



USING OPEN GOVERNMENT DATA FOR ECONOMIC DEVELOPMENT

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Abstract:

Publishing of open government data brings enormous benefits both to providers and consumers. On the one hand, governments increase their transparency and enable development of smarter and richer solutions, while on the other hand it enables various stakeholders to extract new information and create value from them. In this paper we investigate applicability of open government data for economic development and creation of value from published data. Different aspects of open government data consumption are explored, such as effectiveness, transparency and quality – and how they interrelate. They are of great importance for valorisation of open government data, and we will show that leveraging economic value of OGD must be accompanied by governments' ability to make high quality OGD available.

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INTRODUCTION

Governments around the world are launching the Open Government Data (OGD) portals to ensure that citizens, businesses and other stakeholders have the necessary prerequisite for exploitation of OGD in different areas. Opening government data is the first step towards creating an open and transparent government. Government data must be provided in a way to allow opportunities for users to go beyond passive recipients (Wirtz *et al.*, 2019). OGD influence the development of a country as a whole, and at the same time accelerate innovation in a variety of sectors with trend of continuity. Constant evolution of OGD in terms of accessibility, reusability and application of innovative e-services implies building smarter and richer solutions (Milić *et al.*, 2018). Moreover, they enable various stakeholders to extract new information and new knowledge.

Valorisation of OGD through datafication of everyday life contributes to profitability and creating of new socio-economic reality. Furthermore, this is a path to creating vital means by which labour market is producing and reproducing smart services and smart data (Burns & Welker, 2022).

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In this regard, political economy mainly focuses on material exchange of value and profit, while in the era of open government movement, this is pushed to the investment of energy to make government services “smarter”. Achievement of this goal is closely related to open data and innovations policies and their proper application for stimulation of economic growth. For example, stakeholders of OGD may rely on published data about reports, which can serve as valuable input for estimation of potential value of these efforts. Having investigated the OGD impact on producing new services and innovations, Mergel *et al.* (2018) claim that according to a Gartner study, open data policies could stimulate OGD based services up to a value of 96.5 million USD. As OGD in economic domain are mainly raw material, they serve for contemporary innovations, which leads to the growth of companies. Furthermore, OGD policies are extremely important as they ensure transparency of government information. Transparency then brings confidence and collaboration between government and citizens. Moreover, in the context of open government, transparency extends the accountability of public authorities as well as reuse to create new products and services. This mutual interaction develops an understanding of common and differing elements in the policies, identifying their variations at the same time, which consequently affects their impact.

This paper brings the discussion about utilization of OGD in economic domain, especially for the purposes of stimulation of economic development and how OGD can be exploited to create value from them. The goal of this paper is to contribute to a better understanding of how OGD facilitate public accountability for effectiveness and direct usefulness of these processes. In the following sections of the paper, we will explore the transparency and effectiveness aspect of OGD. In addition, utilisation of OGD for value creation and economic development shall be described. Final sections of the paper are dedicated to the discussion about quality aspects of provision of OGD and findings conclusions.

EFFECTIVENESS AND TRANSPARENCY OF OPEN GOVERNMENT DATA

OGD represent new currency in the digital world and is essential to the knowledge economy, serving as a valuable source for business and economy growth (Milić *et al.*, 2015). According to a World Bank report on the impact of OGD on economic growth (The World Bank, 2014), a direct economic benefit of provision of data-rich services on the Internet can be identified with very low marginal costs of distribution, exemption from upstream data charges and restrictions, as well as market availability. Different kinds of OGD such as weather data, economic statistics, geo data and road traffic information can lead to innovations in government services and the creation of new jobs and work opportunities.

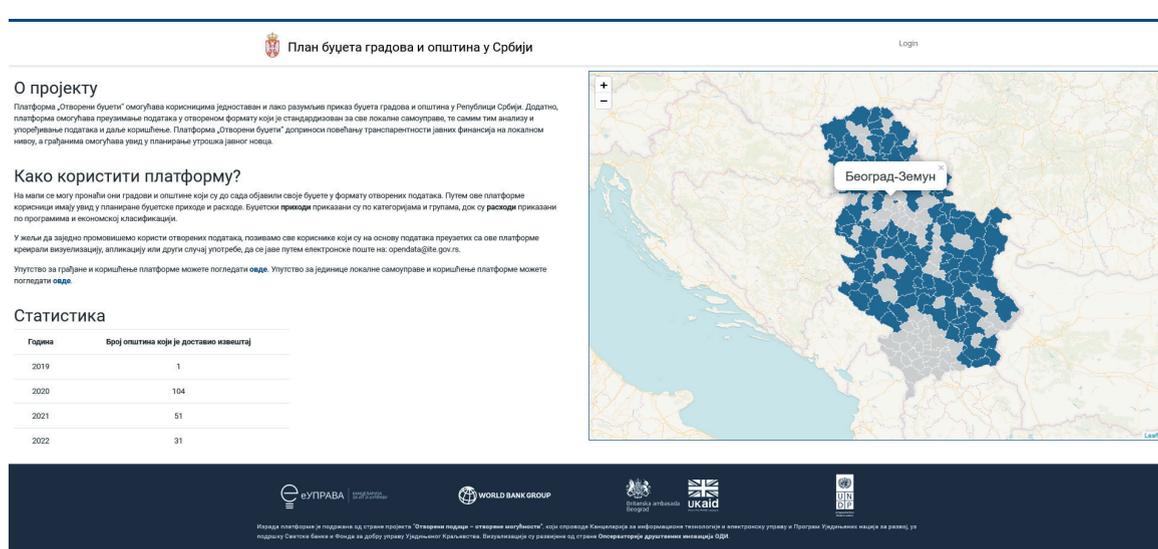
Businesses are considered to be direct beneficiaries of effective usage of OGD due to the fact that they have means and interest in direct translation of available data into new commercial products, services and innovations. Governments own data such as official registers (either company or cadastres) together with geospatial data, providing core reference for the economy as a whole. Harrison and Sayogo (2014) reported that OGD may give an insight into the fiscally-related transparency, participation and accountability, along with information about national budgets as the focal policy domain. Therefore, publishing OGD provides an overview of the usage of public resources and government commitment to fulfilling stated performance objectives. Accountability data must take precedence over statistical data published on OGD portals in order to avoid risk of relegating the accountability objective in favor of economically valuable data disclosure (Lourenco, 2015).



The economic impact of releasing and (re)using OGD is just one of the arguments at the forefront of the debate about opening government data. For example, in order to enable effective public service provision, exposing data about malfunctioning service providers may lead to the better selection of service by citizens with regard to the services they consume. Similarly, OGD can ensure higher returns on public investment, and at the same time make it easier for policy makers to address difficult challenges, improve public policies and the efficiency and quality of public services (Bogdanović-Dinić *et al.*, 2014). In this way, OGD can fuel the development of services for the benefit of society. Keeping this in mind, businesses themselves are moving towards the valorisation of intangible assets (Lemma, 2012).

OGD are the main prerequisite for building transparent and accountable open government oriented not only to the short-term considerations regarding information availability to all, but also to the long-term considerations regarding information usability by all (Milić *et al.*, 2022). In this way, users will be able to create more value from OGD. Cuicinello *et al.* (2015) claim that government transparency is defined as a measure of citizen's insight into business, processes and operations of the government. Most of the methodologies used for measuring transparency are oriented toward certain aspects of transparency, such as budget transparency. For example, this is one of the key aspects for ranking the countries according to the International Budget Partnership (IBP), which ranks countries based on a questionnaire with 125 questions related to the transparency of government budget (Ramkumar & deRenzio, 2009). A practical example on how this approach can be used is shown in Figure 1 – a screenshot of an application¹ developed on the basis of OGD on the Serbian Open Data Portal. The Office for Information Technology and eGovernment of Serbia has developed an application for visual representation of data on city and municipal budgets.

Figure 1. Visualisation of data on city and municipal budgets on the Open Data Portal of Serbia



Data-driven government transparency is an important constituent of the institutional incentives in the form of the economic gain, accountability and trust in public administration. In order to achieve this goal, governments around the world have introduced soft measures such as financial aids in adoption and consumption of OGD (Ruijter *et al.*, 2020). The same authors claim that creation of certain forms of data-driven transparency may be a deliberate strategy to generate strategic gains. Kingsley and Graham



(2017) found the correlation between data-driven government transparency and country-level foreign capital inflows. The effect of this correlation varies to a great extent based on foreign investors' own private information and their flexibility in responding swiftly to change. Moreover, a research carried out by Hope *et al.* (2021) points in the same direction, confirming that there is a positive association between government transparency and operational efficiency of firms in emerging markets.

UTILIZATION OF OPEN GOVERNMENT DATA FOR ECONOMIC DEVELOPMENT

Availability of OGD is a first step toward its (re)use as a data product. Furthermore, data products provide digital development for traditional sectors such as transportation, health, manufacturing and retail (Attard *et al.*, 2016). The same authors stress the importance of a continuing government commitment with an adequate financing amount allocated for identifying and opening datasets with a high value creation potential. Proper presentation of published OGD data to various stakeholders is a necessary prerequisite for their efficient consumption and value creation. Visual forms of representation of OGD, such as charts, cubes and interactive tables contribute to easier understanding and interpretation of available information (Milić *et al.*, 2018). An example of such data is given in Figure 2, where we can see various possibilities for data interpretation.

Figure 2. Availability of tabular data on Open Data Platform of the city of Edmonton.

The screenshot shows the Open Data Platform interface for the City of Edmonton. The main content is a table titled "Inflation Rate Edmonton CMA" with the following data:

ID	DateTime	MONTH	YEAR	REPORT_PERIOD	ALL_ITEMS_CPI	Inflation Rate - Edmonton CMA
1	01/31/2010 12:00:00 AM	JANUARY	2010	2010-01-10T00:00:00	122.4	1.83%
2	02/28/2010 12:00:00 AM	FEBRUARY	2010	2010-02-10T00:00:00	122.9	1.5%
3	03/31/2010 12:00:00 AM	MARCH	2010	2010-03-10T00:00:00	122.3	1.16%
4	04/30/2010 12:00:00 AM	APRIL	2010	2010-04-10T00:00:00	122.6	1.74%
5	05/31/2010 12:00:00 AM	MAY	2010	2010-05-10T00:00:00	122.8	0.99%
6	06/30/2010 12:00:00 AM	JUNE	2010	2010-06-10T00:00:00	122.7	0.41%
7	07/31/2010 12:00:00 AM	JULY	2010	2010-07-10T00:00:00	123.5	1.4%
8	08/31/2010 12:00:00 AM	AUGUST	2010	2010-08-10T00:00:00	122.9	0.66%
9	09/30/2010 12:00:00 AM	SEPTEMBER	2010	2010-09-10T00:00:00	122.8	0.9%
10	10/31/2010 12:00:00 AM	OCTOBER	2010	2010-10-10T00:00:00	123.3	1.23%

The interface includes a search bar, navigation links (Home, Catalogue, User's guide, Open Data), and a footer with "EMPOWERED BY TYLER TECHNOLOGIES".

Statistical data are most adequate for this purpose, since enhanced visualisation yields concrete and logical conclusions on the basis of the obtained indicators. Albino (2017) contributes to this by identifying a proof of concept with open data from a government agency that supports and finances investments in small and medium enterprises. The results of his research reveal a connection with developments of predictions about possible investment expenditures. Tinholt (2017) reports that according to a Finnish study, companies that reuse government released geographical data, either freely or at marginal costs, have a 15% higher annual growth rate compared to countries that charge such information with an objective of recovering costs.



By using participation and collaboration tools as key pillars of Web 2.0, value co-creation from OGD is enabled. Exploitation of these tools, non-technical end user contribution can be achieved and social and commercial value obtained (Khayyat & Bannister, 2017). Previously mentioned value co-creation can be understood as development of new service, product, or an idea and concept. The importance of semantic web (SW) technologies for value creation from OGD should be born in mind, too. SW technologies offer the possibility for collaborative work of government and citizens with the aim of increasing transparency and added value from OGD. For example, London Borough of Camden Food Premises database integrates with Google maps data in order to generate innovative service offer from government data (Ristoski & Paulheim, 2016). In addition, a recommendation system for finding relevant business partners developed by utilizing SW technologies was proposed by Zhang *et al.* (2017). The proposed system helps government agencies make recommendations to businesses about business partners, according to their requirements.

In order for users to be able to create and capture value from OGD and find ways to generate revenue, the existence of proper business models and business architectures must be ensured (Zeleti *et al.*, 2016). Their aim is to tap into the potential value of OGD. As there are a variety of business models, it is up to each organization to either explicitly or implicitly choose a particular business model. Magalhaes *et al.* (2014) contribute to this topic by stressing the importance of value proposition as the cornerstone of the business model concept. Various business models utilizing OGD as the foundation for entrepreneurial innovations and start-ups, as well as specific OGD datasets for business decisions, are mostly based on reliable and accurate OGD (Safarov *et al.*, 2017).

An interesting approach to creating value from utilized OGD is given by Gao and Janssen (2020). They point out that little attention is paid to the application of Artificial Intelligence (AI) both in academic research and practice. On the examples of Germany (AI parking), Singapore (Chatbot) and UK (Crime prevention), they showed how AI tools can be exploited with a view to saving time and money, or for economic benefit reflected in new investments and business improvements. They also point out the need for guidance and legal framework for proper exploitation of AI. Similarly to this research, Loukis *et al.* (2020) reveal how OGD, together with AI, can be used to predict the impact of recessionary economic crisis on companies. By applying AI, they found a relation between resilience/vulnerability of a company to future economic crisis in accordance with a decrease in sales revenue, profitability, employment etc.

Nevertheless, according to Misuraca & van Noordt (2020) the application of AI systems has been criticised by both the government agencies who use it and citizens. They concluded that the underlying function of the AI is not transparent enough for its users (citizens) as they are not aware of the profiling mechanism. An exploratory study on applied AI systems reveals that clerks have questioned less than 1 in 100 decisions made by AI. Therefore, AI-led decision-making must be accompanied by legal, moral and ethical frameworks (Tan, 2020). Furthermore, incorporation and interpretation of user opinion, along with incorporation of dispersed knowledge in the process of creating necessary conditions for successful implementation of AI based on OGD is recommended. Janssen *et al.* (2020) claim that each AI system could be subject to a risk audit to anticipate and address the possible undesirable effects of the AI algorithms.



QUALITY OF OPEN GOVERNMENT DATA

Zeleti *et al.* (2016) argue that harnessing economic value of OGD along with leveraging associated business opportunities must be accompanied by government ability to sustain the availability of high quality OGD. As OGD are published on OGD platforms, better usability of OGD is in direct relation with usability of OGD platforms. A research by Nikiforova (2019) confirms this, showing that users will not find OGD platforms usable and fit to their needs if they are faced with any issues related to OGD. In this way, the trust in government institutions is irrevocably lost if low quality OGD are disclosed. Furthermore, most of OGD are consumed in innovative applications and adequate description of those data by using metadata on OGD platforms is necessary. In order to check readiness of government portals to provide quality OGD for their users, we conducted an analysis of several OGD portals where we checked definition of metadata fields for description of dataset necessary for their exploitation in innovative application. Results are shown in Table 1.

Table 1. Examined OGD portals.

platform	portal	number of datasets	AVG number of complete metadata fields per dataset	AVG number of machine-readable formats per dataset
uData	https://data.gov.rs/api/1/datasets	1822	64%	67%
	https://dados.gov.pt/api/1/datasets	4910	65%	39%
	https://data.public.lu/api/1/datasets/	1600	63%	13%
	https://www.data.gouv.fr/api/1/datasets/	41037	66%	40%
CKAN	https://ckan.publishing.service.gov.uk/api/3/action/package_list	1822	64%	67%
	https://open.canada.ca/data/api/3/action/package_list	31755	63%	29%
	https://ckan.opendata.swiss/api/3/action/package_list	6963	74%	13%
	https://datos.gob.mx/busca/api/3/action/package_list	9287	60%	14%
	https://data.go.th/api/action/package_list	5898	74%	45%
	https://data.gov.au/api/3/action/package_list	13376	72%	13%
	https://www.govdata.de/ckan/api/3/action/package_list	49571	64%	5%
	https://open.africa/api/3/action/package_list	6490	64%	45%
	https://data.gov.ie/api/3/action/package_list	13373	75%	36%
	https://data.humdata.org/api/3/action/package_list	31796	71%	39%
	https://data.gov.ro/api/3/action/package_list	2691	69%	78%
	https://data.gov.sk/api/3/action/package_list	2841	72%	60%
	https://dados.gov.br/api/3/action/package_list	11029	75%	56%
	https://data.buenosaires.gob.ar/api/3/action/package_list	423	78%	46%
	http://opendata.hu/api/3/action/package_list	67	60%	21%



platform	portal	number of datasets	AVG number of complete metadata fields per dataset	AVG number of machine-readable formats per dataset
DKAN	https://data.gov.gh/api/3/action/package_list	315	100%	90%
	https://data.city.kyoto.lg.jp/api/3/action/package_list	606	100%	78%
	https://data.gov.jm/api/3/action/package_list	32	100%	83%
	https://dadesobertes.diba.cat/api/3/action/package_list	76	90%	81%
	https://opendata.by/api/3/action/package_list	229	100%	49%
	http://data.mmr.cz/api/3/action/package_list	43	73%	100%
	https://dati.gov.it/opendata/api/3/action/package_list	52519	72%	82%
	https://data.cambridgeshireinsight.org.uk/api/3/action/package_list	235	72%	65%
	https://opendata.transport.nsw.gov.au/api/3/action/package_list	206	60%	5%
	https://datosabiertos.rosario.gob.ar/api/3/action/package_list	245	100%	78%
	https://data.nicva.org/api/3/action/package_list	164	100%	80%
	https://opendata.bonn.de/api/3/action/package_list	327	100%	82%
	https://dati.comune.genova.it/api/3/action/package_list	138	100%	81%
	https://data.louisvilleky.gov/api/3/action/package_list	280	100%	53%
	https://data.gov.sa/Data/en/api/3/action/package_list	6442	100%	75%
DKAN	https://data.edmonton.ca/api/catalog/v1	2519	100%	100%
	https://data.cityofnewyork.us/api/catalog/v1	3516	100%	100%
	https://www.dati.lombardia.it/api/catalog/v1	5432	100%	100%
	https://data.texas.gov/api/catalog/v1	1284	100%	100%
	https://data.honolulu.gov/api/catalog/v1	306	100%	100%
	https://cohesiondata.ec.europa.eu/api/catalog/v1	1139	100%	100%
	http://www.datos.gov.co/api/catalog/v1	28964	100%	100%
	https://healthdata.gov/api/catalog/v1	4308	100%	100%
	http://www.pivcide.pr/api/catalog/v1	70	100%	100%
	http://data.usaid.gov/api/catalog/v1	1510	100%	100%
	http://data.sfgov.org/api/catalog/v1	1087	100%	100%
	http://citydata.mesaaz.gov/api/catalog/v1	930	100%	100%
	http://data.cincinnati-oh.gov/api/catalog/v1	156	100%	100%
	http://data.novascotia.ca/api/catalog/v1	1113	100%	100%
	http://www.data.act.gov.au/api/catalog/v1	1127	100%	100%
Open DataSoft	https://public.opendatasoft.com/api/v2/catalog/datasets	623	50%	100%
	https://data.explore.star.fr/api/v2/catalog/datasets	42	57%	100%
	https://data.laregion.fr/api/v2/catalog/datasets	1711	46%	100%



	https://www.data.corsica/api/v2/catalog/datasets	502	56%	100%
	https://opendata.vancouver.ca/api/v2/catalog/datasets	177	36%	100%
	https://ressources.data.sncf.com/api/v2/catalog/datasets	216	51%	100%
	https://opendata.wuerzburg.de/api/v2/catalog/datasets	107	62%	100%
	https://opendata.comune.bologna.it/api/v2/catalog/datasets	425	53%	100%
Open DataSoft	https://data.gouv.nc/api/v2/catalog/datasets	153	49%	100%
	https://transparencia.sns.gov.pt/api/v2/catalog/datasets	148	58%	100%
	https://data.education.gouv.fr/api/v2/catalog/datasets	92	50%	100%
	https://opendata.bristol.gov.uk/api/v2/catalog/datasets	221	64%	100%
	https://data.leicester.gov.uk/api/v2/catalog/datasets	181	66%	100%
	https://data.montreuil.fr/api/v2/catalog/datasets	152	66%	100%
	https://data.bs.ch/api/v2/catalog/datasets	152	54%	100%

Based on what is shown in Table 1, we can see that the level of complete metadata fields and machine-readable formats is not very high. In addition to this, it can be noticed that SOCRATA and OpenDataSoft OGD platforms have the best results for the level of average number of machine-readable formats per dataset. This is because these platforms mostly publish tabular data and offer the possibility to export them in various machine-readable formats such as CSV, XML, JSON, RDF etc. Furthermore, of all tested portals, only SOCRATA powered OGD portals have all complete metadata fields, i.e. all metadata defined. Some of the analysed OGD portals have less than 50% (or near that value) of the level of complete metadata fields per dataset on OGD portals, which may throttle the power of OGD. These portals should address this issue, as more detailed metadata for each dataset on portals contribute to the overall quality of OGD, which in turn improves application processing.

A continued commitment of governments to publishing high quality OGD contributes to their economic value. For instance, Mastodon C (a Big Data company) exploits OGD to identify unnecessary spending in prescription medicine.² Similarly, Saez Martin *et al.* (2016) identify a positive association with a country's economic capacities as a determinant factor for the quality of an OGD portal. On the basis of this, we can conclude that a relationship between OGD quality and economic development can be identified. More specifically, government institutions in this way can stimulate economic growth by creating an environment for the adequate consumption of its services. In so doing, governments complementary contribute to raising productivity, innovations, political progress etc., contributing at the same time to institutional development in the long-term perspective.

Citizens, as well as other stakeholders of OGD, are even more willing to use OGD when they are convinced that enhancement in individual performance and gaining economic value is available. Wirtz *et al.* (2018) suggest hiring external usability experts for reviewing OGD so as to ensure they can be utilized to generate value and benefit. According to a study by Tinholt (2017), a very low percentage of country-level OGD portals publish data that can be classified as comprehensive, i.e. data with high value gain, granular in nature and including extensive datasets. For example, thanks to the efforts made to ensure efficient management of OGD quality in Spain (Spanish Open Data Portal Annual Report, 2012), infomediary sector (companies that base their work on OGD) employs around 4,000 people and generates 330 – 550 million Euros annually, which is in direct relation with OGD reusability.



Periodic assessments of these characteristics of OGD portals will yield new insights into them, with the aim of monitoring whether OGD still have the potential for generating value.

Collecting feedback from OGD re-users is a promising way to increase data quality. For example, an EU study (2020) revealed that in Denmark more feedback was obtained after making address data owned by government publicly available, as part of a crowdsourcing map service OpenStreetMap. The same study revealed that accurate and precise data in the area of public transport could help to save 27 million hours annually for all European travellers. In order to collect citizen opinion and feedback, as well as opinions of other stakeholders, the government of Singapore sponsored a “hackathon” to identify bottlenecks in usage and exploitation of OGD (Chui *et al.*, 2020). Events like this raise the awareness of the necessity of having valuable OGD available. Zuiderwijk and Janssen (2013) identified the lack of the provision of feedback to data providers, or discussions with them after using OGD, and these mechanisms can be used to improve open data quality, data release processes and policies. Rudmark and Andersson (2021) showed that feedback loops in OGD ecosystems can serve as a source for improvements of OGD. Their research revealed that avoiding making OGD a new, separate publication targeting only external users proved to be a requisite quality measure in several studies of public transportation organization in Sweden.

A step forward in creating an adequate environment for publishing of quality OGD was made by Alexopoulos *et al.* (2014). Their research presents the ENGAGE open data infrastructure, the aim of which is to serve as a pipeline for publishing OGD in accordance with novel Web 2.0 oriented functionalities. Alawadhi *et al.* (2021) found that the existence of adequate strategies for publishing OGD would contribute to valuable deliverables. Consequently, this boosts income and productivity, affecting positively the economic cycle in the countries and encouraging the government sector to support the concept of open data and enact the necessary laws for that. The existence of strategy-led re-using of OGD is not just for pure financial profit – it could also be a part of the political or social agenda, or it could be used for hobby activities, academic exercises, or even pure altruistic motivation to advance public good (Sandoval-Almazán *et al.*, 2021).

CONCLUSIONS

The research topic presented in this paper by using descriptive approach represents a brief summary of the extant literature about creating value from OGD. Our intention was to explore how OGD contributes to economic development and how technical aspect of provision of OGD must be consulted in order not to produce negative effects. Moreover, the importance of OGD reusing for value creation is emphasized, implying that the government datasets should be reused by a diverse set of stakeholders. Continuous development of provisioning and usage sides of OGD helps to achieve this aim. It has been shown that if adequate attention is paid to the policy-led production and consumption of OGD, then quality, transparency, accountability and economic benefits will be obtained.

More importantly, our aim was to explore three interrelated topics of open government initiatives – effectiveness, transparency and quality. Proper understanding of these three dimensions enables potential beneficiaries to take advantage of the overall impact of open government on both the organizations and individuals. Keeping in mind that data created by governments are public good nowadays, it becomes clear why governments should make an effort to maximize the outcome out of the data.



REFERENCES

- Alexopoulos, C., Zuiderwijk, A., Charalabidi, Y. & Loukis, E. (2014). Closing the open public data feedback loop: the ENGAGE platform. In H. Alexopoulos (Ed.) *Proceedings of SHARE-PSI Workshop*. Lisbon: SHARE-PSI.
- Attard, J., Orlandi, F. & Auer, S. (2016). Value Creation on Open Government Data. In T. X. Bui & R. H. Sprague (Eds.) *Proceedings of the 49th Hawaii International Conference on System Sciences* (pp. 2605 – 2614). Hawaii, USA: IEEE.
- Albino, J. P. (2017). An Approach to Value Creation in Open Data for Small and Medium-Sized Enterprises using "R" Ecosystem. In L. Shen (Ed.) *Proceedings of the Computing Conference* (pp. 346 – 351), London, UK: The Science and Information Organization.
- Alawadhi, N., Al Shaikhli, I., Alkandari, A. & Kalaie, Chab, S. (2021). Business Owners' Feedback toward Adoption of Open Data: A Case Study in Kuwait. *Journal of Electrical and Computer Engineering*. 2021. 1 – 9. <https://doi.org/10.1155/2021/6692410>
- Bogdanović-Dinić, S., Veljković, N. & Stoimenov, L. (2014). How Open Are Public Government Data? An Assessment of Seven Open Data Portals. M. P. Rodríguez-Bolívar (Ed.) *Measuring E-government Efficiency, Public Administration and Information Technology*, (127, pp. 25 – 44), Springer: Cham. https://doi.org/10.1007/978-1-4614-9982-4_3
- Burns, R. & Welker, P. (2022). "Make our communities better through data": The moral economy of smart city labor. *Big Data & Society*, 9(1), 1 – 13. DOI: 10.1177/20539517221106381
- Cucciniello, M., Porumbescu, G.A. & Grimmeliwhuijsen, S. (2017). 25 Years of Transparency Research: Evidence and Future Directions. *Public Administration Review*. 77, 32 – 44. <https://doi.org/10.1111/puar.12685>
- Chui, M., Farrel, D. & Jackson, K. (2020). *How Government Can Promote Open Data and Help Unleash Over \$3 Trillion In Economic Value*. Washington, DC, USA: McKinsey Global Institute. Retrieved July 1, 2022, from [https://www.mckinsey.com/~media/mckinsey/industries/public%20and%20social%20sec-tor/our%20insights/how%20government%20can%20promote%20open%20data/how_govt_can_promote_open_data_and_help_unleash_over_\\$3_trillion_in_economic_value.pdf](https://www.mckinsey.com/~media/mckinsey/industries/public%20and%20social%20sec-tor/our%20insights/how%20government%20can%20promote%20open%20data/how_govt_can_promote_open_data_and_help_unleash_over_$3_trillion_in_economic_value.pdf)
- EU (2020). *The Economic Impact of Open Data Opportunities for value creation in Europe*. Brussels, Belgium: European Commission.
- Gao, Y. & Janssen, M. (2020). Generating Value from Government Data Using AI: An Exploratory Study. In G. Viale Pereira, M. Janssen, H. Lee, I. Lindgren, M. P. Rodríguez Bolívar, H. J. Scholl & A. Zuiderwijk (Eds.) *Proceedings of 19th IFIP WG 8.5 International Conference: Electronic Government EGOV 2020* (pp. 319 – 331). Springer: Cham. https://doi.org/10.1007/978-3-030-57599-1_24
- Harrison, T. M. & Sayogo, D. S. (2014). Transparency, participation, and accountability practices in open government: A comparative study. *Government Information Quarterly*, 31(4), 513 – 525. <https://doi.org/10.1016/j.giq.2014.08.002>
- Hope, O. K., Jiang, S. & Vyas, D. (2021). Government transparency and firm-level operational efficiency. *Journal of Business Finance & Accounting*, 49(5-6). 752 – 777. <https://doi.org/10.1111/jbfa.12563>
- Iemma, R. (2012). *Open government data: A focus on key economic and organizational drivers*. Torino: Nexa Center for Internet & Society. Retrieved July 2, 2022, from http://porto.polito.it/2520895/1/SSRN_id2262943.pdf
- Janssen, M., Brous, P., Estevez, E., Barbosa, L. S. & Janowski, T. (2020). *Government Information Quarterly*, 37(3), 1 – 8. <https://doi.org/10.1016/j.giq.2020.101493>
- Kingsley, A. F. & Graham, B.A. (2017). The effects of information voids on capital flows in emerging markets. *Journal of International Business Studies*, 48(3), 324 – 343. <https://doi.org/10.1057/s41267-016-0056-6>
- Khayyat, M. & Bannister, F. (2017). Towards a Model for Facilitating and Enabling Co-Creation using Open Government Data. *Information Polity*, 22(4), 211 – 231. <https://doi.org/10.3233/IP-170406>
- Lourenco R. P. (2015). An analysis of open government portals: A perspective of transparency for accountability. *Government Information Quarterly*, 32(3), 323 – 332. <https://doi.org/10.1016/j.giq.2015.05.006>



- Loukis, E., Kyriakou, N. & Maragoudakis, M. (2020). Using Government Data and Machine Learning for Predicting Firms' Vulnerability to Economic Crisis. . In G. Viale Pereira, M. Janssen, H. Lee, I. Lindgren, M. P. Rodríguez Bolívar, H. J. Scholl & A. Zuiderwijk (Eds.) *Proceedings of 19th IFIP WG 8.5 International Conference: Electronic Government EGOV 2020* (pp. 345 – 358). Springer: Cham. https://doi.org/10.1007/978-3-030-57599-1_26
- Magalhaes, G., Roseira, C. & Manley, L. (2014). In E. Estevez, M. Janssen, L. S. Barbosa (Eds.) *Proceedings of the 8th International Conference on Theory and Practice of Electronic Governance: ICEGOV 2014* (pp. 365 – 370), Guimaraes, Portugal: ACM.
- Mergel, I., Kleibrink, A. & Sorvik, J. (2018). Open data outcomes: U.S. cities between product and process innovation. *Government Information Quarterly*, 35(4), 622 – 632. DOI: 10.1016/j.giq.2018.09.004
- Milić, P., Veljković, N. & Stoimenov, L. (2018). Semantic Technologies in e-government: Toward Openness and Transparency. *Smart Technologies for Smart Governments, Public Administration and Information Technology* (pp. 55 – 66), Springer, Cham.
- Misuraca, G. & van Noordt, C. (2020). *AI Watch Artificial Intelligence in Public Services: Overview of the Use and Impact of AI in Public Services in the EU*. Retrieved July 1st, 2022, from <https://ideas.repec.org/p/ipt/iptwpa/jrc120399.html>
- Milić, P., Veljković, N. & Stoimenov, L. (2022). Using OpenGovB Transparency Indicator to Evaluate National Open Government Data. *Sustainability*, 14, 1 – 16, DOI: 10.3390/su14031407
- Nikiforova, A. (2020). Assessment of the usability of Latvia's open data portal or how close are we to gaining benefits from open data. In *Proceedings of the 14th International Conference on Interfaces and Human Computer Interaction*. 20 July 2020. (pp. 51 – 58), Zagreb, Croatia.
- Ramkumar, V. & de Renzio, P. (2009). Improving Budget Transparency and Accountability in Aid Dependent Countries: How Can Donors Help? IBP Budget Brief No. 7; *International Budget Partnership*: Washington, DC, USA.
- Ristoski, P. & Paulheim, H. (2016). Semantic Web in data mining and knowledge discovery: A comprehensive survey. *Web Semantics: Science, Services and Agents on the World Wide Web*, 36, 1 – 22, DOI: 10.1016/J.WEBSEM.2016.01.001
- Ruijter, E., Detienne, F., Baker, M., Groff, J. & Meijer, A. (2020). The Politics of Open Government Data: Understanding Organizational Responses to Pressure for More Transparency. *American Review of Public Administration*. 50(3), 260 – 274. DOI: 10.1177/0275074019888065
- Rudmark, D. & Andersson, M. (2021). Feedback Loops in Open Data Ecosystems. *IEEE Software*, 39(1), 43 – 47. DOI: 10.1109/MS.2021.3116874
- Saez, Martin, A., de Rosario, A. H. & Caba, Perez, M. D. C. (2016). An International Analysis of the Quality of Open Government Data Portals. *Social Science Computer Review*, 34(3), 298 – 311. DOI: 10.1177/0894439315585734
- Safarov, I., Meijer, A. & Grimmelikhuijsen, S. (2017). Utilization of open government data: A systematic literature review of types, conditions, effects and users. *Information Polity*. 22(1). 1 – 24. DOI: 10.3233/IP-160012
- Spanish Open Data Portal Annual Report (2012), *Characterization Study of the Infomediary Sector*, July 2012, Retrieved July 1st, 2022, from https://www.ontsi.es/sites/ontsi/files/121001_red_007_final_report_2012_edi_tion_vf_en_0.pdf
- Sandoval-Almazán, R., Criado, J. I. & Ruvalcaba-Gómez, E. A. (2021). Different perceptions, different open government strategies: The case of local Mexican public managers. *Information Polity*, 26(1), 87 – 102. DOI: 10.3233/IP-180100
- The World Bank. (2014). *Open data for economic growth*. Washington: The World Bank. <https://documents1.worldbank.org/curated/en/131621468154792082/pdf/896060REVISED000for0Economic0Growth.pdf>
- Tinholt, D. (2017). The Open Data Economy Unlocking Economic Value by Opening Government and Public Data. *Capgemini Consultings*. Retrieved July 1st, 2022, from <https://www.capgemini.com>



- Tan, E. (2019). *A conceptual model of the use of AI and blockchain for open government data governance in the public sector*. Retrieved July 1st, 2022, from <https://soc.kuleuven.be/io/digi4fed/doc/d-3-2-1-a-conceptual-model-of-the-use-of-ai-and.pdf>
- Wirtz, B. W., Weyerer, J. C. & Rösch, M. (2018). Citizen and Open Government: An Empirical Analysis of Antecedents of Open Government Data, *International Journal of Public Administration*, 41(4), 308 – 320, DOI: 10.1080/01900692.2016.1263659
- Wirtz, B. W., Weyerer, J. C. & Rösch, M. (2019). Open government and citizen participation: An empirical analysis of citizen expectancy towards open government data. *International Review of Administrative Sciences*. 85(3), 566 – 586. DOI: 10.1177%2F0020852317719996.
- Zuiderwijk, A. & Janssen, M. (2013). A coordination theory perspective to improve the use of open data in policy-making. In Proceedings of the 12th conference on Electronic Government (EGOV), 16 – 19 September 2013, (pp. 38 – 49), Koblenz, Germany.
- Zeleti, F. A., Ojo, A. & Curry, E. (2016). Exploring the economic value of open government data. *Government Information Quarterly*, 33(3), 535 – 551. DOI: 10.1016/j.giq.2016.01.008
- Zhang, Q., Wu, D., Lu, J., Liu, F. & Zhang, F. (2017). A cross-domain recommender system with consistent information transfer. *Decision Support Systems*, 104, 49 – 63, DOI: 10.1016/J.DSS.2017.10.002



KORIŠĆENJE OTVORENIH PODATAKA VLADE ZA EKONOMSKI RAZVOJ

Rezime:

Objavljivanje otvorenih podataka vlade donosi ogromnu korist i dobavljačima i potrošačima. S jedne strane, vlade povećavaju svoju transparentnost i omogućavaju razvoj pametnijih i bogatijih rešenja, dok sa druge strane omogućavaju različitim zainteresovanim stranama da izvlače nove informacije i stvaraju vrednost iz njih. U ovom radu istražujemo primenljivost podataka otvorene vlade za ekonomski razvoj i stvaranje vrednosti iz objavljenih podataka. Istražuju se različiti aspekti potrošnje podataka otvorene vlade, kao što su efikasnost, transparentnost i kvalitet – i kako su oni međusobno povezani. Oni su od velikog značaja za valorizaciju otvorenih vladinih podataka i pokazaćemo da korišćenje ekonomske vrednosti OPV mora biti praćeno sposobnošću vlada da učine dostupnim visokokvalitetne OPV.

Ključne reči:

E-uprava,
Otvoreni podaci,
Transparentnost,
Kvalitet,
Ekonomski razvoj.