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Mentor Geci, Csaba Csáki

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# The Potential of BOLD in National Budget Planning: Opportunities and Challenges for Kosovo

Mentor Geci<sup>1</sup> [0000-0002-9159-4910] and Csaba Csáki<sup>2</sup> [0000-0002-8245-1002]

<sup>1</sup> Corvinus University of Budapest, Hungary  
mentorgeci@gmail.com (Corresponding Author)

<sup>2</sup> Corvinus University of Budapest, Hungary  
csaki.csaba@uni-corvinus.hu

**Abstract.** Kosovo is a relatively new country with short history in terms of national budget planning. Budget preparation dates back to the year of 2000 when it was started under international support. Therefore, even now budget planning is done in line with international practices and standards. This implies exponential increase in the volume of budget data and at the same time resulted in a need for data openness and linking. This paper sheds some light on opportunities and challenges of using Big Open Linked Data (BOLD) in helping budgetary transparency of this developing country. In order to get insights about the status of using BOLD in national budget planning in Kosovo, interviews are conducted with public sector servants, covering different ministries and levels (from technical staff up to ministerial level). In addition, local NGOs are also contacted. This paper points out that the strategic approach developing countries are following in relation to the transparency of their BOLD open budget data and the attitude of public servants involved are more important determinants of future potentials than simple quantity or quality concerns in themselves.

**Keywords:** National budget planning, Open data, Big data, Big Open Linked Data, Data quality.

## 1 Introduction

With the rise of open government [18] issues of public sector transparency and open data quality has gained renewed attention [15]. This has a special connotation in the context of national budget planning – especially in developing countries where accountability and even the practice of open data might face difficulties [6].

Transparency of processes related to the national budget (including planning, spending, and reporting) may be supported by open data [10, 15]. However, considering the nature of such data – as follows from its management process and the feedback associated with it – is not only open, but may be categorized as Big Data [8]. Furthermore, to understand, analyze and apply budgetary data in public sector activities, connection of it to other data sets is crucial as well – all in all making budgetary data to meet the characteristics of Big Open Linked Data (BOLD). BOLD refers to a diverse collection

of data that needs to be formally combined to be effectively utilized or generate new insights [13].

The influence of the national budget cannot be underestimated as it typically touches on or influences almost all entities in the public sector. The public sector is composed of various governmental layers with all resident institutional units controlled directly or indirectly by resident government units having their specific roles and positions – which, of course may differ from country to country. Nevertheless, those units each have their own budgetary plan and collect data about their expenditures [11]. Planning the budget and controlling spending is, therefore, a complex task and could bear civil oversight usually taken on by NGOs and other non-public entities [7].

Questions of Big Data in budgeting as well as BOLD in more developed countries have received reasonable attention [13,14]. Processes of budget planning and execution does provide large volumes of data that can be analyzed to detect patterns, which can be used to improve related decision making when creating future budgets [10]. However, there is little evidence about the use and usability of BOLD in national level budgeting of less developed countries with usually more relaxed policy making procedures. Therefore, the main goal beyond this research was to investigate how BOLD may be utilized to improve the national budget planning process of Kosovo as a newly formed country with a short twelve years of history. To that end the state of open data was assessed and views of various stakeholders on the current and potential role of BOLD was investigated. Kosovo has provided a rare opportunity to look at such a situation from scratch: to create a program how BOLD may be used in the planning and execution of the budget the country may build on international experiences and consider best practices of other developing countries.

The paper is organized as follows. First key concept behind BOLD is presented followed by a review of the area of national budget planning. Then cases of the use of BOLD in the budget planning of other developing countries is reviewed to create a background. The methodology section is followed by the introduction of Kosovo as a special case. After the analysis and the discussion of above goals the final section presents the conclusion and offers direction for future research.

## **2 Big Data, Open Data, Linked Data**

Big Open Linked Data (BOLD) is a broad concept that typically refers to the big data aspect of open data combined with the need to relate and integrate diverse datasets using accepted standards and it has a special relationship to the public sector [14]. The term ‘open data’ assumes that it is accessible for free or at minimal cost, and thus can be reused by anybody for any purpose [9]. The opening of public sector data promotes more transparency and accountability [12] but it may also drive innovation [17]. Big data is about large volumes of data from a multiplicity of sources that needs to be processed to provide value [19]. It might be non-numerical data without context or large volumes of structured or unstructured data [30]. While linked data refers to the possibility (and often requirement) of connecting different datasets through direct links or metadata (using dedicated solutions) in order to provide richer context and to allow for

complex reuse in new services: it is about structured and machine readable data that can be semantically queried [32]. The term is used not only to indicate connections between datasets from various sources but also to imply the presence of provenance (traceability) information [23].

BOLD is often used to harness the potential of existing systems, generate new insights, or even to create new services. A concrete example of utilizing BOLD in the public sector is its use to improve fraud detection by customs and tax organizations [16]. However, the relationships between big and open linked data for use by policy-makers and researchers are less explored [14]. While research in open data has shown that quality rather than the quantity of data matters for service and digital innovation [17], there is still a growing global trend for more and more government data to be released to the public as 'open data'. As a result, the Big and Linked aspect has grown as well over the last decade or so. BOLD is gaining attention in developing countries too, and it is especially true for the planning (and execution) of national budgets [8, 20, 29]. Availability of more data, especially when budgetary data are linked to other data sets (such as project, policy, geographical, or local government related ones) may allow for the creation of evaluation frameworks enabling a national budget that could funnel resources to where they are needed most [10]. This, of course also assumes analytical capabilities being available and utilized at all levels.

### **3 National Budget Planning**

The national budget is the most important economic policy instrument of any government, and as such it reflects its development priorities. From the point of view of financing, general governments are typically composed of four components (also called subsectors): (i) central government; (ii) state government; (iii) local government; and (iv) social security funds. The general government itself includes all government units and all nonmarket or nonprofit institutions (NPI) that are controlled by government units and they fulfil the functions of government as their primary activity. The central government has the authority to incur expenditure on public administration, defence, education, health, and the provision of other services. It may also make transfers to other institutional units, including other levels of government. In all countries, the budgetary central government, as an institutional unit of the general government sector, has the power to exercise certain, fiscal control over many other units and entities. This single unit of the central government encompasses the fundamental activities of the national executive, legislative, and judiciary powers regarding fiscal matters [11]. Budgetary units (such as ministries, agencies, boards, commissions, judicial authorities, legislative bodies, and other entities that make up the budgetary central government) are not separate institutional units for financial purposes. This is because they generally do not have the authority to own assets, incur liabilities, or engage in transactions on their own right. General government entities with individual budgets not fully covered by the main (or general) budget are considered extra budgetary. Extra budgetary entities may have their own revenue sources, which may be supplemented by grants (transfers) from the general budget or from other sources.

Budget plans are based on past budgets, past experience and current revenue projections. While the budget typically regulates the revenue and expenditure over one fiscal year, the budget process is continuous and circular. Financial data should be compiled for the general government and public sectors, as well as for all the subsectors of the general government (and the public corporations subsector).

#### **4 BOLD in the Budget Planning of Developing Countries**

The idea of open data and the potential of BOLD in helping both transparency and the economy has been considered by less developed countries as well. Accordingly, the strategies adopted and the projects that ensued have been reported in the literature. Well documented cases represent emerging economies such as Brazil, Turkey, or South Africa, while notable reports on developing countries cover Saudi Arabia, Chile, Indonesia, Mozambique, or Thailand among others. Some of these cover general BOLD initiatives while a few has dedicated focus on national budget related open data programs. Out of the above list, four countries have been well documented in the literature and those reports offer some background to help explore the Kosovo case.

It is easy for typical eGovernment programs to focus on the technology needed to support the usability and accessibility of data and services. While the open government initiative embraced by Saudi Arabia as Saudi Vision 2030 [21] was more generic (not specifically budgeting) it is still interesting as the goal set by the government was considering both the development of technological capacity as well as the task of increasing citizen awareness and use of open government data in order to promote transparency, trust, and accountability. However, actual actions by government actors and thus awareness of the program has been questioned and it was also revealed that the capabilities of the existing portal was fairly limited [1]. Analyses of the openness and citizen use of the country's Open Data Portal later underlined [2] that further increasing citizen engagement would require more technical integration (such as smart endpoints, a common format framework and a linked data cloud). The results suggest iterative cycles of technology development, practice improvement and marketing engagement.

Brazil, as a large emerging economy has put data standardization into the forefront of their program. To reach effective transparency, the country has a legal framework that enforces all public entities to publish detailed budgetary data on the web in real time [25]. The challenges of such an approach highlight the importance of the standardization of open budgetary data [28]. In response [28] derive a set of requirements to be addressed. Most importantly, attention is directed to the need of interoperability that requires the integration of federal, state and municipal contexts (which in turn assumes an appropriate level of information available to each public organization). Furthermore, from the eighteen criteria proposed, it appears that only three are fully met. The conclusion is that while the legal system is forward-looking, it still lacks regulations that clarifies how to 'identify things' in a digital world and requires reports being presented in a uniform way.

During the last decade serious effort was directed at open data initiatives concerning national budget data in Indonesia [24]. While budget transparency initiatives have

gained attention, including political support in the form of a new policy framework and interest of involved actors from the demand side, actual utilization of open budget data is slow to follow [5]. Although there is a new dedicated data portal, the ability of potential users to relate datasets is limited mostly due to the way data is presented [3]. To overcome the limited utilization of open data by civic actors, there is a host of NGOs that serve as intermediaries in budget issues: on the demand side they help potential users to understand the concept of open data, while on the supply side they work on improving the transformation of the open data program from conception to adoption.

While the government of Thailand had an open data program, it did not gain momentum with respect to utilization of the data primarily due to difficulties with easy access and lack of examples demonstrating the power of open data. There were two projects reported both offering solutions that not only help public sector entities, but also considered citizens as potential users. An analytical system was developed to help the identification of irregular spending or request patterns [27]. The project can be considered BOLD utilization as it covered and linked a vast amount of data for fiscal years 2013-2017 from two different sources: budget requests of government agencies (collected by the Bureau of the Budget), and procurement records of government agencies (stored by the Comptroller General's Department). In addition to supporting budgetary decision making through visualization, the tool had an open interface. Local governments in Thailand also store a significant amount of data in disperse relational databases. Even though the data may be accessed through a Web application (called e-Plan), this solution is not suitable to distribute and reuse that vast amount of data. Using a linking tool [4] that is also able to highlight interesting patterns and hidden linkages Sub-district Administrative Organizations (SAO) are able to make decisions for their strategic and project plans using experiences based on data of other SAOs.

These examples demonstrate different approaches of governance to direct efforts towards utilizing open data in general or in budget planning in particular and they represent different possible viewpoints on related national strategy. Choices made reflect the economic development of the country and the approach of its government to the idea of open data. They serve as examples for countries that are more behind in embracing or cultivating open data opportunities. However, it appears that studies tend to address negative issues faced, which could only serve as guidance what to avoid. One promising approach could be for the government of such countries to jump ahead and instead of looking at open data opportunities only, they could explore the option of BOLD right away. This appeared to be a possibility for Kosovo in the context of their open budget initiative. Therefore, the goal of this study was to look at what stakeholders in the open budget data program the recently formed country of Kosovo think about the potential benefits of BOLD and how the country could take advantage of existing practices.

## **5 Research Questions and Methodology**

The research reported here is essentially a case-study [31], where the case is a so called intrinsic [22] or special [26] case since it is rare to see a new country building up budget and transparency practices from scratch. As Kosovo may build its BOLD initiative from

ground up it is a unique opportunity to watch its government officials and the public to work this out. In order to understand the current state of national budget planning and find ways for improvement, the following Research Questions have been posed: 1) How do regulations deal with transparency related to fiscal data and is there a role envisioned for BOLD in this context? 2) What is the quality of the fiscal data published? 3) What is the knowledge and expectations of stakeholders involved in national budget planning regarding BOLD? 4) How may Kosovo take advantage of experiences and best practices of other developing countries?

Data collection is done using a mixture of methods including deskwork (exploration of the background of the Kosovo case such as legal documents, websites and data published) and fieldwork (interviews with government officials at various levels of the Kosovo government and with NGOs). The goal of the semi-structured interviews was three-fold: a) understand the process beyond the law; b) set a baseline for the quality of fiscal data; and c) understand the opinion and level of understanding of state officials as well as the view of civil groups on the applicability BOLD in the national budget planning process. Content of interview questions was based on the experiences collated from the international case studies (see above). Questions were structured into four sections: (i) basic (e.g. demographic) information; (ii) the budgeting process and the role of open data in it; (iii) opinion about quality of fiscal data (using a 5-level Likert scale along six dimensions – see Fig. 1); and (iv) open questions about specific (individual) views on BOLD. Interviews were executed February-June 2020 and interview respondents were asked to verify interview transcripts. Interviewees were selected using stratified sampling. Selection thus covered three layers, namely Political level; Middle management (i.e. department heads) and Staff with 2, 3, and 2 interviewees respectively. Entities approached included Ministry of Finance and Transfers (2), Ministry of Economy (2), and Ministry of Agriculture, Forestry and Rural Development (3). On top of state institutions, stakeholders approached included heads of 3 NGOs. In terms of time in office, respondents were quite experienced ranging from 3 up to 20 years of experience (with the majority of public servants, 47% having at least 15 years, while NGO personnel had less than 5 years of experience). Number of subordinates of non-staff ranged from 5 to 22 in total.

## **6 The Case of Kosovo**

### **6.1 Kosovo History of National Budget Preparation**

Kosovo has a short history in terms of budget preparation, following the declaration of independence in 2008. Since then, there were several developments in terms of modalities of budget preparation, its execution, as well as transparency issues. Following the approval of the annual Law on Budget, the fiscal year covers the period January to December. The provisions of the respective law are compulsory for all institutions and their respective units, which fall within the scope of the Budget of the Republic of Kosovo. As there was more and more public demand for government data in terms of budget execution compared to the planned one, Kosovo governments were pushed to increase budget transparency. Indeed, amidst the evolution of the country's budgetary



process, the purpose of this research was to get better insights in terms of the potential application of BOLD in budget planning in comparison to international standards.

## **6.2 The Budget Planning Process in Kosovo**

The budget process in Kosovo goes through four stages: 1) budget formulation; 2) enactment, 3) execution, and 4) oversight (including auditing). In this paper the focus is primarily on formulation and oversight (to a certain extent). In addition to the annual budget, the government develops the Medium-Term Expenditure Framework (MTEF), which seeks to improve the predictability and sustainability of the budget, covering the coming fiscal year and estimates of the two following fiscal years.

When preparing the next annual budget, each April the Ministry of Finance (MoF) issues so-called budget circulars, which provide information and instructions on the expenditure ceiling for the next fiscal year and specify the coordination process of budget organizations with the MoF. The requests are checked and are corrected if necessary. The requests are collated, and the draft budget is opened up for public hearings in July and August. Based on the resulting budget proposals, the Minister of Finance prepares the Proposed Kosovo Budget and Proposed Appropriations Law for consideration by the government in September. The government adopts the proposed budget in October, while the Assembly approves by December. In terms of following budget spending, whenever the Assembly requests it, the Minister of Finance shall, on behalf of the Government, present to the Assembly a comprehensive report detailing and reconciling the approved budget spending and appropriations, all subsequent transfers and other changes. Participants and their roles are thus as follows: Ministry of Finance (preparation, guidelines, and consultation), Budgetary organizations (proposals for expenditure), public including NGOs (attends hearings and comments by raising issues), central government (approval), Assembly (final approval). For the purposes of ensuring that the budget is implemented according to the approved budget law, the Assembly exercises budget oversight and to do this the Assembly requires extensive reporting from the government.

The question is then, how data is utilized in the various steps of this process and whether the BOLD nature of the data is considered during Steps 1) and 4).

## **6.3 Data Quality of Budgetary Open Data in Kosovo**

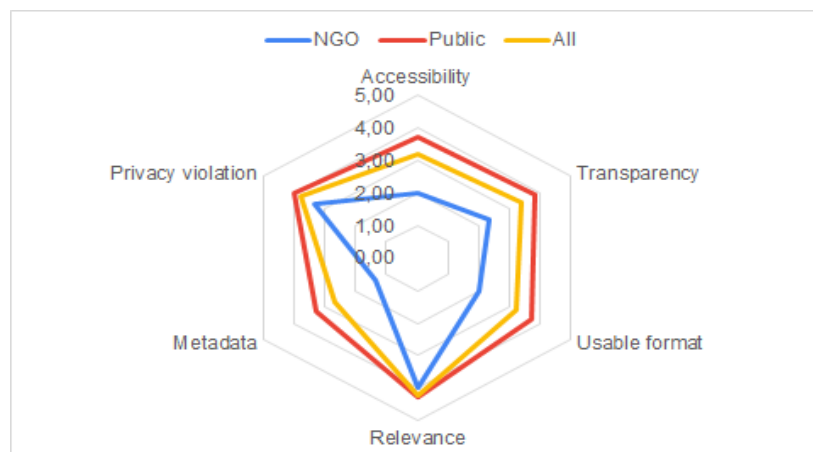
Questions about quality received quite diverse responses as the role of ministries in budget preparation was quite different compared to NGOs. While ministries had to follow specific templates according to the Law on Budget, the main aim of NGOs according to the responses received was to comment in terms of economic reasoning of specific budgetary items and regarding data quality as well.

In terms of composition of data used in budgeting, the main sources are public institutions. As it is a standard procedure using set templates, data are sourced from the Free Balance software officially used across all the ministries in the country. Data disposed are at granular level, by counterparts and type of expenses. This data is supplemented with private sector data, mainly in relation to capital investment projects of the private

sector (such as highway constructions, etc.), where deployment of specific questionnaire or survey is needed to collect information. This is also confirmed from the respondents that apart from the expected 86% that is public sector data, the remaining 14% comes from private sector sources.

On the questions concerning the quality of budgetary data, where answers ranged from 1-worst to 5-best, the average was 2.63: this implies that there is room for improvements. Individual areas covered opinion on accessibility, transparency, usable format, relevance, metadata, and potential privacy violations. As may be concluded from **Fig. 1**, there is a marked difference between the view of NGOs (representing the public) and that of the public servants: the latter group is consistently more optimistic in every dimension. While representatives of ministerial agencies claimed that the budget preparation, execution and data disclosure are quite transparent and they follow international standards, the main claim of NGO personnel was that data are published with certain delay, format is not user friendly so they need to do additional data manipulation, and there are no specific explanations for certain items.

Civil group representatives claim that the data should be published in machine readable format suitable for statistical analysis and handling purposes and it should be published at a more granular level. They recommend that publication of the chart of accounts must be mandatory. Another reasoning for the lack of public sector qualitative data is about the absence of metadata (use of provenance data is limited and clarifications are lacking). This increases the risk of error when transposing them into readable formats. On the other hand, public sector servants' responses rely on current legislative requirements in terms of compilation (preparation) and dissemination. Still, 29% of them responded that the quality is on average and there is space for improvement. Some of the reasoning was that the average quality of public sector data is due to constant increase in the amount of public sector data.



**Fig. 1.** Data Quality of Open Government Data in Kosovo (Source: Authors)

Although budget data is publicly available free of charge, Kosovo is still ranked only 76th out of 79 countries according to the international Global Open Data Index

(<https://index.okfn.org/>). What the index recognizes is that in case of Kosovo government data are not in fully machine-readable format and are not downloadable at once. Therefore, recently, the Ministry of Finance introduced a Transparency Portal within its website (<https://ptmf.rks-gov.net/page.aspx?id=2,1>), but it still offers only a snapshot of budget spending by ministries covering the period 2015-2020. Absence of time series, along with two key parameters specified by Global Open Data Index, are still to be addressed.

#### **6.4 Respondents' Views on BOLD and Its Role in National Budget**

Section 4 dealt with respondents' individual views on BOLD. Regarding personal experience, almost all of the respondents confirmed they had little direct exposure to BOLD before. The opinion was that the main precondition to apply BOLD was to increase the quantity of government data compiled and published in relation to the budgeting process. In addition, formally linking planning data (as approved) to spending details would be necessary. Even more crucial is to link spending to economic and other output results (such as social, health, and other societal and statistical data collected).

Interview responses have also touched on the applicability of BOLD in the daily work of interviewees. Respondents were quite optimistic on the role of BOLD in performing their tasks in relation to the national budget. Both public and NGO officials agreed that it would have major impact if done properly, due to the constant increase in the volume of data. BOLD approaches and tools would also assist in extracting the necessary information to analyse the design and orientation of the state budget and would enable the monitoring of the implementation of the planned budget. In addition to that, higher data volume contributes directly to forecasting of macro-fiscal trends, namely, in producing the Medium-Term Expenditure Framework.

## **7 Discussion**

In comparison to practices of other developing countries and based on these research results it is clear, that there is major room for improvement on open government data in Kosovo in order to meet BOLD standards. In general, the agreement seemed to be that BOLD is an important concept but not yet applicable in Kosovo budgetary practices. Immediate preconditions for its applicability concern both quantity and quality of data published. Kosovo is at a very early level of development regarding openness of government data. Comparing Kosovo to specific countries mentioned earlier, beyond issues related technical features of open data expected results heavily depend on the lack of abilities to link data that is available. However, there was common agreement (including all levels from staff up to ministerial level) that application of BOLD would be very beneficial to all stakeholders as they could use their resources more efficiently by focusing on real social and economic issues based on more advanced analysis.

While increasing the availability, quality and understandability of data is an obvious condition, improvement in other areas are also required. What should be considered

includes education about BOLD (of both public servants and civil stakeholders), improved technological capabilities (such as better platforms) and tools (e.g. portals with semantic abilities). This, of course, assumes a forward looking legal framework with supportive regulations based on a national strategy. Finally, the ecosystem view could be applied by encouraging various intermediaries to come forward who can promote actual utilization through various services offered to specific, targeted user groups.

Although BOLD does not seem to be an applicable concept in Kosovo budgetary data, yet stakeholders do realize the potential benefits. However, they do not think the time has come for a full application – neither they seem to be willing to and, consequently, ready to handle it. This is underscored by the vastly diverging views of public servants from that of the NGO representatives over a few key points (such as judgement of quality performance). Public servants are satisfied with the current direction and speed of the changes in this matter, while NGOs have little influence on the outcome and are quite occupied with dealing with the actual budget and spending in order to be able to provide feedback.

To what extent these findings can be applied to other countries depends on (i) the approach countries are following in relation to transparency through open government data; (ii) their willingness to broaden the scope of stakeholders, especially to those with more critical views on budget issues; (iii) committed economic capacities to develop new tools; and (iv) improvement of management solutions.

## **8 Conclusions and Future Research**

Based on the responses received so far, main conclusion is that BOLD is still not applicable to Kosovo, among others due to short budgetary data history, and, apart from that, due to limited data sources. In addition, users are still not so much aware about BOLD, but they do believe there is opportunity for the application of BOLD in Kosovo budgetary data. Apart from the technological part of BOLD, special attention should be given to users' awareness about open government data in general, and to the training of staff in particular. In the meantime, other factors highlighted by earlier research on national budgeting may be considered such as strong checks and balances by audit institutions, data standardization (at least machine readable syntax), and automated data controls as these could be quite instrumental in improving the quality of national budgeting and transparency practices.

In terms of limitations, this research on BOLD in Kosovo had a special focus on data quality and views of stakeholders, while technological conditions and related costs were not directly investigated. Future research should follow up on improvements of quantity, quality, and transparency issues, including their impact on budgetary execution. For future considerations, results of this research could help responsible stakeholders to better identify issue to be addressed regarding the openness of open government data, access timeline, as well as broader inclusion of non-governmental bodies in budget preparation and execution. Apart from that, other country practices as depicted in this paper could be followed in order to build on their best practices.

## References

1. AlRushaid, M.W., Saudagar, A.K.J.: Measuring the Data Openness for the Open Data in Saudi Arabia e-Government-A Case Study. *Int. J. Adv. Comput. Sci. Appl.* **12**, 113–122 (2016)
2. AlSukhayri, A.M., Aslam, M.A., Arafat, S., Aljohani, N.R.: Leveraging the Saudi Linked Open Government Data: A Framework and Potential Benefits. *Int. J. Mod. Educ. Comput. Sci.* **11**(7), 14 (2019)
3. Aryan, P.R., Ekaputra, F.J., Sunindyo, W.D., Akbar, S.: Fostering government transparency and public participation through linked open government data: Case study: Indonesian public information service. In: 2014 International Conference on Data and Software Engineering (ICODSE). pp. 1–6 IEEE (2014). <https://doi.org/10.1109/ICODSE.2014.7062655>
4. Boonlamp, L.: A linked data approach to planning collaboration amongst local governments in Thailand. In: 2017 2nd International Conference on Information Technology (INCIT). pp. 1–5 IEEE (2017). <https://doi.org/10.1109/INCIT.2017.8257850>
5. Davies, T.: Open data in developing countries: Emerging insights from phase I (ODDC Report). (2014).
6. Dawes, S.S., Vidasova, L., Parkhimovich, O.: Planning and designing open government data programs: An ecosystem approach. *Gov. Inf. Q.* **33**(1), 15–27 (2016).
7. Gaventa, J., McGee, R.: The impact of transparency and accountability initiatives. *Development Policy Review*, 31, s3-s28 (2013)
8. Gray, J.: Open Budget Data: Mapping the Landscape, Open Knowledge (2015). <http://dx.doi.org/10.2139/ssrn.2654878>
9. Hardy, K., Maurushat, A.: Opening up government data for Big Data analysis and public benefit. *Comput. Law Secur. Rev.* **33**(1), 30–37 (2017).
10. Höchtl, J., Parycek, P., Schöllhammer, R.: Big data in the policy cycle: Policy decision making in the digital era. *J. of Org. Computing and Elect. Commerce.* **26**(1-2), 147–169 (2016).
11. IMF GFSM: International Monetary Fund - GFSM. International Monetary Fund, Washington D.C (2014).
12. Janssen, K.: Open government data and the right to information: Opportunities and obstacles. *J. Community Inform.* **8**(2), (2012).
13. Janssen, M., van den Hoven, J.: Big and Open Linked Data (BOLD) in government: A challenge to transparency and privacy? *Government Information Q.*, **32**(4), 363-368 (2015)
14. Janssen, M., Kuk, G.: Big and open linked data (BOLD) in research, policy, and practice. *J. Organ. Comput. Electron. Commer.* **26**(1–2), 3–13 (2016).
15. Kasymova, J., Ferreira, M.A.M., Piotrowski, S.J.: Do open data initiatives promote and sustain transparency? A comparative analysis of open budget portals in developing countries. In: *Information, Models, and Sustainability*. pp. 137–155. Springer, New York (2016). [https://doi.org/10.1007/978-3-319-25439-5\\_7](https://doi.org/10.1007/978-3-319-25439-5_7)
16. Klievink, B., Zomer, G.: IT-enabled resilient, seamless and secure global supply chains: introduction, overview and research topics. In: *Conference on e-Business, e-Services and e-Society*. pp. 443–453. Springer, Cham (2015). [https://doi.org/10.1007/978-3-319-25013-7\\_36](https://doi.org/10.1007/978-3-319-25013-7_36)
17. Kuk, G., Davies, T.: The roles of agency and artifacts in assembling open data complementarities. In: *Thirty Second International Conference on Information Systems (ICIS)*, Shanghai, China. 04 - 07 Dec 2011, pp. 1-16 (2011)
18. Luna-Reyes, L.F., Bertot, J.C., Mellouli, S.: Open government, open data and digital government. *Gov. Inf. Q.* **1**(31), 4–5 (2014).

19. McAfee, A., Brynjolfsson, E.: Big data: the management revolution. *Harv. Bus. Rev.* **90**(10), 60–68 (2012).
20. Musyaffa, F.A., Lehmann, J., Jabeen, H.: IOTA: Interlinking of heterogeneous multilingual open fiscal data. *Expert System Application*, 147, 113135 (2020). <https://doi.org/10.1016/j.eswa.2019.113135>
21. Nurunnabi, M.: Transformation from an oil-based economy to a knowledge-based economy in Saudi Arabia: the direction of Saudi vision 2030. *J. Knowl. Econ.* **8**(2), 536–564 (2017).
22. Patton, M.: *Qualitative research and evaluation methods*. Sage, Thousand Oaks (2002).
23. Pignotti, E., Corsar, D., Edwards, P.: Provenance principles for open data. *Digital Engagement 2011*, Newcastle, UK, 1-6 (2011). <http://de2011.computing.dundee.ac.uk/wp-content/uploads/2011/10/Provenance-Principles-for-Open-Data.pdf>
24. Rendra, M., Cendekia, I.: The national budget transparency initiative at ministry of finance in open government data. In: 2015 3rd International Conference on Information and Communication Technology (ICoICT). pp. 522–527. IEEE, Nusa Dua, Bali, Indonesia (2015). <https://doi.org/10.1109/ICoICT.2015.7231479>
25. da Silva Craveiro, G., de Santana, M.T., de Albuquerque, J.P.: Assessing Open Government Budgetary Data in Brazil. In: 7th International Conf. on Digital Society. pp. 20–27. The International Academy Research and Industry Association, Nice, France (2013)
26. Stake, R.E.: *The art of case study research*. Sage, Thousand Oaks (1995).
27. Surasvadi, N., Saiprasert, C. and Thajchayapong, S.: Budget and procurement analytics using open government data in Thailand. In: 2017 10th International Conference on Ubi-media Computing and Workshops (Ubi-Media). pp. 1–6. IEEE, Pattaya, Thailand (2017). <https://doi.org/10.1109/UMEDIA.2017.8074079>
28. Tavares de Santana, M., da Silva Craveiro, G.: Challenges and requirements for the standardisation of open budgetary data in the Brazilian public administration. In *Informatik Angepasst an Mensch, Organisation und Umwelt (INFORMATIK 2013)*. Gesellschaft für Informatik e.V., Bonn, Germany (2013)
29. Tygel, A.F., Attard, J., Orlandi, F., Campos, M.L.M., Auer, S.: How much? Is not enough: an analysis of open budget initiatives. In: *Proceedings of the 9th International Conference on Theory and Practice of Electronic Governance*. pp. 276–286. ACM (2016). <https://arxiv.org/abs/1504.01563>
30. Wigan, M.R., Clarke, R.: Big data’s big unintended consequences. *Computer*. **46**(6), 46–53 (2013).
31. Yin, R.: *Case Study Research—Design and Methods*. Sage, Thousand Oaks (2003).
32. Bizer, C., Heath, T., Berners-Lee, T.: Linked data - The story so far. *International Journal on Semantic Web*, **5**(3), 1–22 (2009).