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Initial findings from the literature**

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Behavioral factors influencing the opening of government data by civil servants: initial findings from the literature

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ABSTRACT

The actual opening of government data is done by civil servants operating within their institutional environment. As such, the institutional environment and their behavior towards the opening of data is key to increase the quality and quantity of open data. However, few studies have analyzed the behavior of government professionals towards open data policy. The objective of this paper is to review the existing literature to find the factors that influences civil servants behaviors towards open data. To identify the drivers and barriers, a literature review was performed listing the most cited papers with “open government data” and “barriers” focusing specific at the behavioral related factors. Even with the increasing of research on the topic of open data, still most of the papers focus on user drivers and barriers rather than on provider challenges. Even less studies focus on the civil servants’ individual level of factors influencing their support to the release of governmental data. Most barriers found in the literature are related to infrastructural or technical issues. Whereas some individual level behavioral barriers could be found, including culture, lack of individual incentives and misunderstanding the impact of opening data, broader discussions on social norms, lack of education and experience are still missing in the literature. This paper contributes to the need for deeper understanding of the behavioral factors that influences the civil servants to support the opening of data.

CCS CONCEPTS

• **Social and professional topics** → **Computing / technology policy** → *Government technology policy*

KEYWORDS

Decision-Making; Open Data Policy; Behavioral Barriers

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1. INTRODUCTION

Governments are opening their data to public access as it can foster participation, increase transparency and improve public services [1, 2]. Research is being developed in order to understand and explore the opportunities deriving from open government data [3, 4, 5]. These studies are related to different aspects of data opening by governments from technical procedures to the challenges making data available to the public [4, 5, 6].

Even with more data being released by governments, still many datasets remain closed [5, 7]. It is a result of constraints named as barriers for open data. Within the open data barriers research, many studies focus on the limitations for data usage. Hence they focus on discussing factors related to data use [7, 8] and aim at developing standards, protocols, policies and knowledge which are needed in order for the available data to be used. They focus more on the user side of the open data cycle [9, 10] where the released data is found, processed and used by others. Hence, the user side refers to the actual use of open data by the public, which could be individuals, firms and governments [11].

Not many papers focus on the civil servants who actually open data as part of their work. Civil servants face often many challenges to open data, such as a lack of infrastructure, no support from top-management or face technical difficulties to make data available to the public [3, 4].

Apart from the availability of the infrastructure and technical limitations, another reason for data not been disclosed originates



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from the reluctance of civil servants to support the disclosure of data. Civil servants act as policy operators who execute the public policies and can support the opening of data. Moreover, the reluctance of civil servants to do so can be related as behavioral barriers for government data to be released. Behavior are ways of action that can be observed, whereas, attitude represents how a person thinks or feels about a certain topic [12]. In our case, the action is the opening data and civil servants' behaviors are observed. Thus, this paper focuses on the behavior influencing factors in the individual level that leads governments not to open their data. And little research has been developed in the topic.

Mostly, when addressing behavioral barriers, papers tend to focus on the institutional or organizational level of individual perceptions' influencing factors [10, 13]. In the case of the user-side studies, it is discussed that a barrier of data release is the lack of pressure on governments to disclose data. In that case, more data would be released if demands for data were increased [14]. Likewise, limitations of people knowing how to find, process and use government data is turned into an important aspect of data not being released by governments.

Aspects on the organizational level can also be derived to behavioral barriers to civil servants willingness to support the opening of data on the providers side. Similarly, it is important to explore the influences produced at the individual level to better understand possibilities to change behaviors [10]. General elements such as legislation, costs or technical complexities also result civil servants' decisions whether to support the disclosure of data or not. Yet there is no work in this field focusing on the behavior barriers of civil servants.

In order to better understand these variables and progress in mapping barriers for governmental data release, a literature review was performed. The focus of the review was on finding the related behavioral barriers that have already being studied in previous research and summarizing them in common categories for further discussions. The final outcome of such effort is a list of factors influencing civil servants support for open data policy-making.

2. METHODOLOGY

A literature review has been performed aiming at identifying the behavioral factors that influences the civil servants to support the opening of data. On 30/11/2018, the first search in Google Scholar was conducted by using the keywords "open government data" and "barriers". As more than three million publications were listed, another search was performed excluding "user" in the title, resulting in 60 publications. The most quoted papers were analyzed in order to list variables that can influence the support of the opening of governmental data by civil servants. The selected papers were defined in order to capture the open data domain.

In addition, a snowballing process was also performed on the references specifically for the barriers to open data related to behavior. The papers were scanned for civil servants (individual) behavior related papers with specific variables of influence. The final papers selection resulted into 8 main papers which are discussed.

These papers presented different perspectives on variables influencing civil servants individual behavior. Through an iteration process (described next), these variables were grouped and categorized into lists. These lists were merged into a matrix aiming at synthetizing common categories between the references. Finally, an emerging group of labels has been found in order to summarize the findings on the influencing variables of civil servants behavior towards open data.

3. LITERATURE REVIEW

The most quoted paper [3] was taken as a starting point. This paper summarizes a list of benefits and barriers related to the adoption of open data policy-making by governments. As the paper deals with challenges related to both users and providers, a first filter was used to select only the topics related to the government side, the one responsible for the provision of governmental data. Within 30 listed benefits, only 8 were directly related to governments' provision and that could result in influencing the behavior of civil servants towards open data.

The same exercise was performed in [3] aiming at the enlisted 57 barriers for open data in general. 22 different issues were related to governments' challenges to release data. A second scan was performed aiming at those that directly or indirectly referred to behavioral barriers (individual level or organizational level influencing the individual one). A list of 11 behavioral issues was defined and used as focus of this research. This first scanning exercise organized an initial approach to the different dimensions that could be used as reference for the further readings. The scanning also resulted in a broader view of the field of barriers to the opening of data as the paper was already a literature synthesis on the benefits and barriers faced by governments and society. Our literature review confirmed that behavior barriers of civil servants were hardly addressed in the literature, although they are mentioned in some of the works.

3.1. General categories of factors influencing civil servants individual behaviors towards open data

The other 7 related papers were then scanned aiming at defining grouping criteria for common behavioral variables of influence on civil servants willingness to release open government data.

The first finding was a list of general topics related to drivers or barriers that could change the willingness of civil servants towards open data. These were general categories to organize the relations between different factors described in the selected papers and their commonalities.

As seen in Table 1, six different categories of factors could be identified in this first scan. At least half of the papers had similar dimensions that could influence government professionals in behavioral terms. Most of them still discussed barriers in the organizational level and our goal was to understand its effects to individual behavior of civil servants [10].

Table 1: Factors influencing civil servants behavior of open data

Ref	Legal	Cultural	Institutional	Technical	Economic	Political
[3]	Legal		Institutional	Task complexity		Use and participation
[8]	Legal	Cultural		Technical		
[15]	Organizational	Culture of secrecy	Institutional			Political
[16]	Legal	Individual	Institutional	Technological	Economic	
[17]	Opaque ownership	Fear of false conclusions	Lack of priority		Financial effects	
[18]		Cultural				Political
[19]	Legislation	Cultural		Semantic	Economic	

3.2. Drivers and benefits to open data

A second scanning was performed trying to regroup the content of these texts in two groups of factors: the ones that could positively influence civil servants behavior in order for them to open more data (to be discussed as drivers and benefits); and a second group of the different behavioral barriers described in the studies, related to those that would negatively impact the willingness of civil servants to disclose data (the behavioral barriers).

The first group (positive variables of influence) was composed basically by individual and organizational factors that unleashed better understanding and willing for open data adoption. In this group, most of the variables showed aspects of contextual forces that could pressure or guide the disclose of data by governmental bodies. Most of them, summarized in Table 2, are connected to aspects of general functioning of public service and how also civil servants work can be improved by the opening of data.

The related drivers set a standard of conditions which are favorable for governments to opt for disclosing data. Even if not directly related to civil servants themselves, they define general conditions that might lead the opening of data to be in the agenda.

Once the government office starts discussing open data, the willingness of civil servants towards its release become more important. Therefore, the literature lists several benefits that might be of their interest.

It is assumed that by being aware of such benefits may lead more civil servants to support the opening of data [3]. The positive outcomes can increase their willingness for supporting it [20].

Table 2: Drivers and Benefits influencing civil servants to support the opening data

Ref	Drivers	Perceived Benefits
[3]	Political leadership to develop guidelines and infrastructure and promote through learning"	Avoid unnecessary duplication of data and associated costs (also by other public institutions)
[8]	Provide policy-makers with data needed to address complex problems	Optimization of administrative processes
[16]	Institutional pressure compelling policies that organizations cannot avoid	Access to external problem-solving capacity
[20]		External quality checks of data (validation)

3.3. Variables of influence on civil servants willingness to open data

The second group (behavioral barriers to support open data) was composed by variables that appeared to influence negatively the willingness of civil servants towards data release. These were factors which seemed to operate in cultural, attitudinal and behavioral aspects of civil servants perception of the topic. In general terms, the long list of negative influencing factors for civil servants' to the agenda adds more complexity to Table 1 where the mapping related common general positive and negative topics between the discussed texts. As shown in Table 3, the variables can be clustered into 4 group of factors by its characteristics and contribute to explore the barriers influencing civil servants support for the opening of data.

The perception of data (Group 1) and Effort Expectancy (Group 2) defines in different perspectives some of the effects that the inaccurate perception of data management policies can result in public servants' behaviors. The first factor (Group 1) summarizes aspects of data production which might not be common sense in public administration, especially within non-IT professionals. As a consequence of these factors, the efforts of making data available (Group 2) tend to be overestimated resulting in less support for the opening of data.

On the other hand, Risk-Aversion (Group 3) and Social Influence (Group 4) merges more of the cultural environment in which the public service operates and describes how it may affect the behavior of civil servants. Both tend to have negative influence in the support of opening data since they also increase more conservative values and perceptions towards the opening of government itself. Whilst assessments to risk (Group 3) have a greater individual sense of data opening, the environment in which the option to open data is made (Group 4) relates to public service culture [19, 21].

4. FINDINGS

The described findings points out to the list of factors influencing the behavior of civil servants towards the opening of governmental data. It defines that the willingness of civil servants to support the opening of data can be influenced by different knowledge and perceptions of data and its impact in their work.

First, civil servants perceptions can be influenced by their familiarity to the topic and the benefits that might derive from the opening of data (Table 2). A professional that expects more positive outcomes to their work (and to society) by making more governmental data available, shall be willing to open more data as well. Thus, the assessment of benefits that might result from data disclosure is key to their willingness to do so. Also, the existence of specific drivers in a particular administration context can create the necessary environment in order for data to be opened. Drivers in the organizational level and benefits in the individual level shall positively influences civil servants support of data opening.

Conversely, the efforts for getting data to be opened and the negative outcomes that might result from it, will decrease the willingness of civil servants for open data policy-making (Table 3). If these professionals perceive that opening governmental is too complicated and complex or if they cannot understand the basic operations needed for data to be available for the public, the idea of data disclosure will be frightening in itself. Besides, the lack of knowledge of the process of data opening and its consequences will probably influence their risk perception on the results of the opening action. In the same direction, the overestimation of risks will also increase their perception of efforts resulting from opening data thought reducing their willingness to do so.

4.1. Drivers and benefits to open data

Risk can be defined as “the exposure to the chance of loss from one’s actions or decisions” [21] (p.110). One of the most used assumptions in public administration theory is that civil servants tend to behave in risk-averse manners. Studies conducted on different fields gets to different conclusions depending on how it is tested or what is it compared to (e.g. private companies). “Among the many assumptions about public management widely embraced but rarely tested is the notion that public sector managers are more averse to risk than managers in the private sector” (opus cit., p.109).

It is also found in the literature that “individuals with a higher degree of risk aversion in their personal lives (i.e. with regard to insuring personal automobiles, use of seat belts, extent of medical coverage, smoking habits and drinking habits) were more likely to seek employment in the public sector” [21] (opus cit., p.111).

The same assumptions appears in the open data literature. Janssen, Charalabidis, and Zuiderwijk [3] finds that Risk-averse culture (no entrepreneurship) and emphasis of barriers and neglecting opportunities (risk averse behavior) are barriers to open data policy development. Hardy and Maurushat [8] describes that public service tends to favor secrecy of information as the default position which is convergent with civil servants fear that mistakes or misconduct on behalf of government employees might be exposed. Pasquier and Villeneuve [15] describes the bureaucratic culture of organizations as hierarchic, introverted and risk-averse by nature. What is coherent with the position of Peled [18] that “powerful bureaucrats who are not technically skilled manipulate the acquisition and application of technical skill within their organizations to ensure that computer technology operates on behalf of a predetermined agenda” (p.5).

Table 3: Barriers (for civil servants) to support Open Data

Ref	Perception of Data in Work (Group 1)	Effort Expectancy (Group 2)	Risk Aversion (Group 3)	Social Influence (group 4)
[3]	Lack of Knowledge to make use of or to make sense of data Unclear value Unclear trade-off between public values (transparency vs. privacy)	Lack of accuracy in information Concerns on quality and accuracy of data	Risk averse culture (no entrepreneurship) Emphasis on barriers and neglect opportunities	Lack of support to make data available Threat of lawsuits Privacy violations
[8]	Limited understanding of benefits	Data processing (de-identifying government data and common metadata standards)	Secrecy of information as default position Generational preference on public service: younger generation expect to be freely available	Security risks Lack of leadership to drive the opening of data
[15]		Public service not prepared for non-administrative communication with the public	Bureaucratic culture: hierarchic, introverted and risk-averse Security-minded environment (especially after 09/2001)	Tradition of not sharing data Ownership of the ones in power
[16]	Lack of Knowledge	Low Perceived Usefulness	Dependent on personal understanding, awareness and assessment of sharing data Lack of Awareness and knowledge Risk-averse leadership Information privacy and security	Individual and organization privacy Business secrets National security
[17]	Unknown data locations	Opaque ownership of data	Fear of false conclusions Financial effects of data release	Lack of priority
[18]			Lack of skills by powerful bureaucrats	Control over information acquisition and dissemination as an asset for bargaining games
[19]			Risk of protests against public actions by misinterpretation of data	

Also Hossain, Dwivedi and Rana [16] reinforces this position by finding a lack of awareness and knowledge of the leaders as well as risk-averse leadership can be a crucial barrier for open data policy-making. It can also result from information privacy and security issues related to data licensing ownership. Conradie and Choenni [17] adds that the false conclusions and unknown financial effects of open data release are also feared in public service. And that is confluent to the fear of potential increased control of citizens and their capacity to protests against public actions, by using data which can be de-contextualized [19].

Another aspect of the issue is that public servants might see red tape and formalism as risk reduction strategies – getting the rules to impede them from certain practices. But another finding of Bozeman and Kingsley [21] (p.117) is that these measures can increase the cost of risk (higher transaction costs) and reduce benefits of favorable outcomes, implicating in an even more risk-averse situation.

In this sense, the more risks are overestimated, the more effort to use and provide open data should be expected by civil servants. As it is assumed that civil servants can overestimate risks (while lacking knowledge of its benefits [22]); the more risk-averse, the greater the expected effort towards open data adoption.

4.2. Identifying influencing variables at the individual level

Janssen, Charalabidis, and Zuiderwijk [3] found that lack of support to make data available, threat of lawsuits or other violations such as privacy or security might lead civil servants to resist to open data policies. Hardy and Maurushat [8] points out that lack of leadership to support drive open data initiatives influences negatively its adoption as Bozeman and Kingsley [21] refines that perception of trust affects risk culture even more than internal control. Hence, on the contrary, it is expected that as civil servants receive more support to make data available, their willingness to open data will be positively influenced by social influence.

Also personal understanding, awareness and knowledge of and incentive to share data, individual and organizational privacy, business secrets, or national security issues are described by Hossain, Dwivedi and Rana [16] to have effect on intentions of data opening. Pasquier and Villeneuve [15] describes that culturally, a historical tradition in public service exists to accumulate knowledge without sharing. The consequence is that governments officials tend consider files and other data as being their own or the institution's property.

This results in a practice of control of information that “has always been the ultimate asset bureaucrats possess in their internal bargaining games” [18]. As a consequence, the less support civil servants have to open data, the more risks they tend to find for doing so which results in expecting more effort too.

All the influencing variables are contributing to the environment in which the option for disclosing governmental data happens. The public office is a professional space defined with two main characteristics that differs from many private spaces: legal framework and hierarchy [23]. By definition, civil servants

are only allowed to do in their job what the law states that they should do leaving little room for innovation and personal decisions. Thus, if making data available is not clearly defined in the legal framework, some civil servants might increase their reluctance for publishing public data. As open data policy-making progresses around the globe, more governments are having their laws adapted to allow (or even determine) that public data needs to be opened. In such context, the lack of knowledge of the existing laws or even the unawareness of the practice will reduce the willingness of civil servants for the opening of data [16].

As a consequence of this rule-constrained environment, hierarchy tends to prevail on the decision-making processes. In one hand, having a more open-oriented administration can positively increase open data policy-making and also civil servants' perception of such practice. On the other hand, a more opaque administration will also influence negatively the willingness of civil servants to get data to be published. Independently of the directions to which the actual ruling body has, hierarchy is also important when checking civil servants' willingness for opening data.

5. CONCLUSIONS

This paper aims at identifying the factors influencing the behavior of civil servants, professionals from governments which are the data providers, towards the opening of data. This mapping is important in order to understand and influence such factors, increase the data released by governments and achieve the benefits of open data.

The literature was analyzed from the perspective of the factors influencing government data disclosure. Specifically, we focused on civil servants perceptions of data opening as the literature related them as behavioral barriers to getting governments to open data. A list of influencing factors was summarized in four grouping variable:

- 1) Perception of Data in Work: the different perspectives civil servants can have of data production and management in their daily activities;
- 2) Effort Expectancy: group of related challenges civil servants perceive in order to make data available, including technical and political difficulties;
- 3) Risk Aversion: the resulting group of different perspectives of risks related to work in government, from data ownership to misuse of released data; and
- 4) Social Influence: summarizing influences of the legal framework and hierarchy which are characteristics of public service.

Each of the described groups contains a set of variables that influences civil servants behavior on that particular topic. In example, the lack of knowledge or risk-averse environment have different influences on how civil servants behave towards the opening of data. As the main focus of this paper was exploring these influences on the individual level, each of the defined groups

also implicates in different perceptions of consequences for data opening.

An important remark is that more broadly than the individual effects of the described variables on civil servants behaviors are the institutional barriers. It implicates that not only individual perceptions but also the context in which data is operated matters when fostering the release of data by governments.

However, the results from the performed review shows that individual behavior is given less attention in the open government data literature. Most of the barriers related in the literature describes infrastructural or technical issues, usually connected to the government environment as a whole. Examples of broader discussions on social norms, lack of education and experience were not found in the literature. This reinforces the need for a deeper understanding of the behavioral factors that influences the civil servants to support the opening of data. Furthermore, as behavior is shaped by the institutional aspects, in our case it can be characterized by a risk averse culture.

A gap in the literature related to factors that influences civil servants' behavior towards supporting the opening of governmental data is confirmed. It shows that the behavior influencing factors can be analyzed and used to improve actions oriented to increase the release of data governments.

6. LIMITATIONS AND FURTHER WORK

This paper results from analyzing the open government data literature related to the influencing factors of civil servants intentions to support the opening of data. It is based in a first outcome of a Google Scholar search performed in November of 2018 and it analyzes only the 8 most cited papers by that time. Another way to analyze this would be by looking at Institutional Economics or behavior literature. We recommend to confront our findings with this literature.

Still initial, the findings enabled the building a list of influencing factors which suggest this as a promising topic for further research. The existing gap in the literature may unleash new research to increase the release of more governmental data supported by civil servants. Expanding the revised papers list and including new variables (or adjusting the ones previously found) may enable the design of models to explore the behavioral dimensions of open data related to civil servants perceptions of the topic. Moreover, concepts such as bureaucratic capture may allow improvements in the defined factors of the present paper.

As found, there is a gap in the literature related to behavioral studies in governments particularly in the field of open government. Progressing with such research can contribute to fulfilling this gap and advancing on the exploration of limits and opportunities for governmental data to be available to the public

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