Open government data and the private sector: An empirical view on business models and value creation

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ABSTRACT

The release of government data in an open format is broadly expected to generate innovation and economic value. However, despite the emerging public notoriety of this issue, literature is still scarce regarding the commercial application of open government data. The main goal of this study is to understand how firms use open government data to create value. More specifically, we aim to identify what types of use are currently in place and which industries are more prominent in exploiting open government data. Building on the analysis of a dataset of 178 firms that use open government data across various industries in the U.S. we find twelve different atomic models. Additionally, our findings suggest that the way in which open government is used to create value is contingent to the firms' activities. Supported by robust empirical data, we anticipate that our research produces practical insights to entrepreneurs as well as firm managers in deriving value from public datasets, and equip government officials with relevant evidence for advocacy and policy-making.

1. Introduction

The impressive array of new technologies that have been produced in the last few decades have had a profound effect in society. The current ubiquity of Information and Communication Technologies (ICT's) in most countries around the world has generated what has been described as a "knowledge-based society" (David & Foray, 2003). Current mega trends, such as big data, the Internet of Things, or the tremendous progress in areas such as machine learning and data mining are a testament to the current weight of data in every segment of society.

The magnitude of this change in our lives is almost unimaginable, with the current annual Internet traffic passing the zettabyte (10^{21}) threshold (CISCO, 2016). By the same token, in the realm of government, the explosion of digital media and the rise of Web 2.0 technologies have resulted in massive amounts of data being generated, collected, and stored in repositories of government agencies (Harrison, Pardo, & Cook, 2012). If released in an open format (i.e. available at no cost and in a machine-readable format), data has the potential to transform the relationship between governmental agencies and their stakeholders. For example, open government data has been linked to the increase of public accountability (Cerrillo-i-Martínez, 2012; Ponti,

2011) and citizen collaboration (Evans & Campos, 2008; Meng, 2014), as well as the improvement of public services (Kaufman, 2012; Smith & Heath, 2014). Importantly, open government data also has been shown to foster private sector innovation (Stott, 2014). In spite of this, the issue of value creation in the commercial use of open government data remains, largely, an unclear topic (Zuiderwijk, Helbig, Gil-Garcia, & Janssen, 2014). Critics have drawn attention, for example, to the limited empirical data available (Cranefield, Robertson, & Oliver, 2014) as well as to the lack of systematic and structured research (Zuiderwijk & Janssen, 2014). Grounded in a systematic research approach and solid empirical data, we address the issue of value creation in the commercial use of open government data by analyzing the use of open government data by 178 American firms.

Accordingly, the main goal of our research is to shed light on how, in fact, firms create value from open government data use. Additionally, our findings provide both entrepreneurs and managers with a view of how open government data can be used innovatively to build competitive advantages, e.g. by using it to gain market insights and spot business opportunities, to create new products and services, or to improve business processes. In fact, we suggest that open government data can be seen a critical resource in innovation processes, as firms rely increasingly in external knowledge to develop innovative activities and

reduce innovation costs in time, money and other resources (Laursen & Salter, 2006). Finally, our research also provides government officials with empirical evidence regarding the potential of open government data to generate private sector innovation. This seems particularly important considering the overall difficulty among public servants in fully understanding the actual benefits of publishing government data in an open format (Crane, 2013).

This article is structured as follows. We begin by introducing the concept of open government data, and examining the use of the business model concept in the extant literature to study the issue of value creation in the commercial use of open government data. Next, we describe in detail the methodological approach undertaken in order to identify the distinct processes that emerge from the data analyzed in our sample. Upon defining the dimensions of analysis, we present our findings, and discuss how firms use open government data. We support the discussion section with real-world example. We conclude by reviewing the contributions and the practical implications of our study, its limitations, and by providing recommendations for future research.

2. Theoretical background

Today, most governments are engaged in providing information-based online services through which citizens and officials can make better data-informed decisions, as well as interact and collaborate more efficiently (Kassen, 2013). Furthermore, the recent explosion of digital media and the rise of Web 2.0 technologies have augmented the volume of data being generated, collected, and stored in government repositories (Dawes, Pardo, & Cresswell, 2004). Despite the technical and political challenges that this situation entails, this setting presents itself as an unparalleled opportunity to improve democratic governance and accelerate innovation. In this context, Brown, Chui, & Manyika (2011) note that the public sector is a "fertile terrain for change" (p. 5).

In the last few years, following the growing pressure for more government openness from both civil society (Lathrop & Ruma, 2010) and the private sector (Bates, 2012), governments began publishing public data online in open format. Broadly, *open government data* can be described as open data that is "produced or commissioned by government or government controlled entities."[3] Importantly, the role of the government as the main supplier of data in society should not be underestimated. Pollock (2009) notes the following:

"… *compared to many other areas of the economy, the public sector plays an unusually prominent role. In many key areas, a public sector organization may be the only, or one among very few, sources of the particular information it provides (e.g. for geospatial and meteorological information)."* *(p. 2).*

The implications of opening government data in an open format (i.e. available at no cost and in a machine-readable format) are manifold (Davies, 2010; Jetzek, Avital, & Bjorn-Andersen, 2013a, 2013b), as it offers society an opportunity to drive significant social, political and economic change (Jetzek, Avital, & Bjorn-Andersen, 2012). Halonen (2012) notes that open government data "has been hailed as one of the most important public policies of our time, and the potential impacts of sharing such data cooperatively are enormous" (p. 6).

Broadly, the impact of open government data is anticipated to increase public accountability, improved public sector efficiency, and foster innovation (Halonen, 2012; Kulk & Loenen, 2012; Longo, 2011). At the core of this view lies the notion that by making data freely available, governments can fuel the development of services by third parties for the benefit of society (Martin, Foulonneau, Turki, & Ihadjadene, 2013). In this context, due to its unmatched capacity to generate innovation, the private sector emerges as an essential

stakeholder in the open government data ecosystem (Harrison et al., 2012).

Simultaneously, in today's knowledge-economy (Lundvall & Johnson, 1994), businesses themselves "are experiencing a transformation encompassing higher incentives towards the valorization of intangible assets" (Iemma, 2012, p. 3). Despite this, there seems to exist a general gap regarding how data can create value for companies (Hartmann, Zaki, Feldmann, & Neely, 2014). According to Jetzek et al. (2013a, 2013b), the value in the commercial use of open government data is created "through transformational effects, where data are supplied as a service or leveraged in applications in ways that are new and innovative" (p. 7). Furthermore, upon the understanding that what the customer values is a sine qua non condition for firm survival, the anticipation of customer value is a driver of customer satisfaction and loyalty (Flint, Blocker, & Boutin, 2011), reinforcing firms' competitive positioning. Thus, the use of open data to understand market trends and to anticipate customer value may be in itself an important source of competitive advantage.

2.1. The business model concept

The business model is a strategic conceptual tool used widely (Onetti, Zucchella, Jones, & McDougall-Covin, 2012) that seeks to explain both value creation and value capture (Zott, Amit, & Massa, 2010). However, despite its impressive growth in the last few years (Lambert, 2006), there is still much discussion on what the term actually means (Zott et al., 2010). The concept of business model seems to have mainly originated with the rise of the Internet and the subsequent need to better analyze e-business models (Osterwalder, 2004; Steininger, Huntgeburth, & Veit, 2011). Today, "business models may represent a new dimension of innovation that complements traditional ones such as product, process, and organizational innovation, thus broadening the boundaries of innovation-related phenomena" (Massa, Tucci, & Afuah, 2017, p. 74).

Accordingly, the extant literature on the commercial use of open government data has commonly resorted to the business model concept to study the issue of value creation (Ahmadi-Zeleti, Ojo, & Curry, 2014). For example, Gurin (2014) separates the commercial use of open government data in either "Better Business Through Open Data and Open Data Pure Plays". Similarly, Perricos, Branch, and Lewis (2012) suggest five functional business model archetypes in the open data marketplace "suppliers", "aggregators", "developers", and "enrichers". However, both analyses are essentially based on anecdotal evidence. In the case of the academic context, existing literature is also rather scarce and mainly of exploratory nature (Ferro & Osella, 2012, 2013; Foulonneau, Martin, & Turki, 2014). For example, Ferro and Osella (2013) aspire to shed light on "the mechanisms allowing profit-oriented value creation based on public datasets" (p. 1). They draw from interviews with 13 firms that use open government data to identify eight business models archetypes across the dimensions of "strategic vision" and "positioning of the company in the value creation process". However, due to its exploratory study, the research by Ferro and Osella (2013) represents essentially a "promising stepping stone on which to stand for the creation of a new breed of analyses covering the business-side of public data re-use" (p. 5). Other researchers have made use of the business model concept to study the issue of value creation in the commercial use of open government data For example, Kaasenbrood, Zuiderwijk, Janssen, de Jong, and Bharosa (2015) examines the factors influencing the adoption of open government data in six private sector organizations in the Netherlands. Janssen and Zuiderwijk (2014) opted for an interpretive, multiple case study approach to investigate 12 services found in the Dutch national open data repository, while Ahmadi-Zeleti et al. (2014) analyzed the extant literature on open government data business models to derive a typology. Although the research by Kaasenbrood et al. (2015), Janssen and Zuiderwijk (2014), and Ahmadi-Zeleti et al. (2014), have undoubtedly advanced the study of the commercial use of open government data, these studies are limited

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[3] "What is Open Government Data?" by Open Knowledge Foundation http://opengovernmentdata.org/what/ retrieved May 8, 2016.