

Adoption of Open Government Data for Commercial Service Innovation: an Inductive Case Study on Parking Open Data Services

Full Paper

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Abstract

City councils produce large amounts of data. As this data becomes available, and as information and communication technology capabilities are in place to manage and exploit this data, open government data is seen as becoming more and more valuable as a catalyst for service innovation and economic growth. Notwithstanding this, evidence of open data adoption is currently largely scattered and anecdotal. This is reflected in the lack of literature focusing on users of open data for commercial purposes. This research aims to address this gap and contributes to the IS open data services debate by proposing a model of factors perceived by an open data services business as the most relevant in explaining adoption of open government data for commercial service innovation in cities. Adopting an inductive reasoning approach through qualitative methods was critical to capture the complexity of the open data services ecosystem perceived by those reusing this data.

Keywords

Open Data Services, Adoption, Inductive Case Study.

Introduction

This paper proposes findings from a case study in the domain of Parking, in relation to the following exploratory research question: what are the factors that influence adoption of open government data for commercial service innovation in cities? These findings represent a contribution to the IS academic literature on Open Data Services (Lindman et al. 2013a). In particular, evidence of impacts of open data adoption is largely scattered and anecdotal in both current practice and in the extant literature (Susha et al. 2015; Kaasenbrood et al. 2015). On the other hand, the commercial use of Open Data as well as the re-users' perspective, are underexplored in the IS literature to-date (Zuiderwijk et al. 2014). This paper addresses this gap by proposing findings of a case study of an organization that achieved sustained adoption of Open Data for the delivery of a range of commercial services in the parking context. This section provides an introduction to Open Government Data and to the specific IS debate on Open Data Services.

Open Government Data

The definition of Open Data was firstly developed by the Open Knowledge Foundation (<http://okfn.org/>) in 2005 as: "data that can be freely used, shared and built on by anyone, anywhere, for any purpose". In their Digital Agenda (www.ec.europa.eu), European commissioners listed 4 reasons for promoting Open Data initiatives, including potential economic gains from new product and service development (estimated to be 40 billion Euros a year in the EU). This research focuses on Open Government Data released by city authorities (indicated in this paper as "Open Data"), specifically defined in the literature

as “all stored data of the public sector which could be made accessible by government in the public interest without any restriction on usage and distribution” (Geiger and von Lucke, 2011). In this direction, a novel academic conversation named Open Data Services was established among Information Systems (IS) researchers. It gives a structure to the investigation of Open Data as a foundation of service innovation from an IS perspective (e.g. “Open Data Services Mini-track” at the Hawaii International Conference on System Sciences, 2013 (Lindman et al., 2013a)). Private sector’s Open Data and Open Data adopted for other reasons (e.g. research purposes, consultation etc.) are beyond the scope of this study.

Open Data Services

In the open data services’ domain, a distinction between supply and demand of open data can be made (Lindman *et al.* 2013b). Specifically, the supply perspective aims at releasing data to the public. The demand side builds something useful on top of this source. Access to Open Data is therefore just the first step within an infrastructure that allows end-users to consume Open Data services. Hence, for the Open Data to become valuable there needs to be a chain of steps that take the raw data, make it available to others, and analyse, combine and present data in ways that make it useful for users to interpret as information (Lindman *et al.* 2013b). The authors adopted Alter’s (2010) Work System Framework to describe open data services. According to (Alter, 2002), a work system is “a system in which human participants and/or machines perform work using information, technology, and other resources to produce products and/or services for internal or external customers”. Thus, a service system can be seen as a work system that produces services for customers. In the context of Open Data services, following the distinction between supply and demand side, there is an information system infrastructure that provides the Open Data on one side, while on the other side services are built on top of this data for final end-users. Within the supply side, four main factors can be identified. Firstly, the technological building block includes data storage systems and standards for interfacing these systems. The other three dimensions are: the type of raw data that is collected and transformed (information building block); the processes and activities that are undertaken to reach the development of linked Open Data (Berners-Lee, 2006); and the actors involved in this work system. Within the demand side of this framework, the data is assumed to be available as linked Open Data. With data openly available to the public, designers can apply different models and/or theories to the data, and create new artefacts (Kuk and Davies 2011). Hence, at this stage Open Data is used to build a service. Ultimately, to make Open Data services sustainable, there need to be customers. Thus, customers of the Open Data Services Work System are users in terms of people or organizations that either pay for the services or finance them through other means (e.g. advertisement). As a conclusion of their study, Lindman *et al.* (2013b) identify a research gap for open data services researchers. This was described as follows: “it is entirely unclear how to build a sustainable open data market and establish actors within it” (Lindman *et al.* 2013b, p.1242). However, we learned through a SLR study (section 2) how the conversation around this topic is rapidly evolving and being enriched by several contributions.

Literature Review and Research Gap

Prior to the research presented in this paper, we conducted a Systematic Literature Review (SLR) adhering to (Okoli and Schabram, 2010)’s 8-steps methodology (Maccani et al. 2015). The purpose of this review was to analyse the progress of academic research in the field of Open Data Services and subsequently identify the opportunities for implementing a research effort. A total of forty-six articles were ordered, searched, and considered for this study. The vast majority of the literature considered for this study emphasises how Open Data adoption is currently low, scattered and anecdotal (Kuk and Davies, 2011; Susha et al. 2015; Hjalmarsson et al. 2014, 2015). With respect to this issue, adoption of open data has been studied across different contexts (e.g. for citizens’ participation, for experimenting integration in existing services, etc.). A number of adoption barriers, benefits and myths were proposed regarding the supply-side of this ecosystem (Janssen *et al.* 2012; Barry and Bannister, 2014). On the other hand, the demand-side of Open Data Services remains substantially underexplored. In particular, we found six papers (and five related studies) that specifically focus on adoption of open data from the point of view of re-users. These are summarized in Table 1 across five dimensions: (1) the research approach (i.e. deductive/inductive, qualitative/quantitative); (2) the phenomenon of interest; (3) the focus of the study; (4) the theoretical lens (or lenses) applied; and (5) a summary of the nature of each paper’s contribution.

Reference	Research Approach	Phenomena of interest	Focus	Theory	Contributions
Susha <i>et al.</i> 2015	Deductive, quantitative	Open data adoption	Entrepreneurs re-using open data for “learning, visibility, and personal interest”	User Innovation Behaviour Theory	Recommendation for open data suppliers
Kaasenbrood <i>et al.</i> 2015	Mixed method approach	Open data adoption	Integration of open data into existing services	Literature review and interviews	Recommendation for policy makers
Zuiderwijk <i>et al.</i> 2015	Deductive, quantitative	Open data adoption	Adoption by students for research purposes	UTAUT Theory (Venkatesh <i>et al.</i> 2003)	Contribution to UTAUT theory and call for inductive studies
Hjalmarsson <i>et al.</i> 2014, 2015	Deductive, quantitative	Barriers for market entry of open data services	Open data innovation contests / competitions	Framework from literature review	Thin descriptions of 24 innovation barriers
Hielkema and Hongisto, 2013	Deductive	Application design and living labs	Open data innovation contests	Porter’s (1990) model	Benefits of living labs in supporting smart cities

Table 1. Overview of key literature

In summary, this SLR study informed the lack of user-perspective which is likely to inhibit innovation (Zuiderwijk *et al.* 2014). Furthermore, commercial use of Open Data is underexplored in the IS literature to-date. Zuiderwijk *et al.*'s (2015) propose an analysis on acceptance and use of open data technologies (for research purposes) leveraging the Unified Theory of Acceptance and Use of Technologies (Venkatesh *et al.* 2003). Zuiderwijk *et al.* conclude their study stating: “a large part of the variance in the use of open data technologies is not yet explained. Adoption theories for open data specifically are needed. There is a need for open data specific theories and methodologies that address the idiosyncratic nature of open data, including aspects such as data quality, institutional complexity, legal and economic aspects (...). We recommend that adoption theories specifically for open data are developed” (Zuiderwijk *et al.* 2015, p.437). Thus, current IS Adoption theories were demonstrated as not viable for investigating Open Data. Therefore, we conclude that there is a clear research gap concerning the investigation of how Open Data is adopted for commercial service innovation in city contexts. Furthermore, the calls strongly made in (Zuiderwijk *et al.* 2014; Zuiderwijk *et al.* 2015; Hjalmarsson *et al.* 2014, 2015) for moving from deductive and quantitative towards more qualitative approaches are reflected in the lack of studies that inductively tackled this field so far. Therefore, the following exploratory research question has been formulated for this study: **What are the factors that influence sustained adoption of Open Data for commercial service development?** The objective is to generate knowledge for stimulating successful use of open data. This is believed to increase the value of open data as a catalyst for service innovation.

Key Research Decisions

The purpose of this research project is to investigate the factors that influence adoption of Open Data for commercial Service Innovation. Our SLR showed that the current IS adoption theories can play a limited role in relation to the recently introduced academic conversation on Open Data Services. Therefore, an interpretivist philosophical underpinning (Orlikowski and Baroudi, 1991) is considered as the most suitable. The results of this research will then be an inductive social construction of reality, in which the knowledge that will be developed assumes a correspondence of meaning of subjects constructing the adoption process of Open Data (i.e. the reality to be studied) (Mitev, 2000). Generally, inductive studies can be conceptualized as a set of steps (Glaser and Strauss, 1967) (Huff, 2008): (1) extensively describe an interesting situation without leveraging existing academic literature; (2) create a first level of categories by coding these descriptions; (3) modify and improve codes as additional data are collected, categorized

and compared; (4) expect theoretic insights to emerge as categories stabilize and their relationships become apparent; and (5) conclude data collection when new categories are not required to account for further observations. Finally, as the adoption of Open Data is analyzed from the meaning given by the people that are involved in constructing such reality, qualitative research methods are appropriate as they are “designed to help researchers understand people and the social and cultural contexts within which they live” (Myers and Avison, 1997).

Case Study as a Suitable Methodology

As a result of a comparative analysis between different methodologies employed in interpretive / constructionist qualitative inductive research, Case Study research was found to be the most suitable for the purposes of this research. Yin (2013) defines the scope of a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin 2013). As a summary the choice of Case Study research methodology was motivated by several factors. In particular, Case Study: (1) is consistent with interpretivist research, inductive reasoning, and qualitative approaches (Eisenhardt, 1989; Walsham, 1995); (2) ensures richness and depth in order to understand the phenomenon of interest (Flyvbjerg, 2006; Anaf *et al.* 2007); (3) enables the exploration of complex situations allowing for the gathering of multiple perspectives, including contextual information (Flyvbjerg, 2006); and (4) is particularly useful when the unit of analysis is a process, which is compatible with the research question of this study (Walsham, 1995).

Role of Theory

The central notion of this research is to use a case study to develop theory inductively. In this way, it is important to reflect upon the use of IS adoption theories and their role along the research process. In order to justify the need of theoretical building process, at the time of formulating the research question, it needs to be proven that existing theory either “does not address the research question at all, or does so in a way that is inadequate or likely to be untrue” (Eisenhardt and Graebner 2007, p.26). This aspect has been highlighted as part of the SLR study previously presented (e.g. (Zuiderwijk *et al.* 2015)). Therefore, reflections on how to structure the term “adoption” in this research prior to the data collection and analysis are provided in this section. IS literature on adoption of innovations is plentiful (Nakicenovic and Grubler, 2013) and several IS studies have focused on identifying factors that influence the adoption of particular innovations. Most of these studies used the models proposed by Ajzen and Fishbein (1980), Davis (1989), and Venkatesh *et al.* (2003). According to these models, a user first has to make a decision on whether to adopt an innovation. To this purpose, information is collected about the innovation and it leads to the formation of perceptions about the innovation. In line with these perceptions, a decision to adopt or reject the innovation is made (Rogers, 2010). In general terms, these authors suggest that some external factors affect the perceptions about an innovation, which in turn impact the decision of adopting (or rejecting) the innovation. This model is generic in nature and is likely to be applicable in most IS innovation adoption processes (Quaddus and Xu, 2005). As a consequence, the term adoption in the definition of the focus for this study is structured as follows: “External Factors” → “Perceptions” → “Adoption”. It is noted that, according to the previous literature (Quaddus and Xu, 2005), the definition of the term “external factors” was deliberately kept general, i.e. those factors that are not (but influence) perceptions, i.e. the cognitive phenomena influencing an adoption process (Venkatesh *et al.* 2003). This simple scheme enabled us to bind the data collection and analysis within the adoption process without limiting both the flexibility of the study and the quality of the findings. Indeed, covering “all the literature before commencing research” is argued to “increase the probability of brutally destroying one’s potentialities as a theorist” (Glaser and Strauss, 1967, p.253). Similarly, Eisenhardt (1989) argues that in the context of inductive case study research, studies should begin “as close as possible to the ideal of no theory under consideration and no hypothesis to test (...) because preordained theoretical perspectives or propositions may bias or limit the findings” (p.536).

The Research Setting

The case study selected for this research (the name of the company is omitted to ensure anonymity) is an Open Data Services business that provides a range of services in the domain of parking. Currently, three

people are working full-time within the organization. The company operates in Europe in two major cities across Ireland and Spain. However, growth is currently pursued by the case through scaling the services across different urban environments. The main feature of the service is meant to help drivers in the city to find the optimal parking location based on both prices and closeness. The service is enabled by a number of datasets taken from the city council and made available as Open Data through a dedicated online portal. These include: (1) parking locations; (2) tariffs; (3) location of meters; (4) revenue data from the meters; (5) multi-storey car park feeds; and (6) traffic volumes. The integration of these datasets into one content management system identifies a structured knowledge created about parking in the city. Both public and private parking spaces are included. The service is delivered to both drivers and parking operators. The revenue model for this Open Data Service is partially based on the provision of mobile and ePayment systems. A transaction fee is charged by the case. Also, secondary data is generated from data analytics processes undertaken upon the data extracted from the usage of the service itself. In other words, the service offers the opportunity to collect and subsequently analyse data about “how drivers behave in the city” – the product manager said. Significant results in terms of new knowledge creation from the discovery of drivers’ patterns in the city pushed the company to enlarge its revenue model. This new knowledge is structured and “sold to the market” (CEO).

Data Collection and Validation

Inductive qualitative case study researchers need to combine multiple data collection methods (Eisenhardt, 1989) and keep the design of the process flexible. Therefore, according to the literature (Walsham, 1995; Yin, 2013), informal meetings (i.e. observation), document analysis and Semi-Structured Interviews (SSI) were the main sources for the data collection. With respect to documents, eleven were used as sources of evidence. Observation was implemented during the time we spent on site. In addition to invaluable informal conversations, other activities included the display of technical task undertaken by the case’s people. These were critical for understanding the complexity of the open data services offered, as well as specific procedures for extracting and managing open datasets. Regarding SSIs, a protocol was designed across six main topics based on the actual information needed: (1) individual perception and understanding of Open Data; (2) the adoption process of Open Data for commercial service innovation; (3) the motivations for adopting Open Data; (4) the factors that influence the sustainable establishment of Open Data in the company’s processes and the relationships between those factors; (5) the barriers to put in place an Open Data-oriented business; and (6) the required resources and skills for implementing Open Data Services. Both the CEO and the product manager (and co-founder of the organization) were found as relevant sources of information. The first round of SSIs lasted for shortly more than two hours (time recorded). After these interactions, some aspects remained unclear. As a consequence, these were highlighted and new questions were shaped accordingly. These were the focus of the second round of interviews. At the end of this process, we were able to structure preliminary findings from the case as the input for the last stages of this case study, i.e. the validation phase. Overall, the case study lasted for three months from the first contact to the last validation interaction. With respect to the latter, Stake (2006) emphasizes its importance in terms of a “process of gaining assurances” (p.33) by critically reviewing what is being interpreted. This validation phase was undertaken twice. Preliminary findings were presented and discussed with the CEO and the product manager. The process followed for both sessions was the same. Three main stages were undertaken: (1) presentation of the overall preliminary findings (factor by factor and variable by variable); (2) review and discussion of retained concepts (i.e. those for which strong evidence was not found); and (3) review of links between factors. This last phase ensured that correct interpretation of the data collected was obtained. A general positive feedback was received from the analysis of the data collected. Given that no specific insights emerged suggesting future data collection, the case study was considered concluded and the findings were established.

Data Analysis

All the qualitative data collected was in a textual form. Interviews were transcribed, documents were collected as texts, and data from observation, informal meetings, and discussions on site, were stored in field notes. We chose manual open coding primarily because of the social constructionist nature of this study. After transcribing the SSIs, summarizing field notes and selecting documents, the steps that were implemented were (Miles and Huberman 1994; Darke et al. 1998; Patton 2002): (1) manually review the transcripts, line by line and sentence by sentence, and all the data collected to uncover key

patterns/themes and produce key words/phrases (indicated as “codes” in this document); (2) produce labels/categories of these key words/phrases; (3) identify high level factors and corresponding variables and formulate tentative assertions about those for which strong evidence is found; (4) look for relationships among the factors; (5) develop raw tables of factors variables and their links for the case study; (6) ensure correct interpretation of the data has been achieved. When extracting codes from the texts, we distinguished concepts referred to External Factors and those related to Perceptions. As a result, 340 codes fell in the External Factors’ category, and 259 were found in relation to Perceptions. Due to the high number of concepts, these needed to be divided into more focused units of analysis. After reading several times these statements, we classified them in 17 different clusters. For each of these clusters, similar codes across different sources were grouped together. When strong evidence (i.e. from at least three sources of information) was found, tentative assertions were formulated about the factors. Related variables and links were explored and defined subsequently.

Findings and Discussion

Findings demonstrate that the case’s adoption of Open Government Data for commercial service innovation is influenced by ten external factors and seven perceptions. Twenty-three links were established between factors. These factors emerged as being described by a total of sixty-three variables. Each factor, variable, and link was systematically extracted, clustered and validated. The resulting adoption model emerged from the case studied is depicted in Figure 1.

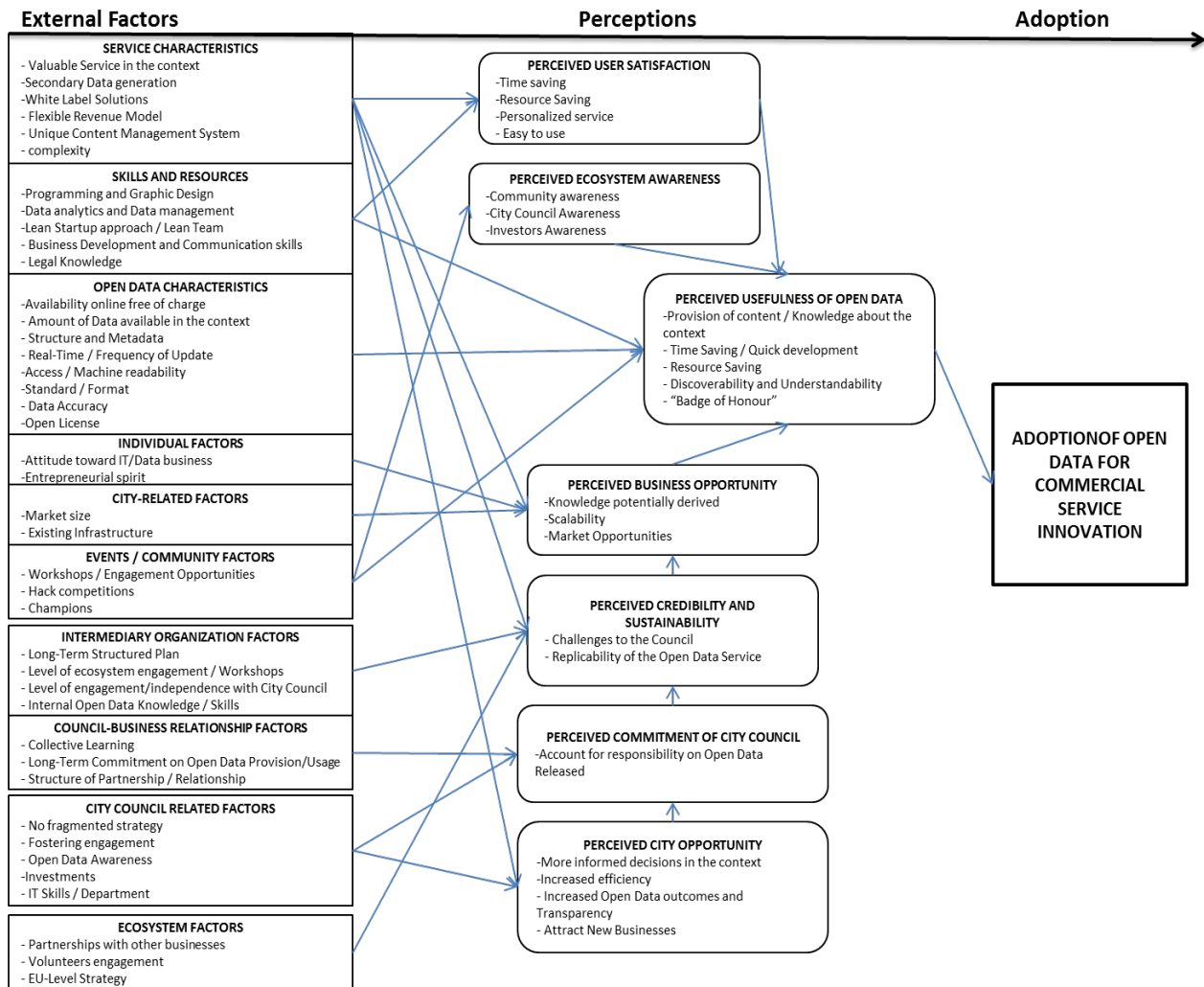


Figure 1. Open Data adoption model

In this section, the findings are discussed in relation to the previous contributions to this debate.

External Factors

First, this research asserts that certain *Open Data Characteristics* need to be in place for this source to be perceived useful for commercial service innovation. Aspects such as the need for Open Data to be: frequently updated; accurate; machine-readable; and provided with metadata; are well acknowledged in the extant literature, e.g. (Lakomaa and Kallberg, 2013; Zuiderwijk *et al.*, 2015; Matheus *et al.*, 2012; Aoyama and Kojima, 2013).

In relation to *Individual Factors*, particularly explanatory is one of the myths related to Open Data outlined in (Janssen *et al.*, 2012): “the dream is that everyone can make use of the data that is available and that anybody can use the data directly” (p.19). Results of this research confirm this statement by asserting that individuals with a positive attitude toward IT and with entrepreneurial spirit are more likely to re-use Open Data.

Together with the characteristics of Open Data, some attributes of city councils were of the most researched in this field to-date (e.g. the need for *Non-Fragmented Strategies* across departments (Cyganiak *et al.*, 2010)). These aspects were further reflected in this research in the need for councils to have an established IT department and a city CIO in place. In the extant literature, Open Data is found to be mainly a data provision movement, and this “one-way communication” is argued to be a barrier for Open Data re-usage (Janssen *et al.*, 2012). In this research the variable *Fostering Engagement* emphasizes the need for council and potential and actual re-users to educate each other about their needs and constraints. Similarly, *Events / Community Factors* and *Ecosystem Factors* stress the importance for initiatives and entities (outside the city council) to be in place. For example, *Hack Competitions* were critical for the case in the adoption process. However, in alignment with the previous research, these competitions are not found to be directly linked with the market entry of the developed solutions (Hjalmarsson *et al.*, 2015).

In relation to *Intermediary Organizations* the literature suggests that these bodies are meant to help the city councils (Stephenson *et al.* 2012) in effectively releasing Open Data. In this research, one of the key aspects for these entities was found to be their level of independence from the city councils (as described by case's CEO, “the importance of being vocal towards the council and their initiatives”). According to the case, this results in a strong stimulus for the council to improve Open Data outcomes and subsequently in an increased credibility of the overall Open Data movement among both re-users and potential investors.

The investigation of what skills are needed to develop a service from Open Data is original in this academic conversation. Lindman *et al.* (2013b) highlight the need for IS researchers to answer the following research question: “what are the skills and knowledge needed in developing high quality Open Data Services?” (p.1245). These emerged as being: *Data Analytics and Management*; *Programming*, as well as *Graphic Design Skills*. Interestingly, people within the case shed light on the importance of developing *Communication Skills*. These emerged to be critical in this research especially for approaching the councils. Indeed, the importance of establishing a relationship with the council where Open Data is actually released was identified for one critical reason, i.e. perceiving commitment from city councils and, subsequently, credibility and sustainability of the Open Data provision. In other words, ensuring the future availability of the data was found to be critical and a main condition to perceive business opportunities. This aspect remains substantially unexplored in the literature. In their studies aiming at identifying inhibitors for Open Data Services to “enter the market” Hjalmarsson *et al.* (2014, 2015) identify a barrier named “hard to interact with data providers”. Findings from this research suggest that establishing “win-win relationships” (CEO) is a cornerstone for the case to sustainably adopt Open Data. In this way, Open Data Services should provide an outcome that is beneficial for the council, in exchange for the sustainable provision of Open Data. The final implication of this outcome is the enabling of more informed decisions regarding the Parking domain within cities, i.e. contributing to Perceived Opportunities from the city. The latter was found as a main condition for businesses to perceive the availability of Open Data as credible and sustainable. Another aspect under this cluster refers to the structure of these relationships. The case indicates that no optimal solution is found yet. In fact, this research suggests that the establishment of contracts between the two parties can be beneficial for the business in question, but results in precluding other businesses to innovate in this field. The term “lock-

in” emerged from the interaction with the case to explain these situations in which the case was discouraged to re-use Open Data in a specific city because of the presence of an existing partner.

Interestingly, according to the CEO, open data intrinsically has a risk, that is: “it is ready”. This is perceived as a risk that the overall company faces in two main directions. Firstly, if no major work is conducted on the original open data, “other businesses might easily replicate the service” (CEO). Secondly, this led investors to “under-estimate the value of our solution” (Co-founder). These reflections suggest that complexity of the service is believed to positively affect the Open Data business’ success.

Perceptions

The only direct link emerged with Adoption refers to *Perceived Usefulness of Open Data*. The case was found to perceive Open Data useful in terms of content provision, time and resource saving. Also, this research suggests that using Open Data is perceived as useful in terms of improving access to the council to subsequently establish long-term relationships. In this way, Open Data is found as a “badge of honor” (Product Manager) that “opens the councils’ doors” (CEO).

As expected, perceptions about business opportunities are also in place. Ferro and Osella (2013) significantly contribute to this discourse when identifying business models for Open Data re-use. Our research suggests that there are several concepts involved in the generation of these perceptions. First, there is a need for the service to match a market opportunity. Second, the service’s potential to derive secondary knowledge from the usage of the service itself has important implications (i.e. establishing relationships with the councils, and enabling additional revenue models). Perceived business opportunities are also related to the perceived ability to scale the Open Data Services to other cities, thus enabling business growth.

Perceived Commitment and *Perceived Credibility and Sustainability* emerged as the cornerstone for the overall process. Perceiving credibility and sustainability of the provision of Open Data enables *Perceived Business Opportunities*; this in turn enables individuals to perceive Open Data as useful for commercial service development. This factor and its (inbound and outbound) links provide an answer to the research questions proposed for IS researchers in (Lindman *et al.*, 2013b): “what are the motivations and incentives needed for the data providers to maintain the data and ensure its continued accuracy?” Results demonstrate that this set of perceptions is augmented if: (1) intermediaries are in place and operate independently from the councils and, together with an EU-related effort, provide “challenges to these initiatives” (CEO), and (2) the level of commitment of the council is perceived as credible and sustainable. In relation to the latter, findings show that city councils-related characteristics influence the creation of these perceptions, but also, and more importantly, the establishment of a relationship with the council is the key driver for enabling these beliefs. In addition, the case’s people emphasized how in order to generate *Perceived Commitment*, cities councils themselves should perceive opportunities. Findings from this research suggest that the following opportunities exist: (1) opportunities from the actual design and delivery of the Open Data Service, and (2) opportunities in terms of augmenting their images and in terms of the perceived ability to enable economic growth. The latter emerged as follows: “if we use open data, they can gain legitimacy about the goodness of their open data program” (CEO). This relates to increasing the perception about the city being “open and transparent” (Zuiderwijk *et al.*, 2014), and to fostering local economic growth (Hielkema and Hongisto, 2012).

Conclusions, Limitations, and Future Works

This research contributes to the IS open data services debate by proposing a model of factors perceived by an open data services business as the most relevant in explaining adoption of open government data for commercial service innovation in cities. The literature acknowledges that value of Open Data is generated by adopting this source and not by merely releasing it (Kaasenbrood *et al.* 2015; Susha *et al.* 2015; Zuiderwijk *et al.* 2015). This research complements the extensive literature to-date which mainly focused on studying socio-technical aspects within the supply-side of this ecosystem. Also, this research responded to the call for inductively and qualitatively investigating this field (Zuiderwijk *et al.* 2014; Zuiderwijk *et al.* 2015; Hjalmarsson *et al.* 2014, 2015). According to Zuiderwijk *et al.* (2015), “there is a need for open data specific theories that address the idiosyncratic nature of open data”, as by leveraging established adoption and diffusion theories deductively “the large part of variance in the use of open data

is not yet explained” (p.9). The choice of inductively tackling theory resulted in the generation of thick descriptions extracted, clustered, defined, and validated for each component of the model. This approach was critical to capture the high complexity of the open data services ecosystem perceived by those re-using this data. The identified factors led the case to overcome many of the barriers identified in (Janssen et al. 2012; Barry and Bannister, 2014). In this way, we believe that findings from this research represent clear recommendations to city councils that pursue economic growth from open government data initiatives.

Nevertheless, we also acknowledge a potential limitation for this study. Despite generalized outcomes from one case study are achievable (Flyvbjerg 2006; Yin 2013; Eisenhardt 1989), this debate is still ongoing. In this research, by assuming an interpretivist philosophical underpinning the process was kept coherent and consistent from its problem definition to the formulation of the final outcome. However, in order to provide a stronger contribution to existing theory, some case study methodologists argue that Multiple Case Study is a more viable option (Stake 2006). Thus, future research will involve more cases with context-related diversities. As a result, additional aspects and stronger assertions are expected to emerge when conducting analysis across cases.

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