcomes of the open data publishing process, i.e. published data reuse (Zuiderwijk, et al., 2014).
- Working in open data initiatives is not necessarily a priority for a public organisation (Conradie and Choenni, 2014; Dawes and Helbig, 2010; Hossain et al., 2016; Zuiderwijk et al., 2018). Open data initiatives can be seen as extra responsibilities “that may compete for resources with the demands of mission-focused operations” (Dawes and Helbig, 2010). This is because work with open data is not part of the regular daily work of the personnel, which usually is an extra task without clear incentive for them given that benefits of data release or a business case are not always clear (Barry and Bannister, 2014; Conradie and Choenni, 2014; Zhang et al., 2005), and return on investment is still debated (Martin et al., 2013).
- Ownership of data raises significant discussions (Conradie and Choenni, 2014; Hossain et al., 2016). Due to vertical data management and work in silos, departments and functions lack a complete picture about which data others control (Conradie and Choenni, 2014). However, even if location of datasets is known, its ownership remains opaque (Conradie and Choenni, 2014) and a few organisations may claim ownership of data (Martin et al., 2013; Hossain et al., 2016). This has a negative impact on open data release.

(ii) Risk related barriers. There are certain concerns that shared data might be misinterpreted or misunderstood against the interest of data provider (Barry and Bannister, 2014; Conradie and Choenni, 2014; Martin et al., 2013; Zhang et al., 2005; Zuiderwijk et al., 2018). Interpretations of data by others having no understanding or prior knowledge about the data gathering purposes, goals, used methods,



Table 2. Risks related to open data publishing.

Category	Barrier, risk, challenge	Reference
Organisational barriers	Organisational culture	Barry and Bannister, 2014; Janssen et al., 2012; Hossain et al., 2016; Martin et al., 2013; Zhang et al., 2005
	No uniform policy and guidelines for publishing data	Janssen et al., 2012; Zuiderwijk et al., 2014
	Integration of different expertise	Zhang et al., 2005; Zuiderwijk et al., 2014
	User input, its processing and quality	Janssen et al., 2012
	A lack of focus on outcomes	Zuiderwijk et al., 2014
	Not a priority work	Barry and Bannister, 2014; Conradie and Choenni, 2014; Dawes and Helbig, 2010; Hossain et al., 2016; Martin et al., 2013; Zhang et al., 2005; Zuiderwijk et al., 2018
	Opaque ownership of data	Conradie and Choenni, 2014; Hossain et al., 2016; Martin et al., 2013
Risk related barriers	Misinterpretation of data	Barry and Bannister, 2014; Conradie and Choenni, 2014; Janssen et al., 2012; Martin et al., 2013; Zhang et al., 2005; Zuiderwijk et al., 2018
	Abused data	Barry and Bannister, 2014
	Fear of errors	Barry and Bannister, 2014
	Unintended or undesirable social implications	Barry and Bannister, 2014; Hossain et al., 2016; Zuiderwijk et al., 2018
Economic barriers	Resource constraints and a lack of funding	Barry and Bannister, 2014; Janssen et al., 2012; Hossain et al., 2016; Martin et al., 2013; Zhang et al., 2005
	Loss of data-based revenue streams	Barry and Bannister, 2014; Conradie and Choenni, 2014; Janssen et al., 2012; Hossain et al., 2016; Martin et al., 2013
Legal barriers	Privacy violation	Janssen et al., 2012; Hossain et al., 2016; Martin et al., 2013
	Data protection challenges	Barry and Bannister, 2014; Zuiderwijk et al., 2018
	Security issues	Barry and Bannister, 2014; Janssen et al., 2012
	Limited conditions for using data	Janssen et al., 2012
	Licencing related issues	Barry and Bannister, 2014; Janssen et al., 2012; Martin et al., 2013; Shadbolt et al., 2012
	Conflicting political and legal principles	Hossain et al., 2016; Zhang et al., 2005; Zuiderwijk et al., 2018
Technical barriers	Low quality of data	Conradie and Choenni, 2014; Janssen et al., 2012; Hossain et al., 2016; Martin et al., 2013
	Absence of standards for datasets and metadata	Barry and Bannister, 2014; Janssen et al., 2012; Hossain et al., 2016; Huijboom and Van den Broek, 2011; Martin et al., 2013
	Undefined / heterogeneous data formats (incompatibility)	Janssen et al., 2012; Hossain et al., 2016; Shadbolt et al., 2012
	A lack of knowledge and technical expertise and capacity	Barry and Bannister, 2014; Zuiderwijk et al., 2018
	A lack of infrastructure	Janssen et al., 2012
	Fragmentation of software and applications	Janssen et al., 2012

and applied frameworks might potentially result in unwanted situations and invalid conclusions (Conradie and Choenni, 2014; Janssen et al., 2012; Martin et al., 2013). In addition, data might be abused and used for fraudulent purposes (Barry and Bannister, 2014). Fear of errors is another barrier to open data (Barry and Bannister, 2014). Some governmental organisations have a fear of “large

numbers of queries being raised about perceived inaccuracies” (Barry and Bannister, 2014). Finally, there might be unintended or undesirable social implications to releasing certain datasets (Barry and Bannister, 2014; Zuiderwijk et al., 2018). For example, anonymised data might be de-anonymised in combination with other datasets or using specific software (Barry and Bannister, 2014; Hossain et al., 2016). Another related risk is digital divide, when certain groups of users may get privilege and unfair advantage (Barry and Bannister, 2014; Hossain et al., 2016).

(iii) Economic barriers. It is an open question how open data initiatives should be funded (Barry and Bannister, 2014; Janssen et al., 2012; Hossain et al., 2016; Zhang et al., 2005). In some cases, data is used to create incomes for governmental organisations, and licensing fees become a barrier to opening data (Barry and Bannister, 2014; Conradie and Choenni, 2014; Janssen et al., 2012; Hossain et al., 2016; Martin et al., 2013). This is very problematic for self-funding departments or organisations (Barry and Bannister, 2014; Hossain et al., 2016). Even loss of a low amount of income from data licenses requires compensation for such entities. Another category of issues is related to which resources (i.e. hardware, software, and personnel) should be used to implement open data initiatives (Barry and Bannister, 2014; Janssen et al., 2012; Hossain et al., 2016; Martin et al., 2013). Very often available budgets and resources are very scarce.

(iv) Legal barriers. Major legislation-related risks involve privacy violation (Janssen et al., 2012; Hossain et al., 2016; Martin et al., 2013), security issues (Barry and Bannister, 2014; Janssen et al., 2012), compliance with data protection regulation (Barry and Bannister, 2014; Zuiderwijk et al., 2018), and limited conditions for using data (Janssen et al., 2012). Licensing restrictions represent a crucial challenge to adoption of open data (Shadbolt et al., 2012). A few examples of issues related to licensing are: a lacking licence for using data (Janssen et al., 2012), ensuring robust licensing (Barry and Bannister, 2014), managing heterogeneous reuse conditions for multiple datasets (Hossain et al., 2016; Martin et al., 2013). There is an uncertainty created by conflicting political and legal principles, for example, public access, privacy, security, and confidentiality (Zhang et al., 2005; Hossain et al., 2016). There also are tensions between privacy, transparency, and accountability (Hossain et al., 2016).

(v) Technical barriers. One of the key concerns is related to information quality of datasets, which is not automatically granted (Janssen et al., 2012). Data may be incorrect, lack some of important parameters, be obsolete, non-valid, and inconsistent (Janssen et al., 2012; Martin et al., 2013). These characteristics refer to low quality data (Hossain et al., 2016). There are a number of technical barriers including undefined formats, a lack of standards for datasets (Barry and Bannister, 2014; Janssen et al., 2012; Hossain et al., 2016; Huijboom and Van den Broek, 2011; Shadbolt et al., 2012), a lack of infrastructure (for example, there is no portal or architecture in place), fragmentation of used software and applications (Janssen et al., 2012). A lack of knowledge, technical expertise, and technical capacity becomes a serious barrier (Barry and Bannister, 2014), especially, for small organisations or municipalities (Zuiderwijk et al., 2018).

### **3 METHODOLOGY**

The purpose of this research is to examine socio-economic impact of open data, its value, and major challenges and risks using the perspective of municipalities. The research follows a multi-method approach (Mingers, 2001), where the main method (qualitative research) is contributing from another method (quantitative method). The major reason behind selecting a qualitative approach as the dominant research method is the novelty of the research area and a need to understand the specifics of the research phenomenon (Ritchie et al., 2013). The quantitative approach is used to quantify socio-economic impact where applicable.

#### **3.1 Qualitative approach**

##### **3.1.1 Research approach and data collection**

The major aim of the qualitative research was to explore the direct and indirect impact of publishing accounts payable as open data, related benefits, challenges, and risks. The research was conducted

within the Nationell Skalning Öppna Data (National Scaling Open Data, NSÖD) project. This project aims to help Swedish municipalities to publish defined datasets in a standardised and safe way. Organisations participating in the project included 16 Swedish municipalities, a few regions, a number of authorities including DIGG (Agency for Digital Government), Trafikverket (Swedish Transport Administration), and Lantmäteriet, a consultancy company, and a data management platform provider.

We have interviewed representatives of seven Swedish municipalities (see Table 3). Currently, the process of opening accounts payable data is at a very early stage in Sweden. Just a few municipalities publish accounts payable dataset regularly. A number of municipalities are preparing to start publishing, and some are discussing the possibility to start publishing. We have interviewed municipalities in each of the mentioned categories. This information was complemented by interviews with experts and consultants involved in the project. These interviewees are involved in the process of accounts payable publishing as open data in many Swedish municipalities and have a broad overview of the situation.

Table 3. List of case studies.

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

The primary data was collected through semi-structured interviews and participation in a collaborative project. The interviewing procedure involved the following steps. First, the interview protocol was developed. The interview questions were formulated based on the research questions and research objectives. Discussed topics were related to:

- The context and specifics of accounts payable administration and handling inquiries from the public regarding purchases in a municipality before publishing it as open data.
- Direct and indirect gains and benefits (already experienced or expected) associated with accounts payable dataset after publishing it as open data.
- Risks associated with open data.

A sample protocol is provided in *Appendix A*. At average, interviews lasted about one hour. Majority of the respondents agreed to have the interviews recorded. Two researchers participated in interviews. One of the researchers was taking interview notes. Recorded interviews were later transcribed. The interviewees reviewed and commented on notes of the interviews that were not recorded.

The contacted actors represent municipalities, a data management platform provider, and a consultancy company. Contacted respondents are specialists and managers from financial, IT, and digitalisation departments of municipalities, who directly work with accounts payable and open data; specialists and consultants involved in the NSÖD project and working with business and technical aspects of open data. This way, all contacted respondents were qualified as having relevant expertise and knowledge for our research.

The interviews were conducted in the period from April to October 2020. The total number of conducted interviews is 9. The total number of interviewed experts is 17. A list of interviewed actors is summarised in Table 4.

Table 4. 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
TietoEvry	Consultancy	- Consultant 1 - Consultant 2	23 June 2020
MetaSolutions	Platform provider	- Top-level manager	23 June 2020

Participation in the NSÖD project included regular meetings and workshops with municipalities, researchers, consultants, digitalisation regulation authority, and industry partners and discussions of technical, organisational, socio-economic, legal, and regulatory aspects of the open data publishing process.

### 3.2 Quantitative approach

In order to estimate socio-economic impact of open data, we have applied Cost Benefit Analysis (CBA). CBA aims to assess open data impact in monetary value (Koski, 2015). At organisational level, costs of open data could be classified in the following groups (Welle Donker, 2018):

- (i) Adaptation costs involve costs needed to develop open data strategy, to find out which datasets are suitable for publishing as open data and which adaptations may be needed. Other preparation costs might include the cost to review existing agreements with third parties for data provision or handling, review licence agreements, etc. After adoption of open data policy, proposed datasets should be prepared for publishing as open data. The cost of collection and processing of raw data is not a part of open data cost, as these costs are a part of normal organisation's operating costs. However, datasets may contain personal data, sensitive information, etc. That is why, before publishing these datasets as open data, they need to be anonymised, checked for sensitive and private data, checked for compliance with existing regulation. Then the dataset should be checked for errors, data format should be transformed to open format, metadata should be created, and open data can be published.
- (ii) Infrastructural costs involve administrative preparation costs, costs related to setting data infrastructure (for example, preparing or adopting web services, data portals, data platforms). There might be a need to purchase specific software. In order to create a user-friendly interface, tools, apps, APIs, services will have to be created. Open data may increase data traffic, and there might be a need for extra services and extra data storage capacity. Some resources might be needed to train personnel and helpdesk to be able to assist users.
- (iii) One more category of costs is maintenance and operational costs of open datasets, their regular update, and maintenance of infrastructure. These costs are a part of the operational cost of the

organisation. Additionally, there might be promotion and support costs, which are associated with marketing, organisation of related events, workshops, seminars, and contests.

- (iv) Loss of revenues due to open data, which is a part of total income of the organisation.

Benefits related to open data are not easy to monetise (Koski, 2015; Welle Donker, 2018). Direct benefits are related to “efficiency and effectiveness gains, higher data quality, improved access to data, lower transaction costs, the development of value added services or complementary products, more investments and job creation, improved consumer and public services” (Welle Donker, 2018). Indirect effects are related to a wider use of data, improved image of data provider, “societal benefits, more-informed decisions by citizens, less corruption and better fraud detection, improved working conditions, welfare gains, avoided costs and damages and a more competitive market” (Welle Donker, 2018).

Although due to open data an organisation may experience a loss of revenue, open data results in certain direct cost savings. This results in improved data quality (due to user feedback and data quality checks), significantly reduced transaction costs (for example, administrative cost for invoicing, account managing, licence compliance and managing cost), more efficient and effective operation of the organisation (for example, different internal departments or different organisations can access and use data), potential new services offer a real value to the citizens, data can be used cross-border, and create new jobs.

### 3.3 Data analysis

Based on primary data, we identified costs associated with open data publishing where possible. After the first interview with a municipality, it became obvious that it would be particularly challenging to identify and quantify costs related to adaptation, infrastructure development, maintenance and operational costs, and loss of revenues as some of them are a part of normal operation of municipalities and information about another part was missing. In this study, we classify costs in: (i) adoption costs, (ii) infrastructure costs, (iii) maintenance and operational costs, and (iv) loss of revenues (see Table 5) and provide their qualitative description.

In order to provide an overview of a complex picture of socio-economic impact of open data, we have use some aspects of CBA together with categories of benefits and risks of open data identified in Sections 2.2 and 2.3. When analysing interview data, respondents’ responses were classified using categories of open data effects presented in Table 5. Value of open data was classified in five categories: (i) increased democratic control, (ii) political participation, (iii) social value, (iv) operational efficiency and effectiveness, and (v) economic growth. Discussed risks related to open data were classified in: (i) legal barriers, (ii) risk related barriers, (iii) technical barriers, (iv) organisational barriers, and (v) economic barriers.

Table 5. Framework for analysis of open data effects.

Cost	Value / Benefit category	Barrier, risk, challenge category
Adaptation cost	Increased democratic control	Legal barriers
Infrastructural costs	Political participation	Risk related barriers
Maintenance and operational costs	Social value	Technical barriers
Loss of revenues	Operational efficiency and effectiveness	Organisational barriers
	Economic growth	Economic barriers

Aspect that seemed the most appropriate to quantify became operational efficiency which was defined as efficiency gains related to time savings. We applied the following calculation (Koski, 2015):

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

where  $Cs$  is cost savings,  $\Delta t$  is the change in labour hours, and  $k_{p,d}$  is the hourly cost of personnel.

The hourly cost of personnel is calculated as:

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

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 salary statistics published by Statistics Sweden (SCB, 2020). Related categories are listed below, and ‘accounting economists’ is the most relevant out of them:

Economy and financial officers level 1: 67 500 SEK/month, public sector.

Economy and financial officers level 2: 54 700 SEK/month, public sector.

Financial assistants: 28 500 SEK/month, public sector.

Accounting economists: 30 500 SEK/month, public sector.

$$k_{p,d} = 30\,500 \cdot (1 \cdot 77\%) \cdot 12 / (226 \cdot 8) = 30\,500 \cdot (1 \cdot 77\%) \cdot 12 / (1808) = \sim 640 \quad (3)$$

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

As a last step of analysis, we performed a comparative analysis. The main aim was to identify similarities and differences across different municipalities. Detailed primary data and case study descriptions are presented in NSÖD project’s report (Apanasevic, 2020).

## 4 ACCOUNTS PAYABLE DATA

### 4.1 General open data regulation in Sweden

General situation regarding regulation of the access to government data in Sweden comprises a few important principles and laws. The Swedish Freedom of the Press Act (*Tryckfrihetsförordningen*) defines a principle of openness (*offentlighetsprincipen*) and states that any citizen or a company can request information from a governmental organisation or authority if it does not contain any confidential information. This means that the citizens and companies can get insights into the activities of the public sector and access public records (*allmän handling*). The European Union’s Public Sector Information (PSI) directive defines open data re-use by citizens. A new law regulating open data publishing is under discussion and should be accepted during 2021.

At the same time, there are laws regulating the use and management of confidential and personal data and restricting open publishing of these data. The examples are the European Union’s General Data Protection Regulation (GDPR) directive and the Swedish Public Access to Information and Secrecy Act (*Offentlighets- och sekretesslagen*, OSL).

### 4.2 Accounts payable data: Public record vs. open data

As mentioned, accounts payable data provides information about purchases, procurements, expenditures, and resource allocation of the governmental sector. Currently, anyone can access this information by sending inquiries to a municipality and asking for invoices of interest as public records. Inquiry handling process usually involves e-mail communication, searching for needed invoices in the financial system, confidentiality check and management, creating a compilation of invoices, checking the material, contacting the lawyer, archiving, and sending the response in a certain format (on paper or digitally). This process involves a number of departments in municipalities, such as administration, accounting and finance, procurement, juridical, IT, etc. In this case, the cost of answering one inquiry is related to the cost of the time, which the municipality personnel devote to provide an answer. Additionally, there is the cost of printing invoices on paper. Municipalities have set a public record pricing (for example, first nine pages are free, 10 pages – 50 SEK, and every second page costs 2 SEK per page (norrkoping.se, 2016)). This way of working with public records has a long history, and public organisations are used to work in this way.

Today, no one mandates to publish accounts payable as open data. However, some public organisations and municipalities are initiating a process of publishing accounts payable as open data. This dataset does not contain invoices, which may have confidential information and personal data. Open data file provides metadata on invoices, for example, the code of the department, the name of the service supplier, the code of the organisation, the account number, the name of the account, and the paid sum. If someone still wants to see the actual invoice, s/he still needs to request it from a corresponding public organisation.

### 4.3 Municipalities: Towards publishing accounts payable as open data

During our research, we have contacted municipalities that already publish accounts payable as open data, municipalities that are preparing to publish, and those that are starting a discussion about the possibility to publish. We briefly present these municipalities below.

#### 4.3.1 Municipalities publishing accounts payable as open data

**The City of Gothenburg.** The municipality of the City of Gothenburg had a few incentives for open publishing of accounts payable data. First, numbers of enquiries from journalists, companies, and citizens regarding public procurement and expenditures have been increasing since 1999. Answering these enquiries required a lot of time and resulted in a high cost. Another key motivation was a corruption scandal in 2010 (Milder, 2013). Consequently, the transparency aspect became important for the municipality. The City of Gothenburg has published accounts payable data as open data for four years now (as of 2020).

The municipality is big and has many divisions and entities. Due to this, the number of people working with accounts payable is big.

**The City of Lidingö.** This municipality has opened accounts payable data since 2017. An IT strategist, who previously worked in the municipality, drove the open data publishing process. He aimed to show that with small costs it was possible to gain great benefits. In addition, a financial system used by the municipality allowed data extraction and publishing in an easy and simple way.

The municipality gets a lot of inquiries about invoices mainly from competing suppliers and journalists. Some of these inquiries are very specific requesting for information that is not available as open data. Additionally, the municipality gets inquiries from a number of statistical analysis companies, which demand procurement and purchases data on a regular basis.

#### 4.3.2 Municipalities preparing to publish accounts payable data as open data

**Skövde.** Supplier invoices are handled centrally in this municipality. Two full-time employees work with accounts payable. The information from accounts payable is processed in the purchasing analysis tool. In order to follow-up expenditures, the purchasing information is analysed in terms of what was bought, in which volumes, from which supplier.

The municipality is receiving inquiries from: (i) public organisations, (ii) journalists, for example, from *Dagens Samhälle*, informing the citizens about municipality's expenditures; (iii) citizens; and (iv) suppliers, who are interested in information on purchases from other suppliers. Today, the inquiry handling process is fully manual. It is not structured or defined, and needs to be built from the beginning every time. It is expected that the amount of inquiries will increase with the start of publishing accounts payable as open data, but it will decrease in the long term.

**Karlskrona.** The municipality has a plan to introduce a new invoice management system. Then it is planned to start publishing accounts payable as open data.

In the financial department, there is a team, which performs administration of supplier invoices centrally. 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. Questions from citizens get responded in about a half an hour or

an hour. Handling of large invoice requests from suppliers or journalists sometimes may take days. To publish open data, the municipality will need to find a right strategy, introduce new work processes, and a clear management of the process.

**Varberg.** At the time of our study, this municipality was preparing to publish accounts payable as open data. One incentive to publish open data was the PSI directive. Another reason was the possibility to save time when working with large public inquiries.

Municipality receives inquiries regarding accounts payable data from citizens, journalists, and suppliers. Economists working with accounts payable and responsible account managers handle supplier invoices. After publishing open data, certain changes in the work process are expected. They will depend on the selected solution.

#### **4.3.3 Municipality discussing the opportunity to start publishing accounts payable data as open data**

**Skellefteå.** The municipality wants to start publishing accounts payable as open data because: (i) this would help reaching a higher level of transparency in the municipality's work and citizens will be better informed about municipality's purchases and important work areas; (ii) the business sector could offer new services or products based on open data.

Municipality receives inquiries regarding accounts payable data from: (i) competing companies and service providers, which, for example, want to know about existing agreements between the municipality and a certain supplier; (ii) journalists and media that can be interested in certain types of costs, for example, travel, renting of premises, representation, etc.; and (iii) statistics agencies and consultants having a task to collect certain information.

Accounts payable are handled centrally in the municipality's financial system. Additionally, there are specialists handling invoices in different organisation's units. It is expected that work processes will not change after publishing open data. There are certain concerns that publishing accounts payable as open data may result in misinterpretation and distortion of information.

**Uppsala.** This municipality wants to make data available for external use to the greatest possible extent (Uppsala kommun, 2020). At the time of our study, the responsible managers were assessing which data could be of interest to the public.

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. Representatives of the municipality believe that open data will allow some time savings. However, if someone requests certain invoice copies, this will require manual work and will take the same amount of time.

Accounts payable are handled centrally, and quite many people are involved in the invoice handling process. These are IT and the system administrators, the accounting unit, and different unit managers reviewing and approving invoices.

## **5 FINDINGS AND ANALYSIS**

In this section, we present findings from our research and perform analysis. It needs to be mentioned that with municipalities that already publish accounts payable as open data, we could discuss observed changes, impact, and effects *ex post*. With municipalities that prepare or plan to start publishing open data, we could only discuss expected impact and effects (*ex ante*).

Groups of population which are most frequently requesting accounts payable data are: (i) public and municipal organisations, statistical agencies; (ii) private sector companies representing supplies and service providers, also media companies and journalists; (iii) research sector and students; and (iv) citizens.



## 5.1 Costs related to open data

**Adaptation cost.** Before starting open data publishing process, municipalities develop a strategy, for example, the Action Plan for Digital transformation developed by Uppsala municipality (2020). In the case of accounts payable, IT and finance departments are involved in the process. Responsible managers carry out preparatory work, analyse the situation with open data publishing in other Swedish municipalities, identify what needs to be done (according to representatives of Skövde, Uppsala, and Varberg). Representatives of the City of Lidingö have additionally commented that it is especially important to select what information to publish for the selected dataset, and which data is interesting for citizens.

Using the example of the a preparatory work of the City of Gothenburg, the manager responsible for open data publishing in the City of Gothenburg have organised two meetings with the top management of the municipality and presented the idea about accounts payable dataset publishing, idea of service, and what should be done for that. Economy departments got half a year to check their data and systems, correct mistakes, make data classification, check data for private and confidential data, etc. In a half a year, the first open data file was released. The IT-specialist made a template for a data export file, created a work process, and prepared documentation on how to publish the dataset. This work took him about two days. Providing instructions to the open data publisher took two hours.

**Infrastructural costs.** Some older financial systems do not support functionalities needed to publish accounts payable as open data, for example, do not support extraction of data for publication. For example, the City of Gothenburg and the City of Lidingö had to update or renew their financial systems. Some municipalities (for example, Karlskrona) plan to introduce new financial systems before publishing open data. In some municipalities (for example, Skövde and Skellefteå), there is no need to change the financial system.

In addition, a dedicated e-service for invoice inquiries was created and launched by the City of Gothenburg and the City of Lidingö. All other interviewed municipalities plan to introduce such services in the future.

**Maintenance and operation costs.** In Varberg's municipality, a minimal cost of technical maintenance is expected for the IT department. This cost includes automatisisation of processes, increasing capacity of servers, ensuring information security, development of needed applications, and software licence cost.

In the City of Gothenburg, publishing of accounts payable as open data for the whole city takes a half an hour [30 min] every month. This is about 325 SEK per month.

A number of municipalities experience promotion and support costs: organise dedicated events (the City of Gothenburg, the City of Lidingö, and Karlskrona), expect marketing and communication costs (Uppsala).

**Loss of revenue.** Some municipalities (Uppsala) get paid for sending out printed invoices in response to inquiries from citizens. Open data will result in loss of this revenue.

## 5.2 Value of publishing accounts payable as open data

### 5.2.1 Increased democratic control

Majority of our interviewed municipalities (six out of seven) highlighted that democracy aspects of open data are more important for them than potential economic savings and gains (see Table 6).

*“The democratic perspective outweighs the time savings”* (a representative of Uppsala).

By opening information on its purchases, a municipality or a city administration shows a wish to be transparent. This is also closely related to openness because anyone can check how the municipality is spending money.

*“I see it [open data] as a democratic process, that we become more transparent and open to our citizens”* (a representative of Skellefteå).

[Being] “transparent in a democratic sense is “to show me the money and show me the trail where it goes” (a representative of the City of Gothenburg).

“Municipality shows openness, shows transparency” (a representative of Varberg).

“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” (a representative of Uppsala).

In addition, transparency leads to a strengthened trust in the municipality (Skövde, Karlskrona).

Due to increased transparency, procurement prices may go down:

1. At the municipal level, people working in different departments of the same municipality can check procurement prices of other departments and find suppliers offering lower prices.
2. At the national level, when more municipalities open their accounts payable data, this will enable a comparison across different municipalities and finding 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.

Publishing accounts payable as open data may improve the municipality’s image (representatives of Skövde) and reputation by gaining publicity and different awards (a representative of the City of Lidingö). In addition, open data would make a correct representation of a municipality in the media (a representative of Skellefteå).

When open data is easily accessible, citizens and journalists can analyse it and find questionable purchases and cases of corruption. Transparency leads to elimination of corruption and may result in considerable savings at the national level.

“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).

Table 6. Value related to increased democratic control.

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
Improves image and reputation		•	•			•				3
Finding questionable purchases and cases of corruption	•							•	•	3

\* 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. Σ represents the frequency or occurrence rate of one or another answer.

## 5.2.2 Political participation

Six municipalities out of seven see a huge value in self-empowerment of citizens (see Table 7). Open access to accounts payable data will increase knowledge of citizens about municipality’s finances and expenses.

“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 it is buying. <...> This is an important information, an important knowledge to have” (a representative of Skellefteå).

“Anyone is able to increase knowledge about the municipality’s finances” (a representative of Skövde).

When open data is easily accessible, citizens and journalists can search it and filter data, analyse it and find mistakes in accounts payable.

“Journalists can make an investigation faster and find mistakes” (a representative of MetaSolutions).

A number of municipalities drive a dialog with the public by organising events aiming to promote, educate, and inform about open data, for example, a Forum for Open Data and Innovation in Gothenburg, Innovation week in Lidingö. Uppsala municipality informs citizens about open data with the help of press releases and seeks to keep dialog about open data “with organisations, researchers, students, who are interested in using the datasets that have been published and get their input on these datasets.”

Table 7. Value related to political participation.

Type of benefit	Publish		Prepare			Discuss		Tie	Met	Σ
	Got*	Lid	Skö	Kar	Var	Ske	Upp			
Self-empowerment of citizens through access to data	•	•	•		•	•	•			6
Finding mistakes	•							•	•	3
Promotion of data transparency efforts, dialog with the public	•	•					•			3

\* 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. Σ represents the frequency or occurrence rate of one or another answer.

### 5.2.3 Social value

A few respondents have mentioned that open data will lead to *better and improved governmental services for citizens* (see Table 8). For example, internal use of open accounts payable data allows Gothenburg municipality’s employees to respond to citizens inquiries directly during a phone call (representative of MetaSolutions). This helps to increase the quality of citizen service in the municipality. A representative of Karlskrona commented that open accounts payable data is “[a] little bit faster and easier way to get an answer” for citizens.

In addition, municipalities publishing open data (Gothenburg, Lidingö) have created dedicated e-services making the process of inquiry simpler. This way, a use of the same standard and an easy inquiry sending procedure can further contribute to a higher quality of service and to ensure that all stakeholders receive the same service (a representative of Skövde).

Table 8. Social value.

Type of benefit	Publish		Prepare			Discuss		Tie	Met	Σ
	Got*	Lid	Skö	Kar	Var	Ske	Upp			
Improved governmental service for citizens	•	•	•	•	•				•	6
Same standard and easy procedure to send inquiries for all stakeholders	•	•	•							3

\* 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. Σ represents the frequency or occurrence rate of one or another answer.

## 5.2.4 Quantifiable operational efficiency and effectiveness

In Table 9, we provide information on the size of considered municipalities (number of population) (SCB, 2021). This helps understanding and relating the number of inquiries and potential efficiency gains for these municipalities.

Table 9. Sizes of municipalities.

Municipality	Population, 2020
The City of Gothenburg	583 056
The City of Lidingö	48 005
Skövde	56 791
Karlskrona	66 515
Varberg	65 397
Skellefteå	72 840
Uppsala	233 839

In this study, we sought to quantify potential efficiency gains *ex post*. This is possible to do for municipalities already publishing accounts payable dataset as open data for a number of years, and which can see the effects (i.e. the City of Gothenburg and the City of Lidingö).

**The City of Gothenburg.** Before opening accounts payable data, answering one question required at least 2 hours per person (sometimes two persons). It was estimated that the total number of inquiries received by all municipality's entities per month was 120 on average. After publishing open data, it takes about 5-10 minutes to answer one inquiry. People working with inquiries notice that the number of inquiries has decreased a lot since open data became available. However, the exact number of inquiries received by the municipality is unknown. Based on statistics for the period from the 1<sup>st</sup> of January to the 14<sup>th</sup> of 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. For that reason, we have considered the same number of inquiries per month (i.e. 120 inquiries) in the calculations.

In addition, there were between 300 and 600 downloads of the open file with data on accounts payable during previous months. Downloads of the open data file can be considered as potential time savings, because the municipality does not need to answer 300 to 600 additional questions per month. However, it is not possible to estimate if anyone has actually sent a request after looking at the open data file.

**The City of Lidingö.** Representatives of the municipality could not provide information regarding the amount of inquiries received before or after publishing open data. Time needed to answer one inquiry equals one hour and a half.

However, during the previous year, there were about 500 downloads in total (about 40 downloads on average per month). Municipality considers these 40 downloads per month as potential savings. However, there is no information if anyone has sent a request after looking at the open data file.

Parameters and assumptions used for calculations are presented in Table 10. Potential efficiency gains and savings for the City of Gothenburg and the City of Lidingö are provided in Table 11.

Table 10. Parameters used for calculations.

	The City of Gothenburg	The City of Lidingö
The hourly cost of personnel	650 kr	650 kr
The number of queries (average per month)	120	–
Hours of work per query before publishing open data (h)	2	1,5
Hours of work per query after publishing open data (h)	0,167 (10 min)	1,5
Average number of open data file downloads per month	450	42
Average number of open data file downloads per year	5 400	500

Table 11. Potential efficiency gains and time savings.

	<b>The City of Gothenburg</b>	<b>The City of Lidingö</b>
Cost of answering 120 questions per month <i>BEFORE</i> publishing open data (SEK)	$120 \times 2 \times 650 = 156\ 000$	–
Cost of answering 120 questions per month <i>AFTER</i> publishing open data (SEK)	$120 \times 0.167 \times 650 = 13\ 000$	–
Efficiency savings per month (SEK)	$156\ 000 - 13\ 000 = 143\ 000$	–
Efficiency savings per year (SEK)	$143\ 000 \times 12 = \mathbf{1\ 716\ 000}$	–
Potential time savings due to open data file downloads per month (SEK)	$450 \times 0.167 \times 650 = 48\ 847$	$487\ 500 / 12 = 40\ 625$
Potential time saving due to open data file downloads per year (SEK)	$48\ 847 \times 12 = \mathbf{586\ 164}$	$500 \times 1,5 \times 650 = \mathbf{487\ 500}$

Summarising, the potential total efficiency gains and time savings are presented in Table 12.

Table 12. Summary of potential efficiency gains and time savings.

<b>Municipality</b>	<b>Efficiency gains per year (SEK)</b>	<b>Potential time savings per year (SEK)</b>	<b>Potential total savings per year, (SEK)</b>
The City of Gothenburg	1 716 000	586 164	2 302 164
The City of Lidingö	not available	487 500	487 500

For municipalities that are preparing or discussing the opportunity to publish (Skövde, Karlskrona, Varberg, Skellefteå, and Uppsala), we could only evaluate the current cost of answering citizens' inquiries.

**Skövde.** The municipality receives about 30 inquiries per year. The average time needed to respond to one inquiry is about 75 minutes. This time includes: email conversation, handling secrecy, creating a compilation of invoices, controlling the material, archiving, contacting a lawyer, etc. However, the time may vary a lot depending on the inquiry.

**Karlskrona.** On a monthly basis, the municipality centrally receives about 3-5 inquiries about invoices from suppliers, journalists, and citizens. There might be many more inquiries being directly sent to administrations of corresponding services, but their number is not known. Usually, it takes about 0,5–1 h to handle one inquiry. It takes more time to handle an inquiry asking for many invoices.

**Varberg.** The municipality receives about 40–50 inquiries per year. On average, one inquiry handling takes about two hours. Some questions might be easier with answers being ready within 30 minutes. But some questions might be very time consuming and answering them may take a few days.

**Skellefteå.** The municipality receives about one inquiry per week. The inquiry handling time is very short, and the answer is sent immediately out in most of the cases. In the municipality, there is one full-time employee who is handling public and media inquiries regarding information from the financial system.

**Uppsala.** The number of inquiries that receives the municipality is hard to estimate. Inquiries can be different: one people ask for invoice copies, others for an Excel file. Some want just a few invoices, which can quickly be done. And others request invoices in large volumes, for example, all invoice copies from a specific supplier during a specific 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. One person in the municipality is handling public inquiries regarding accounts payable between 50% and 75% of his working time.

Parameters and assumption used for calculations are presented in Table 13. Costs related to work with accounts payable are provided in Table 14.

Table 13. Parameters used for calculations.

	Sjövde	Karlskrona	Varberg
The hourly cost of personnel	650 kr	650 kr	650 kr
The number of queries (average per year)	30	48	45
Hours of work per query (h)	1,25	1	2

Table 14. Current cost related to work with inquiries on accounts payable.

Municipality	Cost per year (SEK)	Cost per month (SEK)
Skövde	$30 \times 1,25 \times 650 = 24\ 375$	$24\ 375 / 12 = 2\ 031$
Karlskrona	$48 \times 1 \times 650 = 31\ 200$	$31\ 200 / 12 = 2\ 600$
Varberg	$45 \times 2 \times 650 = 58\ 500$	$58\ 500 / 12 = 4\ 875$
Skellefteå	$30\ 500^* \times 12 = 366\ 000$	$30\ 500^*$
Uppsala	From 183 000 to 274 500*	From 15 250 to 22 875*

\* The calculation is based on salary of a full-time accounting economist. See Section 3.2 for more details.

### 5.2.5 Non-quantifiable operational efficiency and effectiveness

During interviews, benefits and gains related to operational efficiency and effectiveness became the most discussed and commented theme (see Table 15).

**Cultural shift in the organisation.** A cultural shift in the organisation is needed in order to provide open data. An organisation needs to accept a new way of thinking (a representative of Karlskrona) and to understand the importance of data management and structuring as well as the need to introduce a general data management process allowing a systematic approach (a representative of MetaSolutions).

*“There are benefits with a changed way of thinking and internal processes”* (a representative of Karlskrona).

**Time saving.** Majority of our interviewees have mentioned time saving and efficiency gains as the key benefits. Further elaboration of this question provides a more specific understanding of factors leading to efficiency gains and time savings:

a) Narrower and more specific question formulation. From one side, this makes it easier to choose the right person to handle a specific inquiry (a representative of the City of Gothenburg). From another side, a more specific inquiry will require less time to handle:

*“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”* (a representative of Varberg).

*“This [open data] 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”* (a representative of Uppsala).

b) Opportunity to direct a person to open data files. This allows considerable time savings when answering inquiries coming from citizens, journalists, and organisations (a representative of the City of Gothenburg).

*“There may be an advantage in being able to refer to the dataset”* (a representative of Skellefteå).

c) Reduced number of inquiries. The municipalities get less inquiries because people can access and check the open data file themselves (based on observation of a representative of the City of Gothenburg). The Uppsala municipality expects certain time savings after opening accounts payable data because people will be able to search for information in open data instead of sending inquiries to the municipality. In the municipality of Skövde, it is expected

that the number of inquiries may increase after publishing open data and decrease in the long-term period.

d) Creation of standard reports for repeating questions. Certain questions that municipalities receive are repeating, for example, every quarter. Some municipalities (the City of Lidingö, Skövde) create standard reports for these repeating questions. The municipality of Skövde sends these reports on demand. The City of Lidingö publishes them as open data, which also helps to save time.

Table 15. Value related to operation efficiency.

Type of benefit	Publish		Prepare			Discuss		Tie	Met	Σ
	Got*	Lid	Skö	Kar	Var	Ske	Upp			
Cultural shift in the organisation				•					•	2
Time savings	•	•	•	•	•		•	•	•	8
Narrower and more specific questions	•				•		•			3
Ability to refer to open data file	•	•				•				3
Reduced number of inquiries	•	•	•		•		•			5
Creation of standard reports for repeating questions		•	•							2
Structured data publishing process and common routines	•	•	•	•	•	•		•		7
Structured process of getting and handling inquiries	•	•	•	•	•					5
Internal re-use of open data	•	•	•	•		•	•		•	7
Increased quality of internal/published data			•	•	•					3
Enhanced quality of internal processes	•				•	•				3

\* 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. Σ represents the frequency or occurrence rate of one or another answer.

**A structured data publishing process and common routines.** Open data publishing requires a streamlined data management, structured and well-defined process and routines, optimised administrative process, where each steps of the process, responsible people, and their actions are defined (representatives of the City of Gothenburg, the City of Lidingö, Varberg, Skövde, and TietoEvry). This may even help to save more money:

*“It is possible to publish it [open accounts payable data] in a structured way and have a clear administration. This could help us to save money”* (a representative of Karlskrona).

*“But since we have changed into the new system, it was easy to do <...> and we got an easy and seamless process. <...> we also made the process more streamlined”* (a representative of the City of Gothenburg).

**A structured process of getting and handling inquiries.** The municipalities publishing open accounts payable data (the City of Gothenburg and the City of Lidingö) have introduced a dedicated e-service for inquiries. According to interviewees, this is a more structured and streamlined process of getting more structured questions from the public. Municipalities planning to open accounts payable data (Skövde, Karlskrona, and Varberg) are also planning to offer such an e-service.

*“It would be interesting to have an e-service to collect inquiries”* (a representative of Karlskrona).

Representatives of Skövde additionally commented that, currently, the inquiry handling process is fully manual and not structured. This means that the process needs to be built from the beginning

every time. Structured approach and common routines of inquiry handling will ensure a more efficient work.

**An internal reuse of open data.** As commented by a representative of the City of Gothenburg, municipality’s employees tend to use published and structured data on purchases and look 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 at a lower price. The municipalities of Skövde, Karlskrona, and Uppsala also expect to use open data on purchases and suppliers internally across their different municipal units and divisions. In addition, opening accounts payable data may result in reduced procurement time (Skövde) and a better-informed procurement unit (the City of Lidingö, Skellefteå).

**Increased quality of internal/ published data.** This is an expected consequence of open data publishing:

*“A man makes the quality of processes higher because he knows that someone will look at it. A man should think one more time, because the data will be published”* (a representative of Karlskrona).

*“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”* (a representative of Varberg).

Increased quality of internal data is achieved when more people can review the data (a representative of Skövde).

**Enhanced quality of internal processes.** People working with inquiries in the City of Gothenburg noticed that *what*-type questions became replaced by *how*- and *why*-type questions. According to a representative of Varberg: *“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.”*

In addition, a structured management of invoices allows a good control over procurement (a representative of Lidingö) and keeping a *procurement unit better informed* regarding framework agreements and purchases (a representative of Skellefteå). This means that the municipality employees get an opportunity to extract additional insights.

## 5.2.6 Value related to economic impact

The majority of interviewees (representatives of Skövde, Karlskrona, Varberg, Skellefteå, and TietoEvry) relate economic impact of open data to economic growth, data-driven innovation, new services and products that will be created based on open data (see Table 16).

*“Maybe these are local businesses or companies that can use this and make a website or an app”* (a representative of Karlskrona).

*“I hope that with opening data we will get new innovation and new ideas”* (a representative of Varberg).

*“There can be new services and products that can be developed”* (a representative of Skellefteå).

*“Others will start using this data to create solutions for society”* (a representative of Uppsala).

Table 16. Value related to economic impact.

Type of benefit	Publish		Prepare			Discuss		Tie	Met	Σ
	Got*	Lid	Skö	Kar	Var	Ske	Upp			
Stimulation of innovation					•			•		2
Economic growth								•		1
Creation of new services based on open data			•	•	•	•	•	•	•	7

\* 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. Σ represents the frequency or occurrence rate of one or another answer.



### 5.3 Challenges and risks related to accounts payable publishing as open data

In the discussion of risks and challenges, there is a clear divide between municipalities that are already publishing open accounts payable data today and municipalities that are only preparing for publishing. The municipalities belonging to the first group specified that there are no risks in it, while the municipalities that are preparing to publish see a number of risks. Summary is provided in Table 17.

**Organisational challenges.** One of the mentioned challenges is a lack of uniform policy and guidelines when handling citizen inquiries. As commented by the representative of Skövde, “the process is manual and not defined, and needs to be built from scratch every time.” A work process is especially complicated and unclear when handling large volume requests (a representative of Karlskrona).

A few municipalities expressed a concern that opening data may create more administrative work for certain units (Skövde).

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

*“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).

TietoEvry consultants working with a big number of municipalities noted that sometimes personnel in municipalities are not motivated to work with open data, its description, organisation of a process, classification because this is not their core activity.

In the preparation process for publishing, one of the core questions to solve is “Who is the owner of the information?” (a representative of Varberg).

There are concerns regarding detecting mistakes and errors because a process for their handling is unclear (Skövde).

**Risk related barriers.** Skellefteå municipality expressed a concern about risk of misinterpretation, misuse, and distortion of the information published as open data:

*“There is a risk that the information ends up in the wrong hands, the information may be distorted, or performed analyses are incorrect, and drawn conclusions are not true, and, thus, make a bad image of the municipality. <...> [T]here always is a risk of misusing the information”* (representatives of Skellefteå).

**Economic challenges.** Uppsala municipality mentioned that they currently send invoices in printed form and get paid for that. The municipality cannot get paid if invoices are sent in digital form. Even though the municipality was not discussing this as an obstacle or challenge, it means a certain loss of incomes for the municipality.

**Legal barriers.** Majority of expressed concerns are related to confidentiality, privacy, GDPR regulation, and secrecy issues related to accounts payable data:

*“The big risk is that personal information (e.g. name, bank account) will be included in open data”* (a representative of Varberg).

*“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).

*“Confidential information should not be disclosed”* (representative of Uppsala).

For that reason, municipalities want to correct the data, improve its quality, and remove all confidential and personal data before publishing accounts payable as open data.

Table 17. Risks, challenges, and barriers related to open data.

Type of risks/challenges/barriers	Publish		Prepare			Discuss		Tie	Met	Σ
	Got*	Lid	Skö	Kar	Var	Ske	Upp			
<b>Organisational</b>										
A lack of uniform policy and guidelines			•	•				•	•	4
Increase of administrative workload for some units			•	•		•				3
Not a priority work								•		1
Opaque ownership of data					•					1
Undefined process of handling of detected mistakes and errors			•							1
<b>Risk related</b>										
Misinterpretation, misuse, distortion of information						•				1
<b>Economic</b>										
Loss of incomes							•			1
<b>Legal</b>										
Risks related to private data, GDPR regulation				•	•	•	•	•	•	6
Confidentiality and secrecy			•		•	•	•	•	•	6
<b>Technical</b>										
Unclear/ low quality of data			•		•		•	•	•	5
Different systems and platforms							•			1
Financial system does not support fully open data publishing				•	•		•			3

**Technical barriers.** The major technical challenges are related to unclear or low quality of data.

“There is a high risk that there is poor data quality” (representative of Varberg).

“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).

Some of the discussed technical barriers are related to work with different platforms and different systems (Uppsala).

Three municipalities have mentioned that their existing financial systems do not support functionality needed for a smooth work with open data. For example, there is no opportunity to remove personal data from invoices. Masking personal data on printed invoices requested by citizens or journalists implies manual work and takes a lot of time, especially, in the case of large volume requests.

## 6 DISCUSSION

This research aims to understand what kind of socio-economic impact a municipality gains by publishing accounts payable as open data, and how municipalities perceive the major benefits, challenges and risks related to open publishing of this dataset. In this section, we summarise and discuss the results of our study.

### 6.1 Socio-economic impact of publishing accounts payable as open data

The results of this research show that municipalities experience certain adaptation, infrastructural, maintenance and operation costs, and potential loss of revenues. However, some of these costs are embedded in the normal operation of municipalities and are hard to estimate. This supports findings from the previous research (Welle Donker, 2018). In addition, the information about certain costs is

missing. When initiating a process of open data publishing, it is important for open data initiatives that municipalities consider the above-mentioned costs and plan for a budget and resources needed to cover these costs (Barry and Bannister, 2014; Janssen et al., 2012; Hossain et al., 2016; Zhang et al., 2005).

Majority of the interviewed municipalities consider increased democratic control, transparency, and openness as the major driving forces for opening up accounts payable dataset. This is in line with findings from previous research (Dawes, 1996; Janssen et al., 2012; Shadbolt et al., 2012; Zotti and La Mantia, 2014; Zuiderwijk et al., 2018). A few municipalities see potential of open data to reduce information asymmetry and to reduce the level of corruption as discussed by Jetzek et al. (2012) and to improve image and reputation of municipalities as suggested by Zuiderwijk et al. (2018). Based on interview results, we have further elaborated on how open data could reduce the information asymmetry and the level of corruption, and to push prices down. This can be done by finding suppliers offering lower prices to other departments at the municipal level or by performing comparison of municipal purchases across different municipalities at the national level.

In the interviews, respondents have discussed just two types of political participation of citizens. This is self-empowerment of citizens through access to accounts payable data in order to have a better understanding of performance and resource allocation by municipalities (Huijboom and Van den Broek, 2011; Janssen et al., 2012; Jetzek et al., 2012). It is also expected that citizens can find mistakes (Shadbolt et al., 2012). At the same time, one municipality has expressed a concern regarding a lack of processes of handling mistakes identified by citizens. In addition, in order to create awareness and to empower citizens, a number of municipalities drive a dialog with citizens and organise dedicated events.

Previous research (Huijboom and Van den Broek, 2011; Janssen et al., 2012) has highlighted the link between open data publishing and improved governmental services for citizens. This was also confirmed by this study. Easy and fast access to open data allows responding to citizen questions during a phone call, which positively affects the service quality. In addition, dedicated e-services for accepting citizen inquiries make the inquiry process easier for everyone and support the same level of service standard.

A number of studies highlight the opportunity of open data to increase efficiency of work by streamlining data management (Dawes, 1996), improving infrastructure, inter-agency coordination, optimising administrative processes (Janssen et al., 2012; Jetzek et al., 2012). Our findings are in line with this. Interviewed municipalities see structured data publishing process, common routines, structured process of getting and handling inquiries as factors improving operational efficiency and leading to higher quality of both internal processes and published data, and further internal reuse of this data. In addition, our quantitative estimations confirmed considerable potential efficiency gains and time savings *ex post* for municipalities opening up accounts payable. 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 might be greater at the municipality level.

Our research contributes by providing a more detailed understanding of factors leading to time savings and efficiency gains. They are: (i) directing a person to open data files, (ii) receiving narrower and more specific questions which require less time to handle, (iii) receiving a reduced number of inquiries, and (iv) creation of standard reports for repeating questions and publishing them online.

Previous studies (Huijboom and Van den Broek, 2011; Janssen et al., 2012; Jetzek et al., 2012; Kalampokis et al., 2011; Lassinantti et al., 2014; Zuiderwijk et al., 2018) have specifically highlighted that open governmental data is expected to stimulate innovation and to lead to economic growth. This was confirmed by results of our research. Majority of interviewed municipalities expect the appearance of new services and products built using open data.

## **6.2 Benefits and challenges perceived by municipalities in relation to open publishing of accounts payable**

### **6.2.1 Benefits perceived by municipalities**

As mentioned, Swedish municipalities have a long history of working and processing public record inquiries. Public and municipal organisations, statistical agencies, private sector, media companies, journalists, researchers, and citizens send in inquiries regarding municipalities' expenditures and procurement.

Answering some inquiries sent to municipalities can be very time consuming. The price to handle one invoice could be in a range between 5–700 SEK per invoice. Such a high price of one invoice handling can be explained by a need to involve different specialists from administration, accounting and finance, procurement, juridical, and IT departments. In addition, the name of the service provider in the inquiry can be misspelled, and it takes time to find this out; it might be not clear where to look for the requested information; inquiries asking for a big number of invoices consequently require more time; and printing of invoices and, in some cases, manual handling of confidential information takes a lot of time. That is why the actual cost to handle one invoice is below officially estimated public record pricing (see [norrkoping.se](http://norrkoping.se), 2016). From this perspective, open accounts payable data can result in considerable potential time and efficiency savings for municipalities. In addition, a use of a dedicated e-service for inquiries may allow to further streamline the process. For example, if any invoice has already been sent on request, it could also be published as open data and be available for the next use without inquiries.

Another perceived benefit is related to introduction of a streamlined and structured process and clear guidelines of work with open accounts payable data. Today, the process of handling public record inquiries in some municipalities is fully manual, unstructured, and undefined. Responsible employees need to build this process from scratch every time. Using the experience of municipalities already publishing open data, it is important to highlight the importance of a structural approach in the open data publishing process. Municipalities need to organise and structure work with municipal data in an easy and seamless process with open data being a natural outcome of this process.

However, municipalities perceive democratic aspects of publishing accounts payable as open data as the most crucial benefit outweighing all economic and efficiency benefits. Interviewed municipalities seek to be transparent and open towards their citizens. They see open accounts payable data as an opportunity for citizens to increase their knowledge about the municipality, its activities, and important areas. Empowerment of citizens becomes important. Municipalities publishing accounts payable as open data notice an increase of how- and why-types of questions. Answering these types of questions may help the municipality to improve internal processes and rethink used approaches.

Based on our findings, municipalities perceive a number of benefits of publishing open accounts payable data in an easily accessible file. From one side, the number of open data files downloads is perceived as a time saving for municipalities. From another side, this means that a certain amount of people will have a look at open file data without requesting a public record. This way, easy accessibility of open data files by a great degree contributes to openness and transparency.

### **6.2.2 Challenges and risks perceived by municipalities**

In this research, we have analysed two broad groups of municipalities: (i) already publishing accounts payable as open data, and (ii) preparing or discussing opportunity to publish. Reasoning of these municipalities about open data publishing by a very high degree corresponds and supports findings by Zuiderwijk et al. (2018), who have specified three perspectives of motivation for municipalities to open up their data. Municipalities that are already publishing data (The City of Gothenburg, the City of Lidingö) can be classified as advocating municipalities. They want to be open and transparent toward their citizens, they see benefits with open data, expect to see new services created using open data. More importantly, these municipalities do not see any problem or risk related to open data.

The remaining municipalities (Skövde, Karlskrona, Varberg, Skellefteå, and Uppsala) share characteristics of both careful and conservative municipalities. They see many benefits of open data, which motivate them to open municipal data. However, they want to ensure that the data is correct, that personal and sensitive data is handled in a correct way. Some of them believe that the organisational process will remain the same after they start publishing open data. These municipalities are concerned about sharing incorrect data or data of low quality, see risks related to privacy violation, misuse of open data, compliance with GDPR regulation, confidentiality, and secrecy (Barry and Bannister, 2014; Conradie and Choenni, 2014; Janssen et al., 2012; Hossain et al., 2016; Martin et al., 2013; Zuiderwijk et al., 2018) and seek to avoid these risks.

This difference in the perception of open data by the municipalities can be explained by their level of maturity in the area of open data. The municipalities already publishing open data have more experience and knowledge about open data publishing. They have already solved problems and answered questions regarding open data management process, used standards, formats, quality assurance, confident and personal data management and handling. While the municipalities preparing or discussing opportunity to publish still have to go through this process and see challenges related to a lack of uniform policy and guidelines, and risks of possible increase of administrative workload for certain units (Dawes and Helbig, 2010; Janssen et al., 2012; Zuiderwijk et al., 2014). Our research furthermore specifies out-dated IT systems as additional barriers and challenges.

Another identified challenge is related to a long history that Swedish municipalities have been working and processing public records inquiries. In this process, municipalities have a passive role accepting and processing inquiries. Open data denotes a proactive role of public organisations, who decide to open and publish data on their own initiative. As a representative of one of the interviewed municipalities commented: “*We do not have tradition to share data, data is sent on request.*” This means that the organisational culture of Swedish municipalities needs to shift the paradigm from a passive towards an active role.

## **7 CONCLUSIONS**

### **7.1 Contribution**

This research makes a number of contributions to the existing research on open data. First of all, it contributes to academic research by addressing the existing gap in the open data research and performing socio-economic analysis of publishing open data both *ex ante* (expected impact) and *ex post* (experienced impacts) at organisational level. By utilising both qualitative and quantitative approaches, we have discussed the impact of open data on costs, elaborate of the value of open data related to increased democratic control, political participation, social value, operational efficiency and effectiveness, and economic benefits. This study contributes by further elaborating on how open data could reduce the information asymmetry and the level of corruption. Additionally, our study contributed to the understanding of factors leading to time savings and efficiency gains, when compared to public record handling.

Secondly, this study contributes by providing more insights into benefits perceived by municipalities in relation to open publishing of accounts payable. The benefits are time and efficiency savings, publishing invoices requested through e-service as open data, structural approach to municipal data management, empowerment of citizens, and improved internal processes, and the role of open data files contributing to openness and transparency.

Finally, we have also discussed challenges and risks perceived by municipalities. This way, we contribute with a deeper understanding of obstacles and barriers (Conradie and Choenni, 2014) and continue and contribute to the discussion about motivation of municipalities to open up their data (). We argue that motivation of municipalities additionally depends on: (i) the level of their maturity in the area of open data and (ii) existing long tradition of Swedish municipalities, which have used to a passive role in their work with public records.

This study provides important implications and strategic guidelines for practitioners working with open government data. One insight is related to the fact that 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 gets reviewed by open data users and data journalists.

Second, as discussed, a more comprehensive view is needed on the general information management process in a municipality.

Third, a cultural change mentioned by many interviewed experts is needed. Indeed, considering the value of transparency as their core task could additionally strengthen the motivation of public organisations to open their data.

Finally, 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 reuse, analytics and data journalism.

## 7.2 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 quantifiable results, this study should be extended with the experience from more municipalities opening up accounts payable data.

Secondly, some data needed for analysis is missing, and we had 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 the 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. This is a potential area for further research.

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## **Appendix A. Sample interview protocol**

The municipality that publishes accounts payable as open data

### **1. Overall context**

- Why is it important for the municipality to make data on accounts payable available?
- Is there interest in this data:
  - o for you (your department)?
  - o from other departments in your municipality?
  - o from other municipalities / public organisations?
  - o from suppliers?
  - o from citizens / journalists? etc.

### **2. Data management of accounts payable BEFORE publication as open data**

- How was the accounts payable data handled before you started publishing this data as open data?
  - o How was the work process organised? Who was responsible? Who was involved?
  - o What do you do with this data? How is it used?
- What were the related costs?
  - o Total working time (total hours worked, number of people) related to the work process and the administration of data before you started publishing it as open data?

### **Situation AFTER publication as open data**

- When did you start publishing?
- How is accounts payable handled when it is being published as open data?
  - o How is the work process organised now?
  - o Were there any obstacles to open data publishing?
  - o How well does it fit into the organisation's work processes?
- What is different from the previous process in terms of data management costs and savings:
  - o Total working time (total hours worked, number of people) related to the work process and the administration of data after you started publishing it as open data?
- Is it possible to estimate the costs of introducing an open data publishing process?
  
- What other direct benefits / advantages do you see with accounts payable publishing as open data?
- What indirect benefits / benefits do you see?
- What risks do you see?