

Open Government Data Concept Over Time: Approaches and Dimensions

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Resumo

Research in the Open Government Data (OGD) area has grown substantially in recent years, producing several different conceptual approaches and dimensions. Considering that, it is important to understand the concept over time as a way to better conceive researches based on the contemporary approaches. Therefore, the present study aims to review and categorize existing research on OGD, identifying which approaches are being adopted, which are the research strategies used, how the concept evolves and which are the most referenced articles. Thus, this study reviewed and categorized existing researches on OGD. A systematic review of literature was performed, covering 186 publications presented in the main databases. Papers were analysed through content analysis, more specifically through the steps of reduction, display, conclusion and double verification in isolation. The researches were classified into seven dimensions and under ten different themes. Moreover, countries now considered fully mature in relation to the open data initiatives have addressed issues relating to policy in articles from previous years, when they were still implementing their initiatives. Concurrently with the development of global initiatives in OGD, new scientific papers tend to direct their focus on issues such as added value and corruption. Through the results of this research it is possible to identify widely discussed approaches and those that can be further explored as well as the development of the OGD concept and its dimensions, which can form the basis for future research.

Open Government Data Concept Over Time: Approaches and Dimensions

Abstract

Research in the Open Government Data (OGD) area has grown substantially in recent years, producing several different conceptual approaches and dimensions. Considering that, it is important to understand the concept over time as a way to better conceive researches based on the contemporary approaches. Therefore, the present study aims to review and categorize existing research on OGD, identifying which approaches are being adopted, which are the research strategies used, how the concept evolves and which are the most referenced articles. Thus, this study reviewed and categorized existing researches on OGD. A systematic review of literature was performed, covering 186 publications presented in the main databases. Papers were analysed through content analysis, more specifically through the steps of reduction, display, conclusion and double verification in isolation. The researches were classified into seven dimensions and under ten different themes. Moreover, countries now considered fully mature in relation to the open data initiatives have addressed issues relating to policy in articles from previous years, when they were still implementing their initiatives. Concurrently with the development of global initiatives in OGD, new scientific papers tend to direct their focus on issues such as added value and corruption. Through the results of this research it is possible to identify widely discussed approaches and those that can be further explored as well as the development of the OGD concept and its dimensions, which can form the basis for future research.

Keywords: Open Data, Open Government Data, Open Data approaches, Open Data dimensions.

1 Introduction

In recent years, many Open Government Data (OGD) initiatives have emerged throughout the world, with transparency and the reuse of data as their two main objectives (Attard et al., 2015). These initiatives have made a significant amount of public sector information available, free for use and redistribution without restrictions (O'Riain et al, 2012.), with the objective of improving public accountability, citizen participation, and cross-sector collaborative partnerships (Linders, 2013).

Open Data is data that can be freely used, reused and redistributed by anyone (Attard et al., 2015). Open Data from the public sector, or Open Government Data (OGD), provides useful information for citizens and businesses in their dealings with the public sector (Galiotou and Fragkou, 2013). OGD is the free openly available data coming from public organizations and it can be used for public projects or integrated into new products, applications or services, such as navigation systems, weather forecasting, or financial and insurance services (Ubaldi, 2013). Therefore, OGD is an important component in supporting data innovation, an approach in which companies analyze data to obtain information about their area of activity, their stakeholders and competitors, or in the development of new service opportunities (O'Riain et al. 2012), and an important tool in the fight against corruption, allowing greater transparency in government activities, budgets and expenditures, becoming an important element in various accountability interventions (Attard et al., 2015).

For Harrison et al. (2012), Open Government Data can help to promote collaboration between public bodies and departments, based on the evaluation of available information purpose, collaboration and public information exchange, restructuring optimizations and internal procedures simplification, with possible later processes automation, elimination of redundant expenses and reduction of internal transactional costs. Subsequent benefits include a reduction in workload, bureaucracy and transaction costs. The services offered by the government are also improved, people can more easily find data and thus can claim the benefits they are enti-

tled to, on the other hand the public sector can adjust their services to the citizen's needs and experience the reciprocal benefits (Ubaldi, 2013).

OGD contributes to social control, strengthening of democracy, active citizenship, improvements in public administration, innovation, cooperation and transparency (Harrison et al., 2012). However, the data must be in an open format, accessible, machine-readable and the information should be produced by all and for all (Harrison et al., 2012).

According to Harrison et al. (2012) the relationships between information, transparency and democracy are fundamental and basic. Information is essential for the development of basic democratic skills, such as the formulation of preferences and opinions, the conjuncture of hypotheses and the participation in decision-making. Without these skills, the citizen voice and exercise of their rights is denied. In short, transparency increases the exposure of government operations to a detailed examination of the various components of the political system (Stamati, 2015), increasing the chances of the detection of corruption (Andersen, 2009). Research in the area of Open Government Data (OGD) has grown substantially in recent years, producing several different conceptual approaches and dimensions, producing efforts in the recurrence of approaches that could be directed to the evolution of this area of research. , this study aims to review and categorize the existing research on open data, identifying the dimensions and approaches outlined in the research conducted to date. Through the results of this research it is possible to identify widely discussed approaches and those that can be further explored as well as the development of the OGD concept and its dimensions, which can form the basis for future research.

Therefore, the present study aims to review and categorize existing research on OGD, identifying which approaches are being adopted, which are the research strategies used, how the concept evolves and which are the most referenced articles.

The remainder of the present study is organized as recommended by Cooper et al. (2009) for a systematic review of the literature, as follows: In the second section the research method is presented, describing the systematic review of the literature, including: a) how the databases were researched; B) years of research; C) search terms; E) inclusion and exclusion criteria, with theoretical and empirical foundation; D) systematic measures taken to minimize bias and errors in the study selection process; E) description of the phases of identification, screening, eligibility and inclusion, with the number of studies included and excluded at each stage and the reasons. In the third section the results analysis is presented, in which the characteristics of the covered studies are described, encompassing critical and systematic evaluation. Finally, section 4 describes the final considerations with the results and conclusions of the review, in the context of previous theory, evidence and practice, linking conclusions in an explicit and intuitive way to the revised evidence.

2 Research Method

To achieve the established objectives, a systematic review of the literature was carried out. Systematic reviews aim to address problems of identification, critical assessment and integration of the findings of all relevant and high quality individual studies addressing one or more research questions. A systematic review can achieve most or all of the following objectives (Baumeister and Leary, 1997; Bem, 1995): a) to establish to what extent the existing research has progressed to clarify a particular problem; B) identify relationships, contradictions, gaps and inconsistencies in the literature, exploring reasons, proposing a new conceptualization or theory that explains the inconsistency; C) formulate general statements or a comprehensive conceptualization; D) comment, evaluate, expand or develop the theory; E) provide implications for practice and policy, and f) describe guidelines for future research.

According to guidelines of Cooper et al. (2009), the analysis of the articles was composed of seven phases. In the first phase we consulted the databases *SCOPUS*, *WBOFSCIENCE* and *SCIENCEDIRECT*. Table 1 contains the terms, databases, criteria and

the quantity of articles found. This first phase resulted in a selection of 574 articles. All research phases was held between September and November 2016

Search term: "OPEN GOVERNMENT DATA"		
Databases Researched	Search criteria	Number of studies
SCOPUS	In: Article Title, Abstract, Keyword; Document type: Article; Subject Area: all sciences; All years.	77
SCIENCE DIRECT	In: Abstract, Title, Keyword; Refine: Journal; All Sciences; All years; Except: Article status "Corrected Proof".	28
WEB OF SCIENCE	Topic: "Open Government Data" OR Title: "Open Government Data"; Document type: Article; All years.	48
Search term: "OPEN DATA" AND GOVERNMENT		
Databases Researched	Search criteria	Number of studies
SCOPUS	In: Article Title, Abstract and Keyword; Document type: Article; Subject Area: all sciences; All years.	234
SCIENCE DIRECT	In: Abstract, Title, Keyword; Refine: Journal; All Sciences; All years; Except: Article status "Corrected Proof".	47
WEB OF SCIENCE	Topic: "Open Data" and Government Or Title: "Open Data" and Government; Document Type: Article; All years.	140

Table 1 - Search terms and databases used.

In the second phase, a crosscheck of the articles was performed to identify and remove duplicates. In this phase the articles originating from events and conferences were also removed, leaving 310 articles. In the third phase the articles were verified, based on article content, to confirm that they actually addressed the concept of OGD, or the use of OGD. Articles that did not meet these criteria were removed from the selection. Regarding the language, only articles in English were kept. As a result of this phase, 186 articles remained in the selection, which are the basis of this research.

The 186 articles were analysed in the fourth phase, searching for definitions of Open Government Data or Open Data in Government. In this phase we used the software tool MAXQDA 12 to search using the terms Open Data and Open Government Data. Excerpts of four lines were generated that were coded and analysed in pairs. In the fifth phase the common terms within each definition of Open Data and Open Government Data were analysed, through content analysis, following the steps of reduction, display, conclusion and double verification in isolation (double blind) (Gibbs, 2008), producing a classification of the articles in seven categories. The categories were: transparency, participation, innovation, reuse, accountability, collaboration and added value.

In the sixth phase, the terms covered in the articles were identified using the Word Frequency functionality of NVIVO 11. The most frequent words were validated through the comparison with the results of the research by Hossain et al. (2016) and Attard et al. (2015). For each item addressed an axial category was assigned (Gibbs, 2008) with various terms of similar meaning for the search in the next stage.

In the seventh phase searches were conducted in the articles, through the MAXQDA 12 software search tool, using the keywords of each axial category of focus. Through excerpts

obtained by MAXQDA the articles were reanalysed and the respective categories of items covered by the article were designated to them.

3 Analyses and Results

As illustrated in Figure 1, there were no studies previous to 2010, although a year a limit was not established in the search criteria described in Table 1. However, the results increase significantly in subsequent years. This demonstrates the scientific interest in the theme, which grows concomitantly with the number of initiatives of open data in the world.

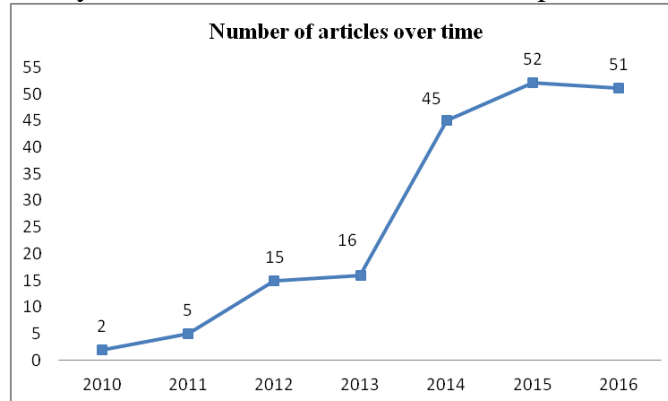


Figure 1 – Publications by year

Table 2 identifies the journals with more than two published articles. The journal Government Information Quarterly stands out from the others, contributing with 29 articles, equivalent to 16% of publications.

Main Journals	Number of studies
Government Information Quarterly	29
Information Polity	10
Social Science Computer Review	7
Journal of Theoretical and Applied Electronic Commerce Research	6
IEEE Intelligent Systems	5
Transforming Government: People, Process and Policy	5
Procedia Computer Science	4
Policy and Internet	4
Procedia - Social and Behavioral Sciences	4
Semantic Web	4
Journal of Organizational Computing and Electronic Commerce	4
Records Management Journal	3
Review of Policy Research	2
Scientific Papers of the University of Pardubice	2
Hitachi Review	2
Journal of the Knowledge Economy	2
Journal of the American Society for Information Science and Technology	2
IEEE Internet Computing	2
Computers in Industry	2
Australian Economic Review	2
Journal of Web Semantics	2
Journal of E-Learning and Knowledge Society	2
Statistical Journal of the IAOS	2

Table 2 - Number of Studies for Main Journals

Figure 2 presents the evaluation of twelve authors with three or more published articles, according to the selection criteria of this study.

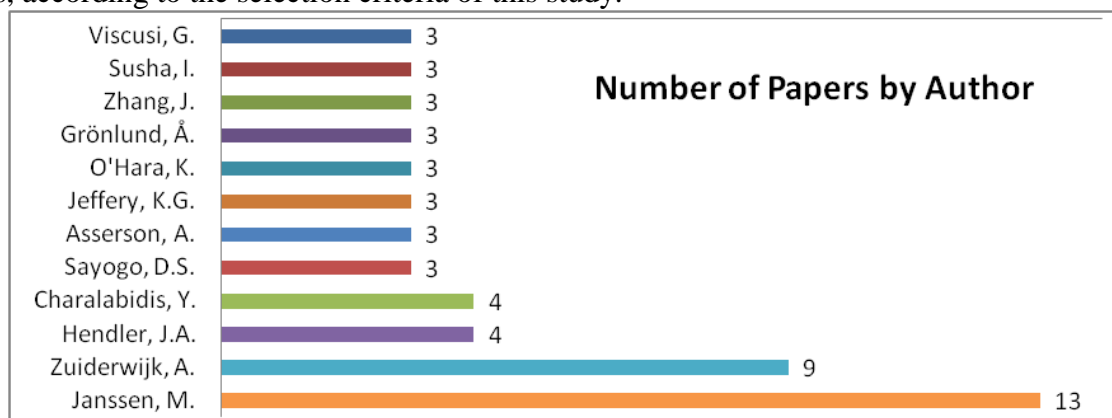


Figure 2 – Number of Papers by Author

Table 3 shows the twenty most cited articles, along with their respective number of citations, as indicated by the databases used in this research.

Title Studies	No. of Citations
Benefits, Adoption Barriers and Myths of Open Data and Open Government (Janssen et al., 2012).	153
An Open Government Maturity Model for social media-based public engagement (Lee and Kwak, 2012).	111
Open data policies, their implementation and impact: A framework for comparison (Zuiderwijk and Janssen, 2014).	73
The influence of the PSI directive on Open Government Data: An overview of recent developments (Janssen, 2011).	71
Linked Open Government Data: Lessons from data.gov.uk (Shadbolt et al., 2012).	65
TWC LOGD: A portal for linked Open Government Data ecosystems (Ding et al., 2011).	49
A Smart City Initiative: The Case of Barcelona (Bakici et al., 2013).	39
A classification scheme for Open Government Data: Towards linking decentralized data (Kalampokis et al., 2011)	36
XBRL and Open Data for global financial ecosystems: A linked data approach (O'Riain et al., 2012).	34
A promising phenomenon of Open Data: A case study of the Chicago open data project (Kassen, 2013).	33
Benchmarking Open Government: An open data perspective (Veljković et al., 2014).	28
Towards a global participatory platform: Democratising open data, complexity science and collective intelligence (Buckingham Shum, 2012).	27
On the barriers for local government releasing open data (Conradie and Choenni, 2014).	26
Accidental, open and everywhere: Emerging data sources for the understanding of cities (Arribas-Bel, 2014).	26
US government linked open data: Semantic.data.gov (Hendler et al., 2012).	26
Infomediary Business Models for Connecting Open Data Providers and Users (Janssen and Zuiderwijk, 2014).	21
Linked data in government (Shadbolt and O'Hara, 2013).	20
Industrial ecology 2.0 (Davis et al., 2010).	20

Exploring the determinants of scientific data sharing: Understanding the motivation to publish research data (Sayogo and Pardo, 2013).	19
Big data, Open Government and e-government: Issues, policies and recommendations (Bertot et al., 2014).	19

Table 3 – 20 Most Popular Studies

Table 4 presents the most clearly definitions of OGD, among the 186 articles, in a chronological order, and highlights some of the terms used in these definitions. These terms originated the dimensions categories. Notably, the authors point out that the governments, motivated by the need for transparency, make data available, from which added value is expected, through the re-use of the data in services created by companies and citizens, generating innovation for society.

Indispensable in the development of public policies and the provision of services, valuable to citizens, organizations and public companies, decision-making and in the creation of innovative products and services (Janssen, 2011).
The last years have seen the emergence of a "Data Web", fuelled by initiatives of Open Government transparency , which has made a significant amount of public sector information freely available for use and redistribution without restrictions (O'Riain et al. 2012). Open government data is an important component in supporting data innovation , an approach in which companies analyze data to obtain information in respect to their area of activity, stakeholders and competitors, or on the development of new service opportunities (O'Riain et al., 2012).
Public sector open data connects useful information for citizens and businesses in their dealings with the public sector (Galiotou and Fragkou, 2013).
Open Government data initiatives are based on transparency, participation and collaboration for the strengthening of democracy. Through these three pillars, the publication of government data sets not only has the potential to improve accountability and curb corruption, but to also to affect everyone involved in various ways (Attard et al., 2015).
Transparency improves public accountability, citizen participation, and collaborative cross-sector partnerships (Linders, 2013).
The formulation of evidence-based policies, strategic planning, performance monitoring and results-based management requires extensive knowledge on the current conditions of a country and the impact of the projects and demands huge amounts of data from a wide variety of sources on every topic. Open data platforms can help make public these essential components of knowledge. The powerful advantage of an open data approach is that it also makes the data findable, reusable, accessible, interoperable and machine-readable; improving dramatically the efficiency of analyses and insights (Linders, 2013).
When opening their data government agencies have the potential to promote transparency , increase citizen participation and stimulate innovation . In addition, the open data initiatives can help citizens learn about government activities improve government accountability and allow citizens to participate in the political process. Open data initiatives can also provide the data that independent parties need to assess the quality of the policy targets in government decision-making (Whitmore, 2014).
It refers to data produced or commissioned by government or government-controlled entities, which can be used freely, reused and redistributed by anyone. The nucleus of the OGD movement establishes the proactive disclosure of raw unstructured data, aiming firstly at innovation and economic growth by exploiting the provided data for the production of new value-added products, and secondly at the provision of accountability and transparency through access to data that has political value (Yannoukakou and Araka, 2014).

<p>They provide useful information to citizens and companies for their transactions with the public sector, available to anyone to analyze and reuse, it is organized and published chaotically and its exploitation in its current state remains a difficult task. This will be simplified only if the public sector data is transformed into connected Open Data, in order to meet the minimum requirements for the interconnection and reuse of the data. The term connected data refers to data published on the web in a form that is machine readable and linked to other sets of external data and can in turn be connected to from external data sets (Fragkou et al., 2014).</p>
<p>Data of public interest that is available without any restrictions and that can be easily found and accessed. This may include transport data, spatial data, meteorological information, reports, images and other information of public interest (Veljković et al., 2014).</p>
<p>It is available for reasons of transparency and to promote a market of added value services. Starting with the desire of governments to appear more transparent, it has become a trend in Western countries. In fact, the principal motivation is that by making available the data sets collected by government departments, with taxpayer funding, commercial companies will be encouraged to provide commercial services using this open data and add value to the end user (Jeffery et al., 2014).</p>
<p>Available data sets collected by government departments with funding from the taxpayer. From which private companies are encouraged to provide commercial services that use this open data, adding value to the end user (Jeffery and Asserson, 2014).</p>
<p>Free to use, reuse and redistribute, sharing the same license. In this context, the movement <i>Open Government Data</i> makes a great effort to spread this vision in public bodies around the world, with the objective of making information available to the public and of the creation of economies of scale due to data reuse and the creation, with the data, of more valued and enriched services (Alvarez-Rodríguez et al., 2014).</p>
<p>It is the information policy that provides a particular structure in which the data sets that are produced by public institutions are destined for use by third parties. The "non-personal" data produced by public bodies should be open for all to be reused, free of charge and without discrimination (Bates, 2014).</p>
<p>To meet one of the main objectives of Open Government: to promote transparency through the publication of government data and, thus, allow accountability of public officials and the reuse of the data disclosed with social or economic value (Lourenço, 2015).</p>
<p>In recent years, a series of open data movements have emerged around the world, with transparency and reuse of data as two of the principal objectives. The Open Government Data Portals, resulting from such movements, provide a means for citizens and stakeholders to obtain government information on the locality or country in question (Attard et al., 2015).</p>

Table 4 - Sample definitions of the concept of Open Government Data

Table 4 highlights dimensions of OGD, which were identified through content analysis, during the fifth phase of analysis of articles. The terms “reuse” and “add value” have arisen more emphatically in more recent definitions about OGD, still the term “transparency” is almost a constant among definitions.

3.1 Open Government Data Dimensions

The dimensions can be analysed by the goal or benefit biases of OGD, at any rate they are interconnected and encompassed by diverse approaches, for example, transparency can be considered one of the benefits of OGD, as described in Table 4.

The identified dimensions are shown in Figure 3 along with the number of articles that addressed them. Each analysed article can be counted in more than one dimension, depending

on its content. The list of 20 most popular articles that discuss each dimension is contained in Appendix A.

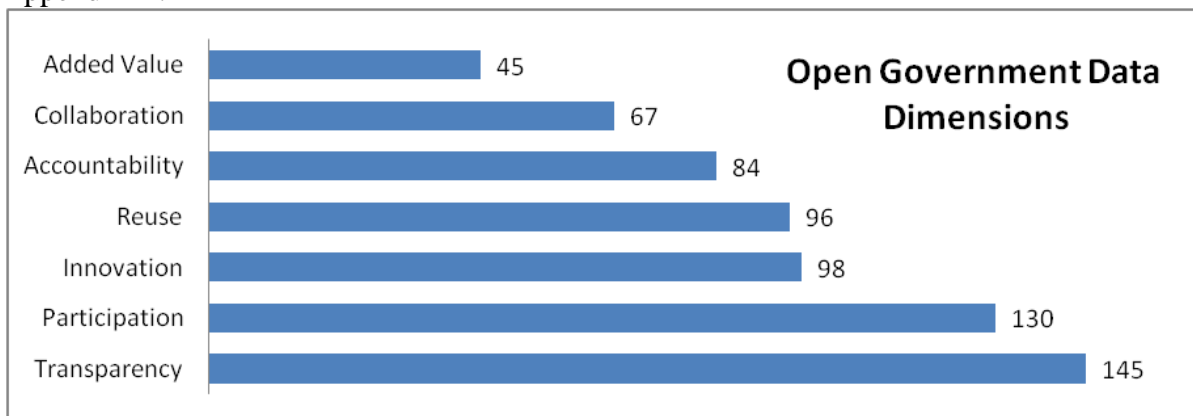


Figure 3 – Dimensions and Number of Studies

Transparency is considered the precursor of accountability (Garcia and Soriano Maldonado, 2012; Al-Jamal and Abu-Shanab, 2016) and is closely connected to a reduction in levels of corruption, through the accountability of public officials (Murillo, 2015), but the relationship between them is not complete (Worthy, 2015). However, the lack of data quality is a risk to transparency (Koussouris et al., 2015), as well as the lack of policies that ensure the continued availability of updated data (Nugroho et al., 2015; Solar et al., 2014; Leontieva et al., 2015). The research of Meijer (2015) stands out in the transparency approach, by addressing its various levels. The Dawes (2010) research is another article that deals with important properties of transparency, such as stewardship and usefulness.

According to Barry and Bannister (2014), in the UK the full objective of accountability through transparency was not reached, due to the lack of citizen participation, caused by lack of understanding and trust in the data. However, the participation is linked primarily to adequate disclosure, through advertising or public notice, thus the citizens are aware of the availability of open data and how this data can be used (Khayyat and Bannister, 2015); consecutively, that depends on the data quality (Al-Jamal and Abu-Shanab, 2016; Sáez Martín et al., 2016; Wang and Lo, 2016), on the trust in government and on the understanding of the available data (Wirtz et al., 2016; Al-Jamal and Abu-Shanab, 2016). In this sense, the research of Al-Jamal and Abu-Shanab (2016) indicated that the information quality is a determinant in government data use intention.

Paradoxically, the improvement of quality can be achieved by increased participation and inherent feedback on the publications (Attard et al. 2015); additionally it can be obtained by adding services and applications that depend on the data and consequently generate pressures for higher quality (Zeleti et al., 2016). Another form of qualification that was identified is the co-creation of data sets, with the participation of governmental publishers and future users of the data (Zeleti et al., 2016).

Regarding innovation, according to Yannoukakou and Araka (2014), OGD aims primarily at innovation and economic growth, exploring the data to produce new products with added value. According to Yang and Wu (2016), OGD can be thought of as an innovation to help government agencies achieve the principles of Open Government, including transparency, participation and collaboration. According to Lakomaa and Kallberg (2013), Open Data is essential for innovation in applications and information services, influencing the innovative process in many ways. Conversely, the absence of the Open Data retards the innovative process and, in these circumstances, impedes the beginning of business innovation (Lakomaa and Kallberg, 2013).

According to the research of Gonzalez-Zapata and Heeks (2015), OGD is an innovation from the technological perspective, with changes performed by technical professionals in ICT and the involvement and availability of new design formats, processes and data standards. OGD directly supports data innovation in which raw government data is analysed by companies and used to better inform stakeholders about their business situations or the development of new service opportunities (O'Riain et al. 2012), highlighting the importance of promoting public innovation, and stimulating the creative use of the data with awards and recognition (Khayyat and Bannister, 2015).

For Hellberg and Hedström (2015), many of the policies, that until now addressed the public data reuse, consider OGD as an engine for innovation. New technologies have emerged from the web, making data exchange and data reuse a reality (Curtin, 2010). The main task of governments and authorities involved is not only to open their public data, but also to encourage users to reuse it. The idea is not to provide new or improved services to citizens, but to put at their disposal tools to evaluate the work of the government and also to produce services to substitute or complement those offered by public sector bodies (Maramieri, 2014). Through government portals, the reuse of information held by government agencies, encourages the generation of qualified services, reduces workload and redundant procedures, and ensures unrestricted access for citizens (Yannoukakou and Araka, 2014).

Veljković et al. (2014) point out that collaboration is aimed at more responsive decision-making based on collaborative work and feedback information, and identifies different types of government collaboration: G2G (government to government), G2B (government to business) and G2C (government to citizens). The publication of OGD can stimulate the cooperation of various stakeholders, facilitating its use (Zuiderwijk et al. 2014). Sieber and Johnson (2015) argue that a participatory model presents open data as a formalized channel between citizen and government, where the contributions of citizens are integrated into decision-making, with the government focused on meeting data demands, as well as future data. In the Open Government Maturity Model (OGMM), suggested by Lee and Kwak (2012), government agencies reach Collaboration maturity (corresponding to the fourth level), when promoting collaboration between government agencies, the public and the private sector, and when public involvement in tasks or complex projects aims to generate specific results. Zuiderwijk and Janssen (2014) point out possible reasons for the lack of collaboration in organizations: the operability at different government levels, which are assigned different responsibilities and have different data types; differences between organizations regarding mission types; motivations behind the development of policies and policy objectives.

In terms of added value, Zeleti et al. (2016) address the business model and modes of exploring the rising value of open data. Al-Debei and Avison (2010) derived a unified business model based on a comprehensive literature review. They argue that the model provides an abstract, but holistic vision, and that the fundamental dimensions are based on value. There are four relevant structural aspects of the business model: a) Value proposition - the business logic to create value for customers by offering products and services to specific segments; b) Value architecture - an architecture for technological and organizational infrastructure used in the provision of goods and services; c) Value network - collaboration and coordination with other organizations; and d) Value financing - costing, pricing and revenue sharing associated with sustaining and enhancing value creation. The value to be added can be economic, social, governmental or political (Gonzalez-Zapata and Heeks, 2015). The governmental value can also be a technological innovation within government data systems; the public or social value can be improvements in public services through greater efficiency and effectiveness of data management. The governance value can be greater transparency, accountability, participation and empowerment; the economic value can be through new products, services, revenues, profits and jobs.

In this regard, the article of Janssen and Zuiderwijk (2014) compares different modes of use of open data. They identified six types of business model: single-use applications, interactive applications, aggregators of information, comparison of models, open data repositories and service platforms. The cases investigated differ in their levels of access to raw data and in how they stimulate dialogue between the different actors involved in the publication and use of open data. The distinction between different types of open data users was considered critical in explaining the different business models.

All the dimensions quoted are addressed in the articles by different approaches, which produce new perspectives. To illustrate these perspectives ten principal usually addressed items were identified, which are listed below.

3.2 Open Government Data Approaches

After establishing the dimensions covered by each article, we reanalysed the articles and designated to them the respective categories of other items mentioned by them. Following the previously described methodology, 10 categories were defined. The files were grouped, in the Policy category, by the terms that addressed *policy* and *politics*, in the Benefit category by the terms *benefit*, *contribution* and *advantage*, and for Risk we used the terms *risk*, *jeopardize*, *hazard* and *danger*. For Barrier we used *barrier*, *obstacle*, *hurdle*, *impediment* and *restriction*, in Motivation we used *incentive*, *motivation* and *stimulus*. In the other categories the name of the category was used as a search term. All the extracts that addressed each term were reviewed by two researchers (double blind). As a result Figure 4 was generated showing the categories of items covered and the quantity of articles mentioning them. The list of 20 most popular articles that refers the terms is shown in the Appendix A.

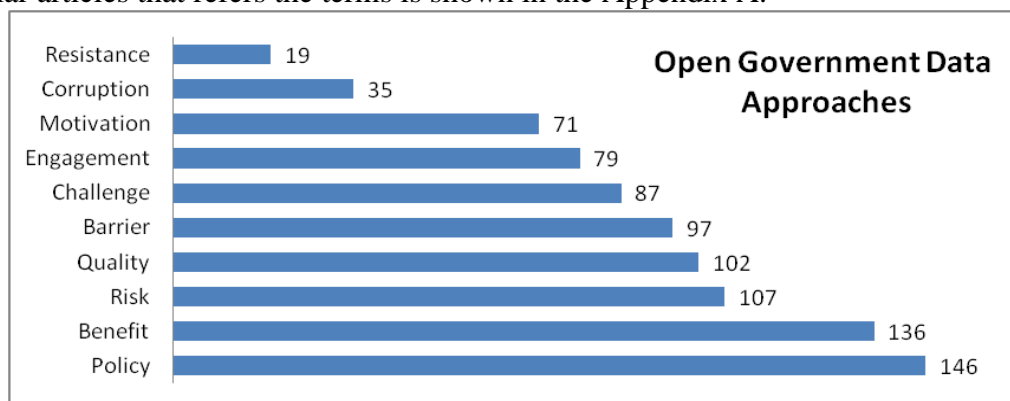


Figure 4 – Approaches and Number of Studies

It is particularly noticeable that the themes resistance and corruption can be better explored in articles on OGD. Policy is one of the topics most discussed, tackled as a way to make OGD publications feasible and as a mechanism to ensure the continuity of the data already published. On the other hand, the benefits are addressed, in most articles, in a conceptual way, as potentials gains to society and government. Overall, OGD publications have tripled in the last 3 years and are centered on Government Information Quarterly journal, with emphasis to authors Janssen M. and Zuiderwijk A, who publish the most on this subject.

4 Final Remarks

This article provided an overview of the dimensions of Open Data in the area of government, through a systematic review of the literature. It was found that the research area of Open Government Data (OGD) has grown substantially in recent years and the subject importance increase justifying this study, which indicates the *status quo* in this area and provides insights and identifies approaches and dimensions that can be best exploited in new research. In terms of practical contributions, this article helps the various agents of the OGD ecosystem to identify more clearly which article deals with what subject. In relation to policymakers, it emphasizes the importance of politics in the OGD theme.

The research on OGD was classified into seven dimensions and under ten different themes. The results showed that resistance and corruption are the themes least addressed, and that added value is a dimension to be further explored in future research. Moreover, this study point to significant differences between the dimensions and terms discussed in articles about OGD, for example, the Transparency dimension with 145 articles (78%), in contrast to Added Value with 45 articles (24%), and Collaboration with 67 articles (36%). These differences were also found in the themes addressed, for example, Policy in 146 articles (78%), against Resistance with only 19 articles (10%) or Corruption addressed in only 35 articles (19%).

Thus, it is apparent that the OGD research area reflects the degree of maturity of Open Government Data initiatives, as evidenced in the Open Data Barometer Report (Davies et al., 2015). Despite the large discrepancy in maturity between countries, few initiatives, on a global level, achieved an effective increase of economic or social value, from the available open data, as well as not obtaining a continuous reflection on the mitigation of corruption through these types of data. On the other hand, the OGD initiatives mostly are still at the stage of establishing national and regional policies to ensure their implementation and continuity (Davies et al., 2015). This is clearly reflected in the widely discussed policy theme.

This study has some limitations, since only articles published in English and in journals were evaluated. Moreover, the research was restricted to the three main databases in Information System area; new databases can be considered in future researches.

Considering the period of the selected articles, it is consistent that even countries now considered fully mature in relation to the open data initiatives have addressed issues relating to policy in articles from previous years, when they were still implementing their initiatives. In short, we believe that concurrently with the maturation of global initiatives in OGD, new scientific papers will direct their focus on issues such as added value and corruption. Future research could address aspects that added public value to open government data, exploring the successes in co-creation processes, that involves society and government, during the choice of data to be published and also on the data governance process.

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APPENDIX A – SELECTED STUDIES*

Reference	DIMENSIONS							APPROACHES									
	Transparency	Participation	Innovation	Reuse	Accountability	Collaboration	Added Value	Policy	Benefit	Risk	Quality	Barrier	Challenge	Engagement	Motivation	Corruption	Resistance
Arribas-Bel (2014)	X	X				X		X	X		X	X	X			X	
Bakici et al. (2013)		X	X				X	X		X				X			
Bertot et al. (2014)	X	X	X	X		X		X	X	X	X			X			
Buckingham Shum et al. (2012)	X	X	X	X		X		X	X	X		X	X	X	X		
Conradie and Choenni (2014)	X	X	X					X	X	X	X	X					
Davis et al. (2010)		X		X		X		X	X	X	X	X	X				
Ding et al. (2011)	X	X		X				X	X		X						
Hendler et al. (2012)	X	X	X						X			X	X				
Janssen (2011)	X	X	X		X			X	X	X		X	X		X		
Janssen and Zuiderwijk (2014)	X	X	X	X			X		X	X		X	X	X	X		
Janssen et al. (2012)	X	X	X	X	X		X	X	X	X	X	X	X	X	X		
Kalampokis et al. (2011)	X	X		X	X		X	X	X		X	X	X				
Kassen (2013)	X	X			X			X	X			X	X	X	X		
Lee and Kwak (2012)	X	X	X		X	X		X	X	X	X	X	X	X	X		
O'Riain et al. (2012)	X		X	X			X			X	X	X	X				
Sayogo and Pardo (2013)				X		X	X	X			X	X	X		X		
Shadbolt and O'Hara (2013)		X		X	X			X	X	X							
Shadbolt, et al. (2012)	X			X				X	X		X	X	X	X			
Veljković et al. (2014)	X	X			X	X			X		X	X		X	X	X	
Zuiderwijk and Janssen (2014)	X	X	X	X		X		X	X	X	X	X	X		X		X

* For a complete list of the 186 articles analysed, please contact the authors.