Non-profit organisations' capabilities to reduce open government data barriers: a conceptual framework

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Abstract

Non-profit organisations are a type of intermediary that can expand the freedom of or empower communities of open government data users while not generating profits. Non-profit intermediaries perform activities with open government data to make it more easily reusable for various user groups by decreasing their user barriers, for example, through aggregating the data for less data-skilled users. According to the capability-based view, non-profit organisations have specific value capabilities to help users reduce their barriers. Based on a capability-based view and the literature on open government data user barriers, this study aims to develop a conceptual framework of the value capabilities non-profit intermediaries use to reduce open data user barriers in different stages of the user value creation process. Using a multiple case study approach, we find what constitutes the value capabilities of non-profit organisations to help reduce user barriers, and we present a conceptual framework that shows which value capabilities are applied during the users' open data value chain stages. This study helps non-profit organisations using open government data understand which value capabilities they should focus on to reduce user barriers. The scientific relevance of this study is in creating a conceptual framework that applies a capability-based view in the context of open government data value creation and explains how non-profit organisations reduce user barriers.

Keywords

non-profit organisations, capability-based view, open government data

1. Introduction

Open government data (OGD) can help governments achieve transparency, democratic participation, economic growth, and societal benefits [1]. OGD intermediaries, such as Non-Profit Organisations (NPOs), bridge the gap between OGD providers and users [2], facilitating data reuse [3]. NPOs advocate for social change and provide services without generating profits [4]. They make OGD more usable by developing tools and visualisations, training users, and organising hackathons [5, 6]. According to the Capability Based View (CBV), NPOs have specific capabilities, defined as the capacity of an organisation to utilise its resources and its organisational processes to get the desired results [7]. Such capabilities are tangible and intangible processes that develop over time through the interactions of

organisational resources (ibid.). Value capabilities represent the capabilities contributing to creating value for the users of OGD (ibid.). OGD value is harnessed by applying an open data value supply chain [8] to data reuse, but it is often insufficient [9] due to the barriers. NPOs reducing the OGD user barriers create value for the users.

While previous research has examined open data user barriers [10], value capabilities [11], and open data value creation [8] separately, there is limited insight into their interrelation. This gap results in a lack of knowledge on how NPOs' value capabilities reduce user barriers throughout the user value creation process. This knowledge can help NPOs get OGD value to their users by identifying which capabilities to develop and when to apply them.

This study aims to identify the value capabilities used by NPOs to reduce OGD user barriers at different stages of the value creation process. This framework helps NPOs implementing OGD understand which value capabilities to focus on to aid their target groups. The scientific relevance of this study is in creating a conceptual framework that applies CBV in the context of OGD value creation and explains how NPOs can reduce user barriers.

2. Research Background

2.1. User Barriers

In our research, non-profit intermediaries are organisations that reuse, enhance, or otherwise invest in open government data to generate user value and achieve NPOs' mission. Non-profit intermediaries can republish enhanced OGD, use OGD to create applications and provide training or advice to publishers and users on OGD [3, 10]. Non-profit intermediaries assist users in overcoming barriers to OGD reuse, with main user groups of public sector employees, private sector organisations, and citizens/civil society [13]. These barriers include difficulty in finding data, data quality issues, and complex access [12, 13]. Organisational and individual barriers, such as users' skills, knowledge, and privacy concerns, also hinder OGD use [14, 15]. In our research, we look at five groups of user barriers based on the literature: the lack of skills and awareness, lack of usability, lack of community building, lack of governance, and lack of accessibility and findability [16, 17].

NPOs' perception of barriers faced by OGD users can be influenced by their mission and the social issues they address [19]. NPOs possess unique resources and capabilities, such as specialised expertise, skills, or connections with data providers and users, which may affect barriers that other intermediaries cannot affect [11]. Therefore, NPOs may prioritise and address OGD user barriers in distinct ways compared to other organisations due to the difference in capabilities.

2.2. Capability Based View

Capability Based View (CBV) is an influential theoretical model that suggests that resources are the source of capabilities, while capabilities are the source of an organisation's competitive advantage [20]. CBV has been applied in a variety of research related to the management field [21], marketing [22], business [23] and information systems [24].

Lockett, Thompson, and Morgenstern [25] claim that customers prioritise a firm's capability to meet their needs over its resources. Thus, a set of organisational capabilities is needed for customer value-creating activities [7]. Our research focuses on NPOs' capabilities to create customer value, which equates to user value addressed by the value capabilities.

We derive five value capabilities from the literature: "Individual competencies", "Business processes", "Organisational capabilities", "IT and Technological Infrastructure", and "Management and Governance" capabilities [26]. "Individual competencies" concern specific skills of an employee for specific tasks related to OGD [27, 28] that are expected or needed on an organisational level to deliver user value. "Business processes" require structured activities that produce a service or product for the users. In the context of OGD, business processes are NPOs' "Open data processes", such as data enhancement or visualisation [26]. "Organisational capabilities" refer to how NPOs' systems and employees work together toward organisational goals, including their collaboration, flexibility, and motivation [29, 30]. "IT and Technological Infrastructure" are about NPOs' technological foundation of relevant equipment and systems for user value creation [30]. "Management and Governance capabilities" involve managing people, OGD resources and organisational governance [29]. This is especially relevant for NPOs, which may differ in management style from for-profit organisations [4].

The existing literature on the capabilities of open data intermediaries, particularly NPOs, is limited [32, 33]. In one of the studies on the capabilities of open data organisations, the authors investigate a few NPOs [11]. They find that the two most important value capability areas are "Individual competencies" and "Management and governance" [11]. Their study shows that applying CBV to OGD intermediaries is possible, and implementation in the NPO context has potential value.

2.3. Open Data Value Chain Stages

The open data value chain represents the stages of value creation experienced by the NPOs [8]. It can show at which point the value capabilities are used to reduce user barriers. The value chain consists of four stages [8]. First, in the context of OGD use, the users need to *acquire the data* from the government. The second stage is to collect the data from the sources, aggregate and process it as, in many cases, the data needs to be enhanced to add value. The third stage is data distribution and delivery, which includes data publishing, giving users access to and bringing awareness about the data for reuse. Fourth, *the final data use* stage implies the reuse of the data by various users to get the most value.

3. Research Method

This section describes the design of our research. A case study approach is used to answer questions of how and why to explain a current event [35, 36] and to show how specific practices are developed in the organisations [35], which fits with the research objective. Following guidelines on describing case study research [34], the next sections discuss the rationale and selection criteria, data collection, and case vignettes.

3.1. Rationale and Selection Criteria

The selected cases are NPOs performing OGD activities to provide value to user groups. The case studies are exploratory due to a lack of an existing knowledge base [34, 35]. The theoretical replication approach is chosen for its potentially contrasting case results from diverse contexts fostering conceptual development [36]. Multiple case studies are essential for this approach, so two are proposed to fulfill research objectives [34].

Embedded case studies are used, focusing on NPOs as the unit of analysis, with embedded units examining OGD activities [37]. NPOs undertake various activities across projects involving different stakeholders and OGD types [5], impacting different barriers to OGD reuse [38]. Semi-structured interviews with employees and document analysis are used for data collection. Variations in NPO missions result in possibly different activities performed and barriers influenced [10, 40]. Hence, the first criterion for the case study is the difference in the mission and focus of NPOs. The second criterion is the organisational skills and knowledge of OGD. The third criterion is that the organisation should have different types of activities they perform with OGD [39, 42]. The fourth criterion is for organisations to be located in the European Union due to its OGD-related regulations. That makes cases more easily comparable, although there are still country differences. The fifth criterion is that different administrative levels, municipal and national, are chosen to capture possible differences. The sixth criterion concerns the willingness of NPOs to be part of the case studies.

3.2. Data Collection and Analysis

Qualitative data from various sources were collected to enhance construct validity [34]. Semi-structured interviews with NPO employees, recorded via Microsoft Teams, were the primary method, covering NPO specifics, users, OGD barriers, and activities [34]. Interview transcripts, lasting about an hour each, underwent no suggested changes. Data documentation was also gathered from organisational websites, with translation if needed using the built-in translator of the Microsoft Edge browser.

ATLAS.ti software was used for qualitative data analysis, following the coding stages outlined by [33] and [41]. These included open coding, axial coding, and selective coding. Intercoder reliability was evaluated according to [42] and involved a second coder verifying codes independently on a subset of the data. Close similarity between the authors' codes was observed, with high intercoder reliability.

3.3. Case Vignettes

Open Knowledge Belgium (OKBE) is an NPO whose mission is to open up knowledge in Belgium for it to be used and useful. OKBE performs different activities as part of its projects, such as aggregating open data, making it easier for users to find and overcome the findability barrier. Another important activity is the organisation of campaigns and talks with governmental organisations to open up the data so the users can access the data they need and overcome the accessibility barrier. The organisation conducts these projects on different administrative levels, from regional to national [5].

City LAB Berlin is an NPO that focuses on digitalisation and urban development for the common good of society [42]. It demands that the municipality opens up the data, aggregates it, and develops tools for further use by the citizens. The NPO also organises events and workshops to promote the digitalisation of the city. Projects of City LAB Berlin focus on the city of Berlin.

4. Results

In this section, we first briefly describe the value capabilities of the NPOs we found. We found the corresponding groups of underlying processes for all the value capabilities, which we discuss in sub-section 4.1. The full value capabilities summary tables can be accessed via doi: 10.4121/c063c91d-2ed2-4ec9-a3d3-cf9b37119a00. In sub-section 4.2. we present the conceptual framework combining the CBV and user barriers over value chain stages as described in 2.3.

4.1. Non-profit organisations' value capabilities

We explored five categories of NPO value capabilities in reducing open data use barriers. Specific capabilities or processes were identified and highlighted within each category in *italics*. Firstly, the value capabilities related to "Individual Competencies" concern NPO employees' Expertise, Knowledge, and Skills, specifically related to open data, legal issues, communication skills, and technical skills. NPOs should promote openness to other organisations. Secondly, *Connections* of the employees with other intermediary organisations and potential OGD providers contribute to their knowledge and expertise in the field.

Secondly, within the "Organisational Capabilities," the *non-profit organisational model* brings its capabilities to an organisation, such as being seen as an advisor and a public representative rather than competing with private organisations. Moreover, it eases the hiring process and promotes a politic of open data and open source as a necessity. The second organisational capability group is *Collaborations* with other actors, such as governmental organisations, civil organisations, and for-profit organisations, on projects, feedback, and data opening. The third capability group is related to *Internal decision-making* that can differentiate from other intermediaries. For example, NPOs are more open to follow-up with employee initiative projects, but they are also open to other actors proposing project ideas. NPOs make quick decisions on project opportunities while considering users' needs and interest in projects. The fourth organisational capability group is related to the *Personal motivations* of employees that keep the organisation on track to achieve its goals by focusing on the personal perspectives of employees. The freedom to do interest-based projects on current social and technical topics helps to pursue diverse social problems on the organisational level.

Thirdly, concerning "Management and Governance," the *Country's legislation context* that can account for local OGD directives and data publishing standards is an important capability. The *organisational hierarchy* of NPOs can be useful due to the flexibility in project taking and project approval process. *Work structure* can count as another capability as

independent project management by the employees can also be unique to the non-profit intermediary approach to OGD.

Fourthly, "Open data processes" incorporate many aspects of reusing OGD or contributing to reuse by the users. We indicate *seven groups of activities* that are involved in these processes: 1) Creating communications channels for OGD users, 2) Improving OGD users' awareness and data literacy, 3) Facilitating networking between OGD actors, 4) Resolving legal concerns of OGD users, 5) Improving OGD quality, accessibility, and usability, 6) Advocacy for OGD, and 7) Making OGD relevant and interesting for the users.

Finally, or the group of value capabilities around "IT and Technology Infrastructure", we identify two main aspects from our data: *Front-end* and *Back-end capabilities*. For example, for their more technical project that involve applications/websites, NPOs might need to build database API, use cloud services, and utilise desktop open data visualisation and integration software.

4.2. Conceptual Framework

Based on the CBV applied to NPOs' value capabilities and OGD user barriers, as discussed in previous sub-sections, we propose a conceptual framework linking the two. Figure 1 below shows the value capabilities of non-profit intermediaries that help them create user value based on our results. The value capabilities are then linked to the groups of OGD users' barriers that they face during their value creation stages.

4.2.1. Stage I: Acquiring Open Government Data

During the first stage of the open data value chain, the users may face barriers such as lack of accessibility and findability, lack of skills and awareness, and lack of community building. The individual competencies of NPO employees help them push the government to open the data, which could bring value to the users. One of the interviewed board members says: *"You need knowledge on how to communicate with [...] policymakers, to lobby, to help them understand."* Where the users may lack knowledge and awareness on what data they can get and how to demand that data be open, NPOs have connections to governmental organisations and know how to approach lobbying for data openness. Open data activists can start by having that knowledge and connections to become NPO employees or board members and use their knowledge and expertise for societal benefit. On the organisational capabilities level, collaboration with other organisations helps NPOs to connect more easily with a possible government data provider and push them to open the data. As one project researcher points out: *"[if there is a] need for data that doesn't currently exist or maybe not in the best quality, then we would turn to our [partner organisation] and be like, do you have contacts to these people?[...] Maybe, can we start a conversation? And that's a luxury that the average data user would not have."* There is an awareness among NPO employees of the benefits of NPOs, such as collaborations with other organisations and easier access to potential data providers. Moreover, having a non-profit organisational model means that the government, as an OGD provider, can see them differently from for-profit ones. As a respondent points out: *" ...what's different for us is that we [...] lobby in a different way [...] we are speaking for the public and for a vision, we don't negotiate with money..."* That suggests that the role of a public representative can affect the perception of NPO openness demands. By lobbying for the data to be open on behalf of the user groups, NPOs then reduce the

barriers related to accessibility that prevent value creation from the data the government holds not as open. Additionally, as another open data process, NPOs help create spaces for the users to come together with potential data providers. For example, the Open Knowledge Belgium NPO organises a conference: *"It's a day where data publishers sit next to users, citizen developers and communities to network and to openly discuss the next steps in [...] Open Data."* Creating spaces for such communication helps users share knowledge and access the data providers to discuss data needs in person, establishing more lasting connections.
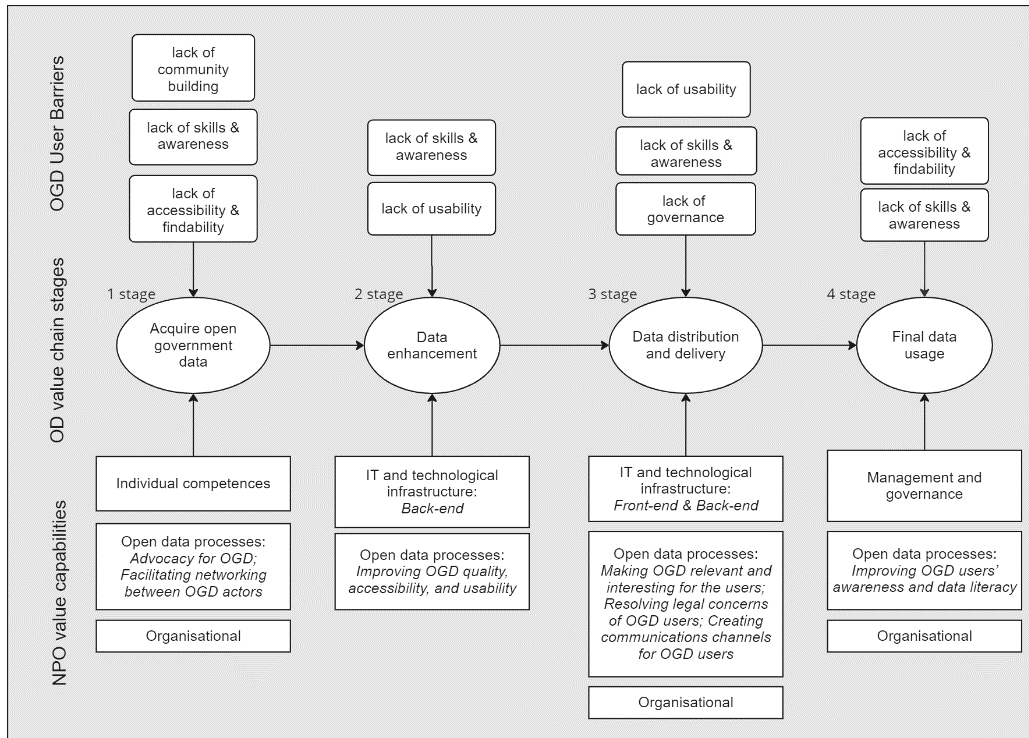

Figure 1: Conceptual framework of NPOs' value capabilities reducing OGD user barriers over the value chain stages.

4.2.2. Stage II: Data Enhancement

For the second stage of the open data value chain of data enhancement, the users face a lack of data skills and awareness and a lack of OGD usability due to, for example, the non-machine readable format of the data. That is where the back-end part of the IT and Technology infrastructure capabilities of NPOs become useful. As one interviewee describes: *"So as we [...] build a Python script to get this data and transform it into the tiles that you can also see on [the project's map]."* From collecting the data to aggregating to normalising it, many steps make OGD more usable for the user, especially if they lack the skills to do that work themselves. As part of the open data processes that NPOs perform, improving the quality and usability of the OGD is an important activity that can also include data validation or improving metadata. As the respondent discusses: *"...what is a good meta description, what format do you want... making [...] data GDPR compliant, meaning that there is no personal data in it."*

4.2.3. Stage III: Data Distribution and Delivery

During this stage of the OD value chain, the users still might face a lack of awareness and skills, a lack of data usability, and a lack of governance. NPOs apply their IT and Technological infrastructure's front-end capabilities to reduce user barriers during this stage. A respondent gives an example: *"We have applications that are prototypical visualisations that [...] demonstrate the usefulness of [...] open data. [...] we rely on the community or invite the community to then use the published data and develop a use case for themselves."* By creating prototypes in the form of, for example, web applications with data visualisations, NPOs show the potential and value of OGD to the users. This way, the users are aware of existing OGD on a possible topic of interest and can more easily find and access the data as NPOs provide it through their channels. The important part of this stage is the open data processes and organisational capabilities of NPOs. Firstly, non-profit intermediaries make OGD relevant to user groups by considering current societal topics. A respondent shares: *"...because this was already a relevant topic and the data was out there, we created a map just to visualise this data of energy usage and public buildings so that people could navigate it..."* As energy prices rose and more people became invested in the topic, the NPOs' employees, using their interest in pursuing relevant projects, addressed it by data visualisation with a map, making OGD accessible and of interest to various citizens. Due to the collaboration with the government as a data provider, NPOs can provide a feedback channel for the users on how they want the data distributed. As an interviewee explains:*"...someone from the government has approached us, said: "We [want to] publish this data. We would love to know what people want in this data so that we can make sure when we publish it that we include it". And [...] then we've carried that to the community."* NPOs who collaborate and connect with the government can then act as users' representatives and intermediaries. Additionally, by re-releasing the OGD through their channels, NPOs can alleviate concerns about legal issues that come with data reuse. For example, for one of the projects, the interviewee says:*" [our] license allows free [...] access to our map images and all of our underlying map data."*

4.2.4. Stage IV: Final Data Usage

As this stage implies the reuse of the data by a variety of users to get the most value, the users are stalled mainly by their lack of skills and awareness and their inability to find and access specific data they want. Even if there is a lot of OGD available due to the country context, it may take time to grasp where to look for it. As one of the interviewees explains about the context of the city of Berlin: *"...we have a lot of different data sources. You can get the data from the Geo portal, you can get it from the health portal, you can get it from the Bureau, the Office of Statistics, and you have a lot of various sources."* However, even as an NPO employee: *"... It took [them] a long time to understand the whole landscape in Berlin and where to find [the data]."* One of the managerial capabilities that NPOs possess is navigating the country context and its legislation around OGD to know what is available, what is expected, and what can be demanded. Thus, they can help OGD be more reused by various user communities through this capability. The organisational capabilities of NPOs that allow them to take the role of public representative and collaborate with the stakeholders means

that they can help increase the reuse of OGD. An interviewee recounts such a situation: *"...we've gone to the Slack community and said, hey, we've been approached by someone in the government who wants to publish data on this subject matter. [...] what kinds of projects would you envision doing with it... And we've gotten some really good feedback that way, and then we carry it back to the government ...and then they can try to make sure that they publish data that ... can be used for that."* Another value capability involved is open data processes, specifically processes to improve the users' OGD awareness and data literacy. One of the interviewees highlighted it as an important part of the NPO mission: *"...drawing attention to data that exists that people might not have been aware of..."* NPOs can provide training, outreach events, and advisory services for various user groups that would subsequently help with OGD reuse.

5. Discussion and Conclusion

In our study, we identified five main groups of value capabilities and their subgroups, aligning with the literature. For instance, within "Individual competencies," beyond employees' *expertise, knowledge, and skills*, pre-existing *connections* between employees from diverse sectors emerged as a capability. While literature emphasises open data-related knowledge and skills [11], the importance of connections is not, although this capability can motivate individuals to be part of an NPO in the first place. In "Organisational capabilities," the *non-profit organisational model* contributes to other organisational capabilities, providing space for employees' *personal motivations* and *internal decision-making* flexibility. Given the variation in OGD regulations across countries, "Management and governance capability" must consider the specific national context. If NPO is focused on affecting OGD user barriers, its "Open data processes" that concern different ways of alleviating said barriers take precedence over other value capabilities. The diversity of activities performed is needed to tackle various problems different user groups face.

The conceptual framework highlights that while all five value capabilities groups are present throughout the open data value chain, not all subgroups are important at every stage. "Open data processes" involve various NPO activities to alleviate user barriers and are consistently implemented across all stages. NPOs implement all types of "Open data processes." Another crucial capability is "Organisational capabilities," indicating the *non-profit organisational model*, *decision-making processes*, employee *personal perspectives*, and *collaborations* with OGD stakeholders significantly influence barriers across stages.

The common user barrier across all stages is the lack of open data skills and awareness, followed by data usability issues, particularly in stages two and three. Accessibility and findability challenges arise in the initial and final stages of the value chain. Interestingly, community-building and governance barriers are less common, each appearing only once as less targeted user barriers. In the study of [11], "Individual competencies" and "Management and governance" are identified as the two most important capabilities for open data organisations, including NPOs. However, our study finds "Management and governance" relevant only at the final value chain stage and "Individual competencies" primarily important during the initial stage of acquiring OGD. However, the aim of our

research differs, and our focus on the user barriers might be responsible for the difference in the results.

Overall, NPOs' value capabilities that we identified provide NPO-specific types of capabilities that are not just generalised for OD organisations. Our findings suggest the importance of, specifically, "Organisational capabilities" and "Open data processes" of NPOs to reduce the user barriers across the open data value chain. We also find that the most targeted user barrier is a lack of open data skills and awareness of the user groups, and NPOs see that as the main problem to successful value creation from OGD.

This study's limitations include using a built-in translator of the Microsoft Edge browser for some of the website pages that are not available in English. The automated translation can be imprecise, affecting the coding process. Additionally, few interviews were conducted for the case studies as few current employees worked with OGD. Thus, the study could benefit from more data for generalisation.

NPOs that use OGD or focus on open data promotion can use the findings of this study to help their target groups with OGD reuse by understanding which value capabilities they should focus on. The scientific relevance of this study is in creating a conceptual framework that applies CBV in the context of OGD value creation to explain how NPOs can reduce user barriers. We recommend that future research examines the diversity of NPOs and how this may influence the barriers and relevant capabilities involved in specific cases. This leads to the application and evaluation of the conceptual framework developed in this research.

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References

[1] I. Safarov, A. Meijer, and S. Grimmelikhuijsen, 'Utilization of open government data: A systematic literature review of types, conditions, effects and users', *Information Polity*, vol. 22, no. 1, pp. 1–24, 2017, doi: 10.3233/ip-160012.

[2] F. Gonzalez-Zapata and R. Heeks, 'Understanding multiple roles of intermediaries in OGD.', presented at the 13th International Conference on Social Implications of Computers in Developing Countries, Negombo, Sri Lanka, 2015.

[3] A. Yoon, A. Copeland, and P. J. McNally, 'Empowering communities with data: Role of data intermediaries for communities' data utilisation', *Proceedings of the Association for Information Science and Technology*, vol. 55, no. 1, pp. 583–592, 2018.

[4] L. M. Salamon and H. K. Anheier, 'In search of the non-profit sector. I: The question of definitions', *Voluntas*, vol. 3, no. 2, pp. 125–151, 1992, doi: 10.1007/bf01397770.

[5] Open Knowledge Belgium, 'Activities', Open Knowledge Belgium. Accessed: May 06, 2022. [Online]. Available: https://openknowledge.be/activities/

[6] Open Knowledge Foundation, 'Training', Open Knowledge Foundation. [Online]. Available: https://okfn.org/what-we-do/training/

[7] R. Amit and P. J. H. Schoemaker, 'Strategic assets and organisational rent', *Strategic Management Journal*, vol. 14, no. 1, pp. 33–46, Jan. 1993, doi: 10.1002/smj.4250140105.

[8] B. Ubaldi, 'Open Government Data: Towards Empirical Analysis of Open Government Data Initiatives', OECD Working Papers on Public Governance 22, May 2013.

[9] T. Jetzek, M. Avital, and N. Bjorn-Andersen, 'Generating Value from Open Government Data', in *International Conference on Information Systems (ICIS 2013): Reshaping Society Through Information Systems Design*, Dec. 2013.

[10] M. Beno, K. Figl, J. Umbrich, and A. Polleres, 'Perception of Key Barriers in Using and Publishing Open Data', *JeDEM - eJournal of eDemocracy and Open Government*, vol. 9, no. 2, pp. 134–165, 2017, doi: 10.29379/jedem.v9i2.465.

[11] F. Ahmadi Zeleti and A. Ojo, 'Qualitative Structural Model for Capabilities in Open Data Organizations', presented at the Hawaii International Conference on System Sciences, 2019. doi: 10.24251/HICSS.2019.351.

[12] B. Ricker, J. Cinnamon, and Y. Dierwechter, 'When open data and data activism meet: An analysis of civic participation in Cape Town, South Africa', *Canadian Geographer*, vol. 64, no. 3, pp. 359–373, 2020, doi: 10.1111/cag.12608.

[13] J. Berends, W. Carrara, and H. Vollers, 'Barriers in working with open data', Publications Office of the European Union, 2020.

[14] S. Martin, M. Foulonneau, S. Turki, and M. Ihadjadene, 'Open Data: Barriers, Risks and Opportunities', presented at the 13th European Conference on e-Government (ECEG), Jun. 2013, pp. 301–309.

[15] C. S. Albano and N. Reinhard, *Open government data: Facilitating and motivating factors for coping with potential barriers in the Brazilian context*, vol. 8653 LNCS. Springer Verlag, 2014.

[16] J. Brugger, M. Fraefel, R. Riedl, H. Fehr, D. Schöneck, and C. S. Weissbrod, 'Current barriers to open government data use and visualisation by political intermediaries', in *Proceedings of the 6th International Conference for E-Democracy and Open Government, CeDEM 2016*, Institute of Electrical and Electronics Engineers Inc., 2016, pp. 219–229.

[17] A. Yoon and A. Copeland, 'Toward community-inclusive data ecosystems: Challenges and opportunities of open data for community-based organizations', *Journal of the Association for Information Science and Technology*, vol. 71, no. 12, pp. 1439–1454, 2020, doi: 10.1002/asi.24346.

[18] M. Janssen, Y. Charalabidis, and A. Zuiderwijk, 'Benefits, Adoption Barriers and Myths of Open Data and Open Government', *Information Systems Management*, vol. 29, no. 4, pp. 258–268, 2012, doi: 10.1080/10580530.2012.716740.

[19] F. van Schalkwyk, M. Caňares, S. Chattapadhyay, and A. Andrason, 'Open data intermediaries in Developing countries', 2015.

[20] R. Grant, 'The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation', in *Knowledge and Strategy*, Elsevier, 1999, pp. 3–23. doi: 10.1016/B978-0-7506-7088-3.50004-8.

[21] M. J. Leiblein, 'What Do Resource- and Capability-Based Theories Propose?', *Journal of Management*, vol. 37, no. 4, pp. 909–932, Jul. 2011, doi: 10.1177/0149206311408321.

[22] K. E. K. Möller and P. Törrönen, 'Business suppliers' value creation potential: A capability-based analysis', *Industrial Marketing Management*, vol. 32, no. 2, pp. 109–118, Feb. 2003, doi: 10.1016/S0019-8501(02)00225-0.

[23] H.-L. Wang, 'Theories for competitive advantage', in *Being Practical with Theory: A Window into Business Research*, Wollongong, Australia: THEORI, 2014.

[24] A. Khodabandeh Amiri and H. Cavusoglu, 'Enhancing Strategic IT Alignment through Common Language: Using the Terminology of the Resource-based View or the

Capability-based View?', presented at the Thirty Sixth International Conference on Information Systems, Fort Worth: AISeL, 2015.

[25] A. Lockett, S. Thompson, and U. Morgenstern, 'The development of the resource-based view of the firm: A critical appraisal', *International Journal of Management Reviews*, vol. 11, no. 1, pp. 9–28, 2009, doi: 10.1111/j.1468-2370.2008.00252.x.

[26] F. A. Zeleti and A. Ojo, 'Open data value capability architecture', *Inf Syst Front*, vol. 19, no. 2, pp. 337–360, Apr. 2017, doi: 10.1007/s10796-016-9711-5.

[27] A. Lindgreen and F. Wynstra, 'Value in business markets: What do we know? Where are we going?', *Industrial Marketing Management*, vol. 34, no. 7, pp. 732–748, Oct. 2005, doi: 10.1016/j.indmarman.2005.01.001.

[28] M. R. Haas and M. T. Hansen, 'When using knowledge can hurt performance: the value of organizational capabilities in a management consulting company', *Strategic Management Journal*, vol. 26, no. 1, pp. 1–24, 2005, doi: 10.1002/smj.429.

[29] V. Ambrosini and C. Bowman, 'What are dynamic capabilities and are they a useful construct in strategic management?', *International Journal of Management Reviews*, vol. 11, no. 1, pp. 29–49, 2009, doi: 10.1111/j.1468-2370.2008.00251.x.

[30] G. D. Bhatt and V. Grover, 'Types of Information Technology Capabilities and Their Role in Competitive Advantage: An Empirical Study', *Journal of Management Information Systems*, vol. 22, no. 2, pp. 253–277, Nov. 2005, doi: 10.1080/07421222.2005.11045844.

[31] F. A. Zeleti and A. Ojo, 'Capability Matrix for Open Data', in *Progress in Pattern Recognition, Image Analysis, Computer Vision, and Applications*, vol. 8827, E. Bayro-Corrochano and E. Hancock, Eds., in Lecture Notes in Computer Science, vol. 8827., Cham: Springer International Publishing, 2014, pp. 498–509.

[32] F. A. Zeleti and A. Ojo, 'Capability Model for Open Data: An Empirical Analysis', in *Proceedings of the 11th International Conference on Theory and Practice of Electronic Governance*, Ireland: ACM, Apr. 2018, pp. 403–411. doi: 10.1145/3209415.3209492.

[33] W. L. Neuman, *Social Research Methods: Qualitative and Quantitative Approaches*, 7th ed. Pearson Education, 2013.

[34] R. K. Yin, *Case Study Research and Applications*, 6th ed. Los-Angeles, U.S.A.: SAGE Publications, 2018.

[35] R. W. Scapens, 'Researching management accounting practice: The role of case study methods', *The British Accounting Review*, vol. 22, no. 3, pp. 259–281, Sep. 1990.

[36] A. L. Strauss and J. M. Corbin, *Basics of qualitative research: techniques and procedures for developing grounded theory*, 2nd ed. Thousand Oaks: Sage Publications, 1998.

[37] R. W. Scholz and O. Tietje, 'Types of Case Studies', in *Embedded Case Study Methods*, Thousand Oaks, U.S.A.: SAGE Publications, Inc., 2002, pp. 9–14.

[38] D. den Haan, 'Intermediation as a dissolver of barriers: How intermediaries can help overcome barriers in open data use', 2018.

[39] M. Gascó-Hernández, E. G. Martin, L. Reggi, S. Pyo, and L. F. Luna-Reyes, 'Promoting the use of open government data: Cases of training and engagement', *Government Information Quarterly*, vol. 35, no. 2, pp. 233–242, 2018, doi: 10.1016/j.giq.2018.01.003.

[40] A. Shaharudin, B. van Loenen, and M. Janssen, 'Towards a Common Definition of Open Data Intermediaries', *Digit. Gov.: Res. Pract.*, vol. 4, no. 2, pp. 1–21, Jun. 2023.

[41] J. Saldana, *The Coding Manual for Qualitative Researchers*. London, UK: SAGE Publications Ltd., 2013.

[42] CityLAB Berlin, 'About Us', CityLAB Berlin. Accessed: Sep. 23, 2022. [Online]. Available: https://citylab-berlin.org/en/about-us/