Open Spending Portal Design Principles

Enhancing Online Citizen Engagement

Master Thesis

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Executive Summary

Research Background

In the era of open government, citizens are one of the stakeholders of a country. With the emerging concept of transparency and accountability, supported by ICTs deployments in government areas, citizens have more access to the government. Budget is among the many areas within governments that have utilized ICTs for many purposes, one of them is to share financial data. Through a website, or dedicated website (portals), government agencies have shared their budget planning documents as well as spending data to be used by citizens. Using this data, citizens can monitor how and where the government spent their taxes. This is the main reason why the website such as ‘Where Does My Money Go?’ is created. The activity of following and monitoring the money flow is referred to as budget expenditure tracking.

Budget Expenditure Tracking (BET) exercise is an activity involving citizens in the third stage of the budget process, which is budget execution. To support this exercise, government agencies publish their spending data on a website that can be downloaded by citizens—the website is called open spending portal in this study. Budget expenditure can be traced in two ways: by comparing the actual spending and the approved budget plan, and by tracing the executed transaction. The first activity is to ensure the budget spent by government agencies do not deviate from the plan or there must be acceptable justification if there is, while the second one is to ensure that the transactions were conducted properly.

Engaging citizens in BET exercises has its challenges. In some countries, the effort to provide opportunities for engagement to take place is relatively low. Therefore, there is a need for improvement from governments’ side on this matter. Governments need to provide opportunities for citizens to be engaged in the BET exercises process. Open spending portal is one of many ways to achieve this goal. Through this portal, the government can publish its spending data, and the public can freely access and reuse the data. However, the reality is not as successful as the words say. One of the reasons why online citizen engagement is difficult to realize is the unavailability of guidelines for e-participation. Therefore, there is a need to formulate clear guidelines on how to engage citizens in open spending portals for budget expenditure exercises.

This research aims at developing a set of design principles that can enhance citizen engagement in open spending portals. In the end, this research can help government agencies to review how far they are in engaging citizens and what can be improved in the existing open spending portal. The main research question of this study is: Which principles need to be incorporated in designing an open spending portal so that it can enhance citizen engagement in BET exercise?

Methodology

In order to answer the question, the research was carried out in five phases. The first phase is defining the research scope. This phase consists of two steps. First, defining the terms of citizen engagement and OS portal. The definitions are constructed using a literature review. The constructed definitions are used as a basis for the rest of the research. Definition of citizen engagement and OS portals serve as a common ground of this research. Second, to provide comprehensive knowledge of factors influencing citizen engagement through desk research. This step focuses on identifying factors that can encourage or hinder citizens to be engaged in BET exercises through OS portals.

The second phase is the portal observation. This phase aims to investigate the relevant factors from the first phase that have been implemented in existing OS portals. The observation starts by developing portal selection criteria. The next step is to build a protocol for portal observation, which serves as an observation guideline. The output is a list of functionalities of existing portals that might trigger the citizen engagement.

The third phase is to develop design principles. This phase is a synthesis part of the previous two phases and encompassing several steps within designing activities, including creating the design principles. The
development of design principles focuses on existing guidelines on how to enhance or stimulate citizen engagement. The aim is to provide insight into what design principles need to be adopted by an OS portal to enhance citizen engagement. The output of this phase is an initial set of design principles for OS portals that can potentially enhance citizen engagement.

The fourth phase is to evaluate the design principles with experts. The evaluation focuses on the experts’ opinions of the developed design principles for citizen engagement enhancement. Since the evaluation is to confirm how effective the design principle would be in the future, interviewees would be from citizen itself. Several experts that are interviewed are researchers with a background in open data and citizen engagement, data scientist, journalists focusing on open spending data, and portal owner.

The last phase to integrate findings of previous steps. After evaluating the initial design principles, further analysis is conducted to revise the design principles. Therefore, the output of this step, as well as the final deliverable of this research, is the revised version of design principles for OS portal that can enhance citizen engagement. The answer to the main research question is provided in this phase.

Final Deliverables

Citizen engagement is defined as a two-way interaction between citizens and between citizens and the government that can bridge and facilitate citizens’ interest in tracking budget expenditure and allows the government to involve, collaborate with, and empowers the citizens in decision-making processes. This definition is used to build the model of citizen engagement. Using this model, the researcher defines enhancing citizen engagement as leveling up the engagement from passive to pro-active citizens by facilitating two-way interaction between citizens and the government and providing support for BET exercise.

Enable active citizens

1. Facilitate trust and confidence building

2. Facilitate knowledge sharing
   • [Principle 3] The portal facilitates knowledge exchange between users by providing space for interaction between them.

3. Provide rooms for collaboration
   • [Principle 1] The portal provides a mechanism for users to request datasets and to track whether their request has been approved.
   • [Principle 2] The portal allows citizens to submit feedbacks and view other users’ opinions or submitted feedbacks about a dataset.
   • [Principle 7] The portal allows citizens to submit necessary information or documents to support BET exercise

Enable pro-active citizens

1. Data easy to be found
   • [Principle 6] The portal assists users in understanding how to use the open spending portal.
   • [Principle 9] The portal assists users in searching datasets by providing filtering and suggestion functionality on the search function.
   • [Principle 13] The portal uses a user-friendly interface to ease navigation by categorizing datasets into different topics and providing the user interface in the language that the users’ needs
• [Principle 43] The portal has a standard for data to be disclosed online

2. Minimum barriers to data
   • [Principle 8] The portal ensures minimum barriers between citizens and data.
   • [Principle 21] The portal ensures minimum efforts in retrieving the data

3. Assists users in understanding the data
   • [Principle 12] The portal provides the function to visualize datasets to allow quick viewing of datasets
   • [Principle 16] The portal provides mechanisms that allow citizens to understand the context of the data

4. Provide data processing assistance
   • [Principle 5] The portal assists users in understanding and using datasets

5. Support BET exercise
   • [Principle 11] The portal provides datasets in machine-processable format and allow users to download datasets in the format that they prefer
   • [Principle 17] The portal provides mechanisms that allow citizens to perform accurate BET exercise

6. Ensure legal aspects
   • [Principle 15] The portal complies with relevant privacy and security concern
   • [Principle 18] The portal allows citizens to analyze and share the data legally

7. Innovation-friendly
   • [Principle 20] The portal encourages citizens’ creativity to innovate using the data
   • [Principle 10] The portal provides API when users need to access datasets through external applications

8. Maintaining data reliability
   • [Principle 21] The portal has separate files from citizens and officials
   • [Principle 22] The portal allows for tracking data update history
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1 INTRODUCTION

This chapter includes the contextual background of the research. Research problem and research questions are provided and explained in this chapter. To draw a clear line of the research, the scope of the study is also presented. The chapter starts with the introduction to open budget which will be directed towards citizen engagement in the whole budget process. In the next subsections, explanations about citizen engagement and actors involved in the budget process are provided. In addition to the entry point of citizen engagement, the explanation also includes how the engagement takes place. Examples from different countries that emphasis on engaging citizen within the budget process is provided for each phase. Focusing on phase budget execution, section 1.1.2 provides an explanation about actors involved in this phase along with their roles.

1.1. Open Budget

Establishing the proper relationship between the government and citizens can be quite tricky. Conventionally, in some countries, democracy seems to be the best choice citizens can have to sound their voices. However, the practice is far from the success. Corruption still takes place, and the citizens in the rural area are still wondering what happens inside the government. For several developing countries, transparency is still a concept, far from reality.

To stimulate the transparency between the government and citizens, the Open Government Partnership was established in 2011. One way to make sure the concept feasible is through Open Government Data by publishing several sets of government data (Ubaldi, 2013). Open Definition defines open data as being freely used, modified, and shared by anyone for any purposes. For instance, the US has published the government data through data.gov. Among many other countries, the UK and Germany also followed this step by launching data.gov.uk and govdata.de (Wirtz et al., 2017). In several countries, data about the budget, local or national level, has been published to let citizens dig deeper and spot fraud early. These budget data for public consumption is usually referred to as open budget data (Tygel et al., 2016). The open budget contains data about public revenue, budget expenditure and other data related to the government budget.

Budget is one of many other aspects of the government that can bridge the gap between the government and citizens. Among the government revenue, there are taxes from citizens. Therefore, it is only fair if the citizens also have a stake in deciding what to do with the budget and how much of it should be spent on which sector. To achieve the fairness, the government should let citizens participate not only in planning the budget for the whole period but also in tracking where the budget is spent. The two activities are part of the budget process. The more detailed explanation of the budget process and how citizens should participate is provided in the next section.

1.1.1. Citizens in Budget Processes

This section explains the budget process and how opportunities for a citizen to be involved in a budget circle can be created.

In most of the countries, budget process or sometimes known as a budget cycle is a 4-stage process within the budget environment. The process starts with budget planning by the country executives,
then budget approval by the legislature, the third phase is budget execution by the government, and the last one is budget auditing by official authorities.

Citizens’ involvement in budgeting can be found in all phases of the budget process (see figure 1). The cycle depicts the four-phase of a budget process. Each box connected to the process is the form of citizens’ involvement in every phase. The opportunity for a citizen to be involved in budgeting circle can be whether the government informs the public, hear the public opinions, collaborate with them to make decisions about the budget formulation, its implementation, or the audit.

The first phase is the budget formulation. During this phase, the country executives formulate the budget plan before other parties can influence what ends up in the proposal (Colburn, 2017b). Through the public hearing, citizens’ involvement usually takes place as an excellent opportunity for both citizens and the government to revise the budget planning. For instance, in South Korea, each ministry and agency has an advisory team consisting of academia, media, the private sector, and civic group (Ministry of Strategy and Finance, 2014). This team is authorized to review the budget planning and give advice and recommendations to the country executives.

![Figure 1 Citizens’ involvement in the budget cycle. Based on the conceptual framework proposed by Wagle and Shah (2003)](image)

The second phase is budget approval. During this phase, the budget proposal is submitted to the legislature to be debated, altered, and approved the final proposal. Influencing the direction of the debate may happen in this phase (Colburn, 2017a). A civil society organization (CSO) called the Center for Budget and Governance Accountability (CBGA) published an in-depth analysis of the national budget within 24-hours after the budget presentation in parliament. This quick action can help society and the media to understand the big picture sooner and can also help to influence the direction of the debate. Another way is by inviting non-governmental groups as experts in hearing and commenting on the budget proposal.

The third phase is the budget execution. In this phase, the budget is raised and spent according to the approved proposal. During this phase, citizens may have limited ability to monitor the budget flow. However, the CSOs may act as a bridge between the government and citizens if there are any irregularities detected in budget expenditure (Warner, 2017). CSOs can use the data provided by the government to track the expenditure and whether the execution corresponds to the approved budget planning. The tracking effort by CSOs is referred as Budget Expenditure Tracking (BET) exercise. The more detailed explanation about tracking exercise is provided in Chapter 2.
The last phase is the budget oversight. In this phase, the budget accounts are audited, and the legislature reviews findings. Countries have made an effort to involve citizens in all phases. For instance, Mexico has created a Federal Law of Budget and Fiscal Responsibility. This law obliges the Ministry of Finance to promote citizen participation in BET and to promote the public participation in all phases of a project to be undertaken. Other countries such as South Africa, the Philippines, Korea, among many other countries, have also taken initiatives to promote citizen involvement in government budget processes (Marchessault, 2014).

This study focuses on the third phase of the budget process, which is budget execution. In this phase, the entry point for citizens’ involvement takes place in the BET exercises. Using the data provided by the government, citizens can track how the government spends the budget. The tracking also allows for early detection of any irregularities conducted by the government agency in executing the budget plan. In general, this phase allows the citizens to take a role as a government observer. The decision to focus on this phase is backed by several reasons. First, many citizens are curious about how the government spends their taxes and how their country performs compared to other countries (International Budget Partnership, 2017). The curiosity is the basis of the development of spending tracking website such as Where Does My Money Go? Second, the citizens would like to know whether the government spends the revenue as it was approved by the legislature (International Budget Partnership, 2017). The curiosity includes the recent spending on a particular sector compared to previous years. Explanations about the third phase, including actors playing different roles and the citizen’s activities in this phase are provided in the next sections.

1.1.2. Actors in Budget Execution

In the budget execution phase, many actors with different roles are involved. Marchessault, in her working paper published by Global Initiatives for Fiscal Transparency (2014), categorizes these actors into four categories: government, parliament, CSOs, and media. The process and relationships between actors are illustrated in Figure 2.

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**Figure 2** The process flow happens during the budget execution phase. The illustration is based on a report by Marchessault (2014)

**Government** is the key actor for starting this phase. After the expenditure strategy and allocation has been approved, the Ministry of Finance would transfer the authorized fund to implementing agencies to use for different purposes. The implementing agencies can be any actors responsible for implementing the budget based on its approved allocation. While the implementing agencies do their
tasks, the government has two options to respond to public demands; takes action by establishing new policies or fails to meet the demands by remaining idle.

**CSOs** play the most important role in ensuring the government effort to implement the budget. By employing social accountability tools, CSOs can monitor the budget expenditure process. In addition to monitoring, the CSOs also have a role in transmitting the monitoring results to government and parliament. From the perspective of citizen engagement, the CSOs may act as a bridge between the government and society if there are any irregularities detected during the budget execution process (Warner, 2017). CSOs can use the data provided by the government to track the expenditure and whether the execution corresponds to the approved budget planning. BET exercises or monitoring has been used as a means to facilitate collaboration (Marchessault, 2014).

**Media** plays a role as a bridge between public, government and parliament. By utilizing open data portals, media can monitor the budget implementation and inform the result to the public. Both media and CSOs can monitor the budget implementation, but they answer to different entities. Media, as a bridge, has a responsibility to ensure the public receives the correct and timeliness information. The information could be the results of monitoring and hearings about budget implementation.

**Parliament** is entitled to hold hearings for budget implementation. The hearings are based on internal reports by implementing agencies and BET exercises reports by CSOs. The results of hearings are utilized as a basis to determine which agencies and programs should be audited.

Based on the actors involving in the budget execution process, the citizen in this study is referred to CSOs and Media. However, the roles of the citizen are not limited to only those two. Activists who have interests in tracking the government spending is also referred to as citizens.

### 1.2. Research Problem

The government needs to publish the timely and comprehensive financial data to enable public participation in budget processes, especially in the budget execution phase. According to Maksim et al. (2015), informing citizens about the participatory budgeting process is not sufficient to facilitate the citizen engagement. Open Budget Survey (OBS) reports that efficient and effective management of public resources is difficult to achieve with only access to supply-side data. A platform for engaging citizen where they can assess the data and provide feedback is needed. Also, Information and Communication Technologies (ICTs) offer a higher level of accessibility, in this case, public access to spending data (Yetano and Royo, 2017).

In addition to publishing the data, the government also needs to maintain the data quality. Publishing budget expenditure data may open doors for accountability, but to determine the type of information being published and its quality, public participation is needed (International Budget Partnership, 2012). By incorporating public participation in determining which type of data to publish and how detailed the data needs to be, the government has taken into account the citizen’s opinions. In order to deliver the data to the public, the government can publish its spending data on portals where society can download and reuse the available data. These portals are referred to as OS portals.

However, engaging citizens in BET exercises has its challenges which arise from both the citizen and the government’s perspectives. From the citizen’s perspective, the willingness to engage in BET exercises is low. One of findings of Open Budget Survey 2017 shows that the citizens often lose confidence and interest in participating in BET exercises when they cannot find the budget information they concern about (International Budget Partnership, 2017). According to a report published by USAID, several other reasons are hindering CSOs involvement in BET exercises, such as lack of capabilities, limited access to data, and challenges to interact with policy-makers (Tolmie, 2013).
report mentions that lack of centralized database and incompletely published budget expenditure documents are stumbling blocks to citizens' involvement in BET exercises (Accountability Initiative).

From the government’s perspective, in some countries, the effort to provide opportunities for engagement to take place is relatively low compared to other countries. For instance, Kyrgyzstan is of the countries with timely publication of an annual open budget report, but there is no information on how the budget plan is executed (Kasymova, 2017). The country simply does not provide information on how much and where the government spends the budget. Looking from the perspective of citizens, they do not have an opportunity to participate in BET exercises since there is no data about the actual governmental spending.

Therefore, there is a need for an improvement from the government side on this matter. The government needs to provide as many opportunities as possible for the citizens to be engaged in the BET exercises process. Open spending portal is one of many ways to achieve this goal. Through this portal, the government can publish its spending data and the public can freely access and reuse the data. However, the reality is not as successful as the words say. One of the impediments to online engagement is the unavailability of guidelines for e-participation (Cecez-Kecmanovic et al., 2010). Therefore, there is a need to formulate clear guidelines on how to engage citizens in open spending portals for budget expenditure exercises.

1.3. Research Objectives and Research Questions

This study aims to develop design principles for OS portals that can enhance citizen engagement in budget expenditure process. This objective includes analyzing existing design principles for OS portals. Existing OS portals are designed mostly to pursue the transparency. Citizen engagement is not considered the main objective, rather an impact of transparency exercises. For example, citizens can use and analyze the data in the public sphere because the portal publishes raw data. However, the intention of publishing the data is not because the portal organizers want to enhance citizen engagement, but because they want to encourage citizens to reuse the data.

Research questions have been formulated to achieve the research objective. The main research question is formulated as follow.

Which principles need to be incorporated in designing an open spending portal so that it can enhance citizen engagement in BET exercise?

In order to answer the question, the research was carried out in several phases. Explanation of each phase is provided below.

Phase 1: Research Scope Definition

In this phase, the definition of research scope is provided. This phase consists of two steps. First, to define the terms of citizen engagement and OS portal. The definitions will be built using a literature review. Since citizen engagement and OS portals cover quite a wide area, the definition of these two terms is usually extended based on the context. The same case is also adopted in this research. To cover the intended area of the study, the definition of both terms is constructed based on elements found in the literature review about citizen engagement and budget execution process. The constructed definitions were used as a basis for the rest of the research. Definition of citizen engagement...
engagement and OS portals serve as a common ground of this research. The first step of this phase is reflected in SQ1.

**SQ1: How should OS portals and citizen engagement be defined in the context of BET exercises?**

Second, to provide comprehensive knowledge of factors influencing citizen engagement through desk research. This step focuses on identifying factors that can encourage or hinder citizens to be engaged in BET exercises through OS portals. From the citizens' perspective, their motivations for being engaged in expenditure tracking will be listed as incentives. On the other hands, challenges between citizens and OS portals are categorized as factors that hinder the engagement. A literature review of citizen engagement and OS portal from Public Administration, Sociology and Political Science, and Strategy and Management will be used to answer this question. A more detailed explanation of the literature review will be provided in Chapter 2. The second step of this phase is reflected in SQ2.

**SQ2: What factors can influence citizen engagement in open spending portals for BET exercises?**

**SQ2a: Which factors can incentivize citizen engagement in OS portals during the BET exercises process?**

**SQ2b: Which factors can hinder citizen engagement in OS portals during the BET exercises process?**

A **Literature review** is a selected method for this step. According to Baker (2016), a literature review is a systematic search for published work to find out the state of the art of a specific research topic to provide a theoretical framework and to gain new perspectives and support assumptions and opinions by analyzing published works.

**Phase 2: Observation of existing design**

This phase aims to investigate the relevant factors from the first phase that have been implemented in existing OS portals. Desk research through **portals observation** will be carried out. Fedorowicz et al. (2014) consider design observation as a method for gathering insights into the existing designs as it can describe the current conditions of a design. According to Fedorowicz et al. (2014), design principles can be generated from the design observations. The observation starts by developing portal selection criteria, a detailed explanation of the criteria will be provided in chapter 3. Portals that are considered corresponding with the established criteria will be observed and analyzed further. The next step is to build a protocol for portal observation, which serves as an observation guideline. The findings of observation will be compared to the reference. The output is a list of functionalities of existing portals that might trigger the citizen engagement. The result of this phase is an answer to the third sub-question SQ3.

**SQ3: What functionalities do existing OS portals have that might enhance citizen engagement in OS portals for BET exercises?**

**Phase 3: Development of design principles**

The third phase is to develop design principles. This phase is a synthesis part of the previous two phases and encompassing several steps within designing activities, including creating the design principles. The development of design principles will focus on existing guidelines on how to enhance or stimulate citizen engagement. The aim is to provide insight into what design principles need to be adopted by an OS portal to enhance citizen engagement. The output of this phase is an initial set of design principles for OS portals that can potentially enhance citizen engagement. This phase is reflected in SQ4.

**SQ4: What design principles can potentially enhance citizen engagement in BET exercises?**
Phase 4: Evaluation of design principles with experts
The fourth phase is to evaluate the design principles with experts. The evaluation will focus on the expert’s opinions on the developed design principles of citizen engagement enhancement. Since the evaluation is to confirm how useful the design principle would be in the future, interviewees would be from citizen itself. Several experts that will be interviewed are researchers with a background in open data and citizen engagement, data scientist, journalists focusing on open spending data, and portal owner. Since the design principles are not yet implemented in real life, the evaluation will focus on what experts say about these design principles, and to what extent the developed design principles could enhance citizen engagement once it is implemented. Evaluating the design by enquiring feedbacks form experts is regarded as a common method (Baldwin et al., 2008). This phase will provide an answer to SQ5.

SQ5: To what extent could the developed design principles potentially enhance citizen engagement in BET exercises?

Interviews allow researchers to find information that is not accessible by observations and questionnaires (Blaxter et al., 2006), Also, it ensures the mutual understanding between interviewers and the interviewee since it allows for real-time confirmation (Alshenqeeti, 2014).

Phase 5: Analysis of Findings
The last phase to integrate findings of previous steps. After evaluating the initial design principles, further analysis will be conducted to revise the design principles. Therefore, the output of this step, as well as the final deliverable of this research, is the revised version of design principles for OS portal that can enhance citizen engagement. The answer to the main research question is provided in this phase.

Contribution to Knowledge Base
The last phase of this research is adding a contribution to the knowledge base. Among the relevant knowledge base are open government data and public participation.

All phases of this research can be summarized as presented in Figure 3.

Figure 3 Research approach based on the needs of this study, adapted from Vaishnavi et al. (2017)
1.4. Research Methodology

This section explains the research methods (systematic tools to find, analyze, and interpret information) and data required to answer the main research question. Besides, the results of each step are also provided to give a clear understanding and purpose of each step.

Since the main research question highlights the need for design principles for OS portals, a design science research is selected. The main purpose of this result is to produce an innovative product/artifact by addressing the study through the artifact's building and evaluation. This sequence of activities is defined as design activities (Hevner et al., 2004). Research design suggests three cycles are required to produce an artifact: relevance cycle, design cycle, and rigor cycle (Hevner, 2007). The relevance cycle bridges the contextual environment with the design science activities. Rigor cycle connects the design science activities with the knowledge base of scientific foundations. Design cycle revolves around the iteration of the building and evaluating the design artifact and the processes of the research. In the design cycle, two processes involved: building and evaluation and four kinds of possible design artifacts can be produced: constructs, models, methods, and instantiations (March and Smith, 1995). Model is selected for this research as it can help with the problem and solution understanding.

To satisfy the relevance cycle, proper research on the environment is needed. The research will be divided into three aspects: people (actors involved in humanitarian monitoring and evaluation), institutions/organization (including public and private organizations), and technology (which technologies have already in place). Relevant methodologies, existing frameworks, and theories will be used to support the research this will also satisfy the rigor cycle. Lastly, the design cycle which includes artifact building and evaluation.

The Design Science Research for this study is developed by combining the five phases of this research with the Design Science Research (DSR) proposed by Hevner et al. (2004a). Figure 4 depicts the DSR for this study.

![Design Science Research Diagram](image)

Figure 4 Design Science Research for this study, adapted from DSR by Hevner et al. (2004)

1.5. Research Scope

In section 1.1.1, it has been explicitly mentioned that the research will only focus on the third stage of the budget process, which is budget execution. Therefore, the citizen engagement that will be
researched in this study is BET exercises exercise. This specific phase is selected due to its high dependency on OS portals. In this phase, many actors are involved.

The second scope that needs to make clear is the definition of citizen engagement. Since there is no one definition of citizen engagement that can fit in all circumstances, the definition will be constructed based on the needs of this study. The complete definition of citizen engagement is provided in Section 2.4.2.

The last scope is the definition of OS portal. The definition will be used as a basis for selecting portals for the observation phase. The definition of OS portal is provided in Section 2.3.1.

1.6. Knowledge Gap and Research Relevance

From the previous section, it has been explained that citizen engagement is required to optimize the public budget processes through OS portals. However, there is a gap in the knowledge of open spending data and public participation. This gap entails the lack of standards for OS portals that can enhance citizen engagement.

Formulating clear design principles that incorporate the government’s efforts to enable or support citizen engagement can close this gap. Explicit design principles are essential to guide system designers to design and redesign the information system architecture consistently (Richardson et al., 1990). By developing a set of well-defined design principles for OS portals, the lack of citizen engagement effort in OS portals can be addressed.

The final deliverable of this research is a set of evaluated design principles for open sending portals that can enhance citizen engagement. This research has both scientific and practical relevance. From a practical perspective, the developed design principles can contribute to the effort of designing OS portals that can enhance citizen engagement. Policy makers and portal developers or designers can use the developed design principles as a guideline to ensure the effort for citizen engagement. Following the guideline, the designed OS portal can help the government to achieve its goal of mainstreaming citizen engagement to improve public services. From the scientific perspective, this research will close the knowledge gap between the lack of knowledge on what motivates citizen engagement in OS portals. The findings can be used as a starting point to understand the citizen engagement in general. This will contribute to the knowledge base within the context of citizen engagement and open government spending data.

The previous student had conducted research to develop design principles for open data portal in general (Marta, 2016). The study focuses on design principles that could enhance transparency, accountability, and data quality. Therefore, the research focuses more on the government’s perspective on what the government needs to do to promote transparency and what standard must be adapted to support its goals. Taking another perspective of the open data, this study focuses more on citizens’ perspectives. This research includes the motivations for citizens to engage in open data portal and several principles are developed to facilitate these motivations which are expected to enhance citizen engagement once the principles have been adopted.

1.7. Research Flow Diagram

Research design has been developed to structure the research. A research design is a framework that has been created to seek the answers to research questions (Creswell, 2014) which can be seen as a research flow. The research will be conducted step by step to arrive at the answer to the main research question as illustrated in Figure 5.
1.8. Organization of the Remaining Chapters

The organization of the remaining chapters is as follow.

Chapter 2 Research Background
This chapter provides knowledge of design principles, open government budget, and citizen engagement which are required to understand the problems within the scope of this research. As a documentation of the first phase of the research, this chapter answers two sub-questions: SQ1 and SQ2.

Chapter 3 Observation of Open Spending Portals
This chapter focuses on the current OS portal observation. The discussion in this chapter encompasses the portal selection criteria and the analysis of findings from selected portals observation. This chapter answers the second sub-question SQ3.

Chapter 4 Development of Open Spending Portal Design Principles
This chapter is the documentation of the third phase of the research. In this chapter, the design principles for OS portals are developed. This chapter also provides an answer to the third sub-question SQ4.

Chapter 5 Evaluation of Developed Design Principles
This chapter focuses on expert interviews to evaluate the developed design principles. The experts’ opinions are used as data to be compared to evaluation criteria. The answer to the last sub-question SQ5 is provided in this chapter.

Chapter 6 Conclusions and Discussions
This chapter focuses on the analysis of findings of each sub-question and is the final phase of the research approach. The answer to the main research question is also provided to conclude the research. Also, the return cycle of design principles to the knowledge base and the environment is also provided. Also, academic contribution, research limitation, future research, and reflection can also be found in this chapter.
This chapter provides knowledge about budget expenditure process and citizen engagement which are required to understand the problems within the scope of this research. As a documentation of the first phase of the research, this chapter answers two sub-questions, which are:

SQ1: How should OS portals and citizen engagement be defined in the context of BET exercises?

SQ2: What factors can influence citizen engagement in open spending portals for BET exercises?
   SQ2a: Which factors can incentivize citizen engagement in OS portals during the BET exercises process?
   SQ2b: Which factors can hinder citizen engagement in OS portals during the BET exercises process?

The deliverable of this chapter is a suitable definition of citizen engagement and OS portals. The definition is constructed from the synthesis of literature review in citizen engagement and budget execution process.

2.1. Literature Review on Citizen Engagement in Open Spending portals

Systematic Literature Review (SLR) is defined as a means to identify, evaluate and interpret relevant sources to a particular topic or research question (Kitchenham and Charters, 2007). In order to cover all available literature on this topic, a systematic, successful literature review usually consists of three stages: planning the review, conducting the review, and reporting the review (Brereton et al., 2007; Kitchenham and Charters, 2007). In the planning stage, the author needs to define the problem and inclusion and exclusion criteria. During the second stage which is review conducting, the author is expected to perform the review, from searching the literature to synthesizing the data. Screening the literature, assessing the literature quality, and extracting the data from the selected literature are three other steps lie between literature searching and data analysis and synthesis. After synthesizing the literature, the author is supposed to report the findings. The three stages and all steps on each stage are illustrated in Figure 6. The explanation of each step of this study is provided below.
Step 1: Problem identification

As suggested by Okoli and Schabram (2010), the first step of the literature review is to state the purpose of the review itself. Since definitions of citizen engagement and OS portal might differ from one study to another, literature review to define both terms for this study is needed. In this chapter, the literature review serves two purposes. First, to gather information about citizen engagement in public services governmental portals that publish financial data. Two goals are achieved by conducting this activity: to formulate a definition of citizen engagement along with its measurable dimensions and to formulate a definition of OS portals. Conducting the first part of the literature review provides the answer to the first research sub-question SQ1.

Second, to acquire knowledge about the state of the art of the current citizen engagement within public services. The end goal of this activity is to identify what factors influence citizen engagement in BET exercises process through OS portals. Further analysis is needed to determine which factors incentivize the citizen to be engaged and which factors hinder the engagement process. This activity provides the answer to the second research sub-question SQ2. In total, the literature review is conducted three times to serve three different purposes: defining citizen engagement, defining open spending portals, and analyzing factors influencing citizen engagement in BET exercises through open spending portals.

Step 2: Literature searching

Based on the definition of SLR by Kitchenham and Charters (2007) which emphasizes on the means to identify, evaluate, and interpret problems within a particular topic, the research question plays a critical role in guiding the whole literature review process. Therefore, the selected literature about theories and methodologies help in answering the primary research question. In order to identify subtopics within the proposed research question, Brereton et al. (2007) suggest the author(s) utilize pre-review mapping. Identifying the subtopics within the proposed research question helps the author(s) to classify which literature belongs to which subtopic.

The searching site used for the literature search is Scopus. However, the published work itself is not sufficient for this research. White papers and gray literature are required to have a better understanding of the research. To cover all available literature of a particular sub-topic, Webster and Watson (2002) suggest the researchers conduct both backward search and forward search. Backward search ensures the coverage of all articles cited in particular literature. This task is carried out by using

---

2 Kitchenham and Charters suggest eight steps. Two missing steps are review protocol as supposedly the second step and quality assessment before data extraction. Review protocol is skipped in this research because it is initially developed for the SLR conducted by at least two reviewers to prevent any miscommunication during the review. However, in this research, the reviewer is one individual. Therefore the protocol is not required. On the other hands, quality assessment is not conducted during the literature review process for this research.
the list of references. On the other hands, the forward search is conducted to find other research that cites certain literature by utilizing the ISI Citation Index.

As suggested by Kitchenham and Charters (2007), concept domains can be analyzed from the research question. The research sub-questions are as follows.

**SQ1: How should citizen engagement and open spending portals for BET exercises be defined?**

**SQ2: What factors can influence citizen engagement in open spending portals during the BET exercises process?**

- **SQ2a: Which factors can incentivize citizen engagement in open spending portals during the BET exercises process?**
- **SQ2b: Which factors can hinder citizen engagement in open spending portals during the BET exercises process?**

Citizen engagement in OS portal can be split into two parts: citizen engagement in open data portal and citizen engagement in BET exercises. Further explanation of the engagement parts is provided in citizen engagement model in Section 2.4.2. Therefore, the literature search is conducted using terms of citizen engagement, BET exercises, and open data portal. Specifically, the search string that was used in Scopus is:

```
TITLE-ABS-KEY (((engage OR participate OR involve) AND ("in open data" OR "in e-governance" OR "in data portal" OR "in e-platform" OR "expenditure tracking" OR "public spending")))
```

The search displays results of relevant literature for citizen engagement in open portal data and literature on citizen engagement in BET exercise. The initial result consists of 83 literature.

**Step 3: Inclusion screening**

The third step is to filter the results of literature searching. Kitchenham and Charters (2007) suggest the researchers have a list of inclusion and exclusion criteria based on the research question. Literature that is irrelevant to the research is excluded from the result. As implied by scholars, the inclusion and exclusion criteria must be practical (Kitchenham and Charters, 2007; Okoli and Schabram, 2010). For instance, based on the journals that publish relevant literature. In the same article, Okoli and Schabram suggest that the inclusion criteria could be based on research design and methodology. This statement suggests that the criteria must be able to classify relevant literature from the searching results directly.

The first inclusion criteria are language and subject area. Due to the limitation of the researcher’s language ability, only literature in English is considered relevant. Other than language, the results are also limited to literature published in social science, computer science, economics and finance, arts and humanities, and business and management subject areas. The reason behind this decision is because many articles are not relevant to this study, such as literature about citizen engagement in medical exercise. The first inclusion screening results in 66 literature.

The next inclusion criterion is the title review. Out of 66 literature, 23 literature are considered relevant to this study. The determinant for relevancy is based on the perceived direction of the literature. Only literature which discusses citizen engagement in a budget circle was considered relevant to this study. The third inclusion criterion is the abstract review. The result of this screening is fourteen literature. Only literature which discusses citizen engagement and factor influencing the engagement are considered relevant.
The last inclusion screening step is conducted to select which literature will be used as the main literature. Out of fourteen literature, four of them are considered to have added value to the research. Other nine literature are secondary literature that discusses similar findings with the main literature. However, the nine literature will also be used as additional literature to support the main literature. Since the main literature are not covered the entire problems, forward and backward searching is conducted to retrieve other literature.

The first three steps of the literature review are summarized in Figure 7.

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**Table 1 The summary of literature pre-analysis**

<table>
<thead>
<tr>
<th>Category</th>
<th>Main concern</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept of citizen engagement</td>
<td>Levels of citizen participation</td>
<td>(Arnstein, 1969); (Cecez-Kecmanovic et al., 2010)</td>
</tr>
<tr>
<td></td>
<td>Differences between citizen engagement and participation</td>
<td>(Sheedy et al., 2008); (Afonso, 2017); (Dobos and Jenei, 2013); (Rowe and Frewer, 2005)</td>
</tr>
<tr>
<td></td>
<td>Aspects of online citizen engagement</td>
<td>(Steinberg et al., 2011)</td>
</tr>
<tr>
<td></td>
<td>Concept of accountability</td>
<td>(Bovens, 2007)</td>
</tr>
<tr>
<td>Motivations for citizen engagement</td>
<td>Motivations to join open data innovation contest</td>
<td>(Juell-Skielse et al., 2014)</td>
</tr>
<tr>
<td></td>
<td>The determinant for OGD use by citizens</td>
<td>(Wirtz et al., 2017)</td>
</tr>
<tr>
<td></td>
<td>Barriers to e-participation</td>
<td>(Cecez-Kecmanovic et al., 2010)</td>
</tr>
</tbody>
</table>

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3 The table only shows the main literature. Supporting literature are not mentioned on the table but can be found each section.
2.1.1. Different Opinions about Citizen Engagement

Participation is a cornerstone of democracy. In the paper, she highlights that participation without power distribution is a frustrating exercise or the powerless (Arnstein, 1969). In order to better understand citizen participation, she created a participation topology consisting of 8 levels of engagement. The ladder consists of three stages of participation: non-participation, tokenism, and citizen power.

![Figure 8 An Eight-level ladder of citizen participation by Arnstein (1969)](image)

The first stage is non-participation, which consists of manipulation and therapy. Arnstein describes this stage as a means to gain support from citizens. Both manipulation and therapy suggest that citizens are powerless and incapable of decision making. The second stage is tokenism, consisting of informing, consultation, and placation. Informing allows for information flow from powerholders to citizens without any means for citizens to clarify or provide feedback to the power holders. Consultation allows for a two-way flow of information through activities like surveys, meetings, and hearings, but the inputs might not be well attended. Placation allows citizens to have influence. However, their power is often limited or restricted. Also, their inputs are prone to be outvoted. The third stage is citizen power which consists of the top three levels of participation: partnership, delegated power, and citizen control. The partnership allows citizens to negotiate with powerholders to divide and share planning and responsibilities through a new structure such as joint policy boards. Another result of the negotiation is delegated power. Citizens may eventually have more dominant authority in decision-making than public officials. The last level is citizen control. Citizens demand full authority to govern a program or an institution.

Using this model, Cecez-Kecmanovic et al. (2010) developed another model consists of three levels of engagement: level I passive participation, level II active participation and level III pro-active participation. From the second model, engagement level I and level II are the most important for government and could take place only if the government reveals information to the public that could
be used as discussion materials. The goal of government is usually to climb the ladder from non-participation to engagement level I and from engagement level I to engagement level II.

Participation and engagement are often used interchangeably. However, the underlying concept often based on the engagement ladder by Arnstein. Sheedy et al. (2008) in their work called ‘Handbook on Citizen Engagement’ have developed few characteristics of citizen engagement, one of them is two-way interaction. This characteristic is used by Dobos and Jenei (2013) to formulate their definition of citizen engagement. This means that the information flow also happens from citizens to governments. However, Afonso (2017) disagrees with this concept. According to him, citizen engagement does not have to be two-way interaction. He argues that informing citizens by governments is a form of citizen engagement.

Involving citizens in decision-making processes have different goals; among them are to advance democratic ideals for citizen participation, to create a sense of community, and to inform the public (Afonso, 2017). One of the standard practices of involving the citizens is through citizen engagement activities. However, the concept of citizen engagement is still evolving which results in no common definition of citizen engagement within Citizen Engagement and Participation (CEP) literature (Afonso, 2017; Sheedy et al., 2008). The lack of one agreed definition of CE by researchers has led them to construct their definitions. According to Afonso (2017), the differences in defining citizen engagement are caused by different goals of research, expectations and the roles of actors.

Dobos and Jenei (2013) define citizen engagement as "...is basically interaction, a reciprocal form of exchange instead of the traditional one-way 'exchange' of information between the government and citizens". The authors argue that citizen engagement entails reinforcing community and building citizenship. The definition proposed by Dobos and Jenei implies that citizen engagement is a form of two-way interaction. The same definition is also proposed by (Henvey). Henvey defines citizen engagement as “... the two-way interaction between citizens and governments ... that gives citizens a stake in decision-making with the objective of improving the intermediate and final development outcomes of the intervention”. The definitions proposed in both literature depict the two-way information flow between citizen and the government.

On the other hands, Afonso (2017) defines citizen engagement as “the interaction between a government and its citizens on policy, program, and services”. According to Afonso, the citizen engagement encompasses a wide variety of interactions ranging from information sharing to community consultation, even active participation in government decision making processes. In the same article, Afonso argues that citizen engagement does not necessarily entail a two-way interaction between citizens and the government. Community consultation where citizens communicate their opinions to the government and information sharing by the government to citizens are two forms of a one-way interaction (Afonso, 2017).

The basic concept of citizen engagement that has been established in Handbook on Citizen Engagement by Sheedy et al. (2008) shows that citizen participation and citizen engagement are two different concepts since the latter is a form of two-way interaction, dialogue, and conversation. The authors underline several characteristics of citizen engagement.

**Characteristic 1:** The activity involves individual citizens in policy or program development, starting from agenda setting to decision making and from implementation to review.

**Characteristic 2:** It requires two-way communication (interactive and iterative): between government and citizens; and among citizens and civil society groups.

**Characteristic 3:** It aims to share decision-making power and responsibility for those decisions

**Characteristic 4:** It includes forums and processes through which citizens come to an open opinion which is formed and responsible.

**Characteristic 5:** It generates innovative ideas and active participation.
Characteristic 6: It contributes to collective problem solving and prioritization (deliberation).
Characteristic 7: It requires that information and process be transparent.
Characteristic 8: It depends on mutual respect between all participants.

Even though the basic concept has been established, not all characteristics are incorporated in constructing the definition of citizen engagement (Sheedy et al., 2008). However, most of the definitions proposed by researchers incorporate at least the second characteristic. Most of the characteristics above indicate the requirement for efforts from the citizen’s side (Afonso, 2017). In this context, citizens are required to initiate some activities that allow them to be engaged in the government decision-making processes.

2.1.2. ICTs in Citizen Engagement

Through ICT, participation has received new opportunities and developed new quality, which is usually referred to as e-participation (Kim and Lee, 2012). Wirtz et al. (2017) explain the roles of ICTs in enhancing citizen engagement. The internet allows for interactive discourses between governments and citizens. It crafts a path for citizens to connect with each other and elected representatives and engage in political discussion and government consultation (Grönlund, 2003; Tambouris et al., 2007). ‘The widespread of ICT as a new communication channel is associated with a higher level of political engagement’ (Jho and Song, 2015). Technology has an important role in disclosing information to the public and strengthening the accountability of government agencies since it provides new space for transparency. The new type of transparency is referred to as computer-mediated transparency through which citizens can look clearly through the windows of an institution (Meijer, 2009). Through ICT, governments are not only able to publish their information, but also to enhance other transparency aspects such as publication timeliness (McDermott, 2010).

One of the applications of ICTs in this context is open data portal. Cegarra-Navarro et al. (2014) explain that a portal can be seen as a channel for providing government information and services. Also, it can be used as a tool to facilitate information and knowledge exchange between different social actors and government agencies to enable participation. Another study defines data.gov as a portal data that bring all range of government data into one place (Davies et al., 2013).

A study by Sáez Martin et al. (2016) provides an overview of three indices of an open data portal to be observed in order to measure the portal quality. The three indices are a functional aspect, the semantic aspect, and content-based aspect. Data search techniques, the organizational approach to data provision, data supply, visualization, and feedback mechanism are grouped as functional aspects. The level of metadata, level of open data, multilingualism, and data format are four aspects of semantic aspects. Content-based aspects include free information, data accuracy, timeliness, applications, glossary or list of terms, the possibility of incorporating new data, data categories, the volume of data, number of agencies, and types of filters. According to Zuiderwijk-van Eijk and Janssen (2015), several functionalities that can facilitate participation are discussion messages, social media sharing, submission of related items, wiki descriptions, and discussions.

2.1.3. Citizens-Government Interaction in BET Exercises

The data that is put on a digital platform is referred to as electronic budget and is intended to ensure transparency, openness, and accountability (Faber and Budding, 2018; Noveck, 2017).

Budget Expenditure Tracking (BET) exercise is an activity involving citizens in the third stage of the budget process, which is budget execution. To support this exercise, government agencies publish their spending data on a website that can be downloaded by citizens. Budget expenditure can be traced in two ways: by comparing the actual spending and the approved budget plan, and by tracing the executed transaction. The first activity is to ensure the budget spent by government agencies do not deviate from the plan or there must be acceptable justification if there is, while the second one is to ensure that the transactions were conducted properly.
In the practice, there are usually three types of accountability (Bovens, 2007). First, vertical accountability which is the basic and most common practice that is based on power and responsibilities. Second, horizontal accountability where the government agencies disclose the data directly to the public instead of going through upper levels of actors. The last type is diagonal accountability which was the cause of administrative accountability. Agencies disclose information to external inspectors, but the inspectors do not have the power to influence any decision since they do not fit into the power-responsibility chain.

Over the past few years, the approach has been shifted from vertical accountability to horizontal accountability which allows for citizen engagement in the process (Faber and Budding, 2018). The same phenomenon also appears in the budget execution. The government is becoming more and more open and transparent about its activities (Aristarán, 2016). In the beginning, the government only facilitates media for public communication and consultation. This facility lets citizens consult the city’s checkbook. Motivated by different reasons such as citizen willingness to detect fraud earlier and the government’s awareness to consider the citizens’ concerns, the efforts toward more transparent and open becoming more common (Aristarán, 2016).

The change also shifts the government-citizen relationship; from monitorial to collaborative focusing on using the available information to solve problems (Noveck, 2017). The collaborative relationship between citizens and the government in BET exercises process is illustrated as a horizontal relationship. The relationship allows the citizens to have power over decision-making processes within the government bodies as illustrated in Figure 9.

![Figure 9 Citizens-government relationship in tracking budget expenditure process. Adapted from Bovens (2007)](image)

Figure 9 depicts the citizens’ roles within the government power-responsibility chain. Media as a part of the citizen plays a role in all level of the chain. On the other hands, CSOs, public, and activists tend to pay attention to agencies. As explained in section 1.1.2., government agencies are responsible for executing the approved budget plan. After processing the data provided by the agencies, citizens would compile a report and hand it over to the parliament as consideration for the decision-making process. Therefore, interactions between citizens and the agencies and parliament are more intense than interactions between other actors.

As an effort to be more open and transparent, the government started to publish official data on a website, portal, or any other digital platforms which gives a means to citizens to dig deeper and spot fraud or any irregularities (Noveck, 2017). In some cases, website developers also play an important role in compiling procurement data from different websites and publish it in one single site (Aristarán, 2016). This site is usually called OS portal which is one of the important aspects of tracking budget expenditure. More detailed explanation about the portal is covered in Section 2.2.
2.2. Open Spending Portal

In this section, an explanation about open spending portals is provided. The section starts by defining open spending portal for this study.

2.2.1. Defining Open Spending Portal

In this section, the definition of open spending portals is provided. Constructing the definition starts with literature searching which has been explained in section 2.1.

The public has a considerable interest in how the implementing agencies spend the budget (International Budget Partnership, 2017). The same report also highlights few questions that are usually asked by citizens out of curiosity. Among them are how much fund did the government allocate for a particular issue such as health care or public transportation, and whether the government spends the budget as planned.

In response to the public curiosity, Open Knowledge International launched an open spending project in March 2011. This project aims to track and monitor the transactions made by the government or financial organizations and to provide information about government fiscal data in an interactive and engaging form (Open Spending, 2018). The open spending project was encouraged by the success of two platforms. First, a UK-based platform ‘Where Does My Money Go?’ has succeeded in mapping how and where the UK government use the taxes from society (Where Does My Money Go?, 2018). Second, a Germany-based platform called OffenerHaushalt where the government fiscal data (revenue and expenditure) are published. The information includes how much fund the government gets from any sources and how much of it is spent on particular agendas (Offener Haushalt, 2018).

The result of open spending project is a portal named openspending.org which enables anyone to search, visualize and analyze any financial data within the public sphere (Open Spending, 2018). People from various backgrounds can contribute to the Open Spending project. Starting with the ones who have sources of fiscal data. These users are referred to as contributors, and they can publish the data on OS portal. The second one is the developers. These users can make use of raw data and develop applications to visualize the data in a more interactive and engaging form, e.g., using an assembly kit. The third one is the end users. These users are the ones who have interests in using and viewing the spending data for their benefits. End users are legally registered people from any field of works.

Based on how Davies et al. (2013) describe data.gov, a portal can be seen as centralized access to a range of government datasets. Based on that, a portal in this study is a platform for government agencies to publish their fiscal data for different years and in different sectors. This definition is made clear by the second literature (Cegarra-Navarro et al., 2014). The second literature considers portals as media to deliver government information and a tool to enable information and knowledge sharing between social actors and government agencies. Combining the two descriptions of the open data portal with the existing open spending portals, the definition of open spending portals for this research is presented below.

**Definition 1**

Open spending portals are any digital platforms that provide fiscal data about government expenditure information, budget and spending data which can be downloaded, reviewed, processed, and shared with the public.
### 2.2.2. Functionalities of Open Spending Data Portal

In this section, the components of an open data portal that will be observed are provided. The components of the Open Spending portal cannot be seen as one single category. Two aspects are included in determining functionalities of OS portal: platform functionalities and data functionalities. Since the platform is highly concentrated in the data, not only the functionalities of the platform are important, the data functionality must also be considered significant.

Previous research by a student of the Delft University of Technology provides design requirements for open data portal based on interviews with five experts (Marta, 2016). The design requirements are highly related to portal transparency, user privacy, and information quality of the portal. According to the author, design requirements that can cover the three aspects are dataset request, user feedback, discussion forum, help, dataset tagging, no registration for download, search function, API for the dataset, open and machine-readable data format, metadata, visualization, and user-friendly interface.

Sáez Martín et al. (2016) groups data search techniques, the organizational approach to data provision, data supply, visualization, and feedback into one category, namely the functional aspect. They define this category as the utilities and functions that can be utilized by users to obtain information. According to Romero et al. (2016), mechanisms concerning feedback allow users to respond to the information or data published on the portals. Zuiderwijk-van Eijk and Janssen (2015) propose discussion messages and submission of related content as functionalities of OGD portals. They define discussion messages as a mechanism to allow users to discuss a dataset or findings from using the data. Submission of related content is defined as a mechanism that allows users to submit missing information or document related to the data published on OGD portals.

Semantic aspect concerns the data arrangement through both simple structures and highly linked ones. Four items are considered important in measuring a portal through a semantic perspective are the level of metadata, level of open data, multilingualism, and data format. Romero et al. (2016) explain that a machine-readable format determines the accessibility of the data since it indicates the extent to which the data provider allows users to access the data.

Sáez Martín et al. (2016) refer content-based aspects of the quality of portal information architecture and the data published on the portal. Ten items are taken into account to measure the portal quality from the content perspective: free information, data accuracy, timeliness, applications, glossary or list of terms, the possibility of incorporating new data, data categories, the volume of data, number of agencies, and types of filters. Zuiderwijk-van Eijk and Janssen (2015) propose data quality ratings and data quality review as indicators to measure the data quality. Ratings allow users to rate a dataset based on its quality, whereas reviews allow users to leave opinions about the dataset. They mention that both rating and reviews are visible to other users.

Tygel et al. (2016) propose other functionalities, namely data granularity, data license, and data change track. Data granularity refers to the finest level of the data published on the portal, and it could be transactional or aggregated data. Data change tracking allows users to view the changes made to the data. Romero et al. (2016) suggest that online data disclosure must also include data usage guidance, reference materials, quick access, and users' guide. Zuiderwijk-van Eijk and Janssen (2015) propose another functionality to support data widespread, which is dataset sharing. This functionality covers sharing the dataset and findings by using the data on social media.

Aspects to be observed in an OS portal can be identified by combining all the literature, as represented in Table 2.
<table>
<thead>
<tr>
<th>Data and Portal Functionalities</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functional</strong></td>
<td></td>
</tr>
<tr>
<td>F1: Data search techniques</td>
<td>Whether the data search functionality is available and how advanced the searching technique is</td>
</tr>
<tr>
<td>F2: Approach to data provision (direct/indirect)</td>
<td>Whether the users can get access to the data directly or not. Indirect means that the users have to visit another website for the data</td>
</tr>
<tr>
<td>F3: Data supply (web view or download)</td>
<td>How the users are allowed to have access to the data. Whether it is only by viewing the data, or users can download the data</td>
</tr>
<tr>
<td>F4: Data visualization</td>
<td>The visual representations of the data</td>
</tr>
<tr>
<td>F5: Feedback mechanisms</td>
<td>A means of communication which allows users to let the portal owner know if there any complain or question.</td>
</tr>
<tr>
<td>F6: Discussion forum</td>
<td>A mechanism that allows users to interact with each other</td>
</tr>
<tr>
<td>F7: Help mechanism</td>
<td>Mechanisms that allow users to ask for help from the portal owner</td>
</tr>
<tr>
<td>F8: Glossary</td>
<td>A set of definitions of terms used on the portal</td>
</tr>
<tr>
<td>F9: Users’ guide</td>
<td>A document or media to show users how to use the portal</td>
</tr>
<tr>
<td>F10: Quick access</td>
<td>Direct link to other pages of the portal, or to external links</td>
</tr>
<tr>
<td>F11: Data request</td>
<td>A mechanism that allows users to request missing datasets</td>
</tr>
<tr>
<td>F12: Content submission</td>
<td>A mechanism that allows users to upload or submit missing information or data related to published datasets</td>
</tr>
<tr>
<td><strong>Semantic</strong></td>
<td></td>
</tr>
<tr>
<td>S1: Types of metadata</td>
<td>Information on a dataset. It could be descriptive information, structural, technical, administration, or preservation, or a combination of several types of information</td>
</tr>
<tr>
<td>S2: Data access (free/paid/login)</td>
<td>The openness of access to the data</td>
</tr>
<tr>
<td>S3: Level of data openness</td>
<td>The indication in which format the data is available</td>
</tr>
<tr>
<td>S4: Portal and content multilingualism</td>
<td>The availability of the portal and information provided on it in different languages, or in a universal language</td>
</tr>
<tr>
<td>S5: Statistic on agencies</td>
<td>The number of agencies whose records or spending data are published on the portal.</td>
</tr>
<tr>
<td><strong>Content-Based (Scope and Reliability)</strong></td>
<td></td>
</tr>
<tr>
<td>C1: Data granularity</td>
<td>The detail level of data provided</td>
</tr>
<tr>
<td>C3: Reference materials</td>
<td>The provision of the origin of the published data</td>
</tr>
<tr>
<td>C4: Data change track</td>
<td>History of data revision</td>
</tr>
<tr>
<td><strong>Data Usability</strong></td>
<td></td>
</tr>
<tr>
<td>U1: Data license</td>
<td>Whether the users can legally distribute the data</td>
</tr>
<tr>
<td>U2: Data usage guidance</td>
<td>A guideline on how to start processing the data</td>
</tr>
<tr>
<td>U3: Data API</td>
<td>An interface that allows users to access the data from third-party applications</td>
</tr>
<tr>
<td>U4: Application showcase</td>
<td>A list of data-based mobile or desktop applications to show how the data has been used for different purposes</td>
</tr>
<tr>
<td>U5: Dataset sharing</td>
<td>A mechanism that allows users to share the dataset or findings from using the data</td>
</tr>
</tbody>
</table>

In general, all twelve design requirements developed by Marta (2016) have been observed in different spending portals. Another design requirement that is not explicitly listed as functionality to be
observed in this research is dataset tagging. This item is considered as a part of the content submission.

2.3. Citizen Engagement in Open Spending Portals

This section provides the idea of how to involve citizens in the government decision-making process. Citizens are all people who have legal identities from the government’s perspective.

2.3.1. Defining Citizen Engagement

The citizen engagement in open data portal can be considered as an interaction between users and the resource and the interaction between users and users (Steinberg et al., 2011). In this study, the interaction between citizens and the government is an example of the user-user interaction. The interaction between users and the resource include their capabilities to create, edit, rate, and explore the resource. This suggests that the interaction between users and the resources can be seen as data reuse, in this case, citizens can reuse the spending data published on OS portals. Allowing the data to be reused and distributed can facilitate collective actions through information exchange between citizens and the government (Sandoval-Almazan and Gil-Garcia, 2012).

Figure 10 Relevant aspects to formulate the definition of citizen engagement. Based on the explanation by Steinberg et al. (2011)

Figure 10 depicts the connection between all interactions with open spending portals. User-user interaction, in this study, is defined as the interaction between citizens and the government and the interaction between citizens. The interaction between citizens happens where all citizens with various backgrounds gather around to pursue the same objective. The interaction between citizens and the government happens regarding the information, where the government provides the data and citizens respond to the published information. Based on the second characteristic of citizen engagement proposed by Sheedy et al. (2008), these interactions need to be reciprocal. The resources could be information about fiscal data or datasets.

From discussions of literature in section 2.4.1. and 2.4.2, it is clear that at least two elements are required to ensure that the citizen engagement could take place. First, citizens’ willingness to be engaged in tracking the government spending. Citizens need to be motivated and curious as to how the government spends the country revenue which can assess the government accountability. Second, the government’s effort to facilitate citizen engagement. The government needs to provide enough opportunities that allow for mutual interaction to take place. Transparency is one of the ways to support this effort. In addition to the key elements for successful citizen engagement, different levels of public involvement and different types of citizen engagement have been explained. The definitions of citizen engagement in this study is constructed by taking into account the characteristic of citizen engagement proposed by Sheedy et al. (2008), relevant aspects for online citizen engagement by Steinberg et al. (2011), and the modified version of spectrum of public participation by Rowe and Frewer (2005). Therefore, citizen engagement is defined as follow.
Definition 2
Citizen engagement is defined as a two-way interaction between citizens, and citizens and the government that can facilitate their interest in tracking budget expenditure and allows the government to involve, collaborate with, and empowers the citizens in decision-making processes.

2.3.2. Model of Citizen Engagement

In this section, a model for citizen engagement for this study is developed. The model is developed based on the participation ladder by Arnstein (1969). The ladder shows three stages of engagement: non-participation, tokenism, and citizen power. Cecez-Kecmanovic et al. (2010) use the ladder as a basis to develop a ladder of citizen engagement.

Arnstein describes informing level as a one-way interaction from government agencies to citizens. The next level is consultation in which government agencies provide tools or mechanisms for citizens to provide feedback through questionnaires and surveys. According to her, meetings that are supposed to enable two-way interaction could end up being informed citizens if the powerholders do not give a chance for other attendants to talk. Also, irrelevant answers to questions could turn a discussion into a one-way information flow. Based on her argument, providing a means to enable two-way communication is not enough. Government agencies need to ensure the two-way interaction between citizens and them happen.

The third stage is citizen power which consists of the top three levels of participation: partnership, delegated power, and citizen control. The partnership allows citizens to negotiate with powerholders to divide and share planning and responsibilities through a new structure such as joint policy boards. Another result of the negotiation is delegated power. Citizens may eventually have more dominant authority in decision-making than public officials. The last level is citizen control. Citizens demand full authority to govern a program or an institution. The three levels revolve around citizens exercising their rights as country stakeholders to acquire the power of influence in a decision-making process. Citizens negotiate with powerholders to share decision making authority and demand full control for governance. Negotiation requires citizens to have insights into the problems so that they can offer impactful values to the table. In this case, the insights can be seen in the results of BET exercises. Therefore, supporting BET exercises is a potential means to climb from placation to partnership.

Glaser et al. (2006) agree that there are two types of engagement citizen engagement: neighborhood-based and government-based citizen engagement. The first type of engagement entails the proactive efforts of citizens to engage in government decision making processes, whereas the latter is a top-down approach by the government to facilitate the engagement processes. A surprising finding regarding a top-down approach to citizen engagement is mentioned in another literature by Powell and Colin (2008) which states that in some cases, the goal of a top-down approach to citizen engagement is not to strengthen the community but rather to make the public accept the decisions. The finding backs up the author to suggest a shift from top-down approach to bottom-up approach which indicates that the citizens need to be more proactive and the government needs to provide opportunities for citizens to exercise their rights.

Another author classifies forms of engagement into three types: watching, bridging, and facilitating (O’Meally et al., 2017). Watching means that the government provides an opportunity for citizens to oversee and verify how the state conduct public affairs. Social audit is one of the examples of within this cluster. Bridging involves efforts to bridge the gap between social accountability and political accountability. Enabling BET exercises is one of the attempts of citizen engagement cluster bridging. Facilitating means that the government provides facilities for the growing interests of citizens to engage in government decision-making process.
Passive citizens do not involve information exchange between them or from them to the government. A media to facilitate a 2-way interaction between citizens and the government is required to enable active citizens. The second level of engagement is defined by the availability of a platform or media that allows citizens to voice their opinions to the government, and exchange knowledge or information between them. Once the 2-way interaction has been established, the citizens and governments can put efforts to enable pro-active citizens. This level is indicated by various citizen-based initiatives for better governance which can arise even without involving the government. In order to enable the third level of engagement, citizens need to understand the information or data disclosed online.

Enhancing citizen engagement means to level up the participation. Based on Figure 12 and the explanation of active and pro-active citizenships, the definition of enhancing citizen engagement is constructed as follow.

**Definition 3**
Enhancing citizen engagement means leveling up the engagement from passive to pro-active citizens by facilitating two-way interaction between citizens and the government and providing support for BET exercise.

### 2.4. Factors Influencing Citizen Engagement in Open Spending Portal

In this section, factors influencing citizen engagement OS portals are provided. The factors are distinguished into two, depending on the impact on citizen engagement: factors motivating citizen
engagement and factors hindering citizen engagement. Since the definition of citizen engagement in this study requires efforts from both sides of interaction, the motivations from the government’s perspective are also included in this section.

Factors influencing citizen engagement in OS portals can be analyzed from two different aspects: citizen engagement in open portal and citizen engagement in BET exercises.

2.4.1. Motivations for Citizen Engagement
Factors influencing citizen engagement in OS portals can be viewed from both citizen’s perspective and the government perspective. Most research explains factors that can enhance citizen engagement from the government perspective (Carstens et al., 2015). This study explores incentives to engage in OS portals from a citizens’ perspective. To unveil the reasons behind citizen engagement in BET exercises, literature has been analyzed. The results are presented in Table 3.

Table 3 Factors motivating citizens to engage in OS portals and BET exercises

<table>
<thead>
<tr>
<th>Factors</th>
<th>Explanation</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interest in politics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Address political issues</td>
<td>Citizens are interested in engaging in government platforms because it allows them to address political issues they have been concerned about.</td>
<td>(Hutter et al., 2011)</td>
</tr>
<tr>
<td>Recognition visibility</td>
<td>Citizens want to be heard and deliver their concerns and opinions to the scope of public discussion.</td>
<td>(Hutter et al., 2011), (Rowe and Frewer, 2005)</td>
</tr>
<tr>
<td>Curiosity</td>
<td>Citizens may engage in the process only to satisfy their curiosity about recent political agenda</td>
<td>(Hutter et al., 2011)</td>
</tr>
<tr>
<td>Kinship</td>
<td>Citizens want to do something for the community</td>
<td>(Hutter et al., 2011)</td>
</tr>
<tr>
<td><strong>Interest in platform/community</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fun and enjoyment</td>
<td>Including learning a new platform, enjoyment in programming and personal freedom or autonomy</td>
<td>(Wijnhoven et al., 2015), (Luthiger and Carola Jungwirth, 2007), (Franke and Piller, 2004)</td>
</tr>
<tr>
<td>Making friends</td>
<td>Citizens are interested in meeting like-minded people.</td>
<td>(Hutter et al., 2011)</td>
</tr>
<tr>
<td>Information seeking</td>
<td>Citizens engage in OS portals to find relevant information or data</td>
<td>(Hutter et al., 2011)</td>
</tr>
<tr>
<td>Improve existing services</td>
<td>Citizens engage in the process to improve the current situation. The citizens are usually the ones with resources such as knowledge, funding, and time to exploit both the platform and the data.</td>
<td>(Füller, 2010)</td>
</tr>
<tr>
<td><strong>Self-improvement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic rewards</td>
<td>Citizens are interested in data analyzing, thus participating in BET exercises is seen as one way to demonstrate their passions</td>
<td>(Seltzer and Mahmoudi, 2013), (Boudreau and Jeppesen, 2015)</td>
</tr>
<tr>
<td>Intellectual challenges</td>
<td>Citizens want to challenge their ability with the data</td>
<td>(Juell-Skielse et al., 2014), (Kitsios and Kamariotou, 2018)</td>
</tr>
<tr>
<td>Learning and skill development</td>
<td>Citizens want to learn and develop new skill by involving in BET exercises, especially from fellow activists</td>
<td>(Wu et al., 2007), Xu et al. (2009)</td>
</tr>
</tbody>
</table>
The first aspect that attracts citizens to engage in OS portals is politics. Answering political questions and solving political issues are few purposes of co-creation and crowdsourcing website (Hutter et al., 2011).

- Address political issues
  The survey by Hutter et al. (2011) shows that citizens are eager to help government addressing in political issues. The only reward is ones can get self-satisfaction after delivering their opinions to the government. Therefore, the factor is considered one of the intrinsic motivations for engaging in open data portals.

- Recognition visibility
  This factor is highly related to the addressing political issues. In addition to being able to address political issues in the scope of public discussion, the citizens also want their voice to be heard and their concerns to be addressed (Hutter et al., 2011). The desire is in-line with the concept of engagement where the government needs to promise the citizens to at least hear their concerns and try to incorporate them in the decisions (Rowe and Frewer, 2005)

- Curiosity
  Curiosity can be defined as the desire for more knowledge for intrinsic reasons (Hutter et al., 2011). Citizens may engage in OS portals out of curiosity as to how ones can find a role within the expenditure tracking process.

- Kinship
  Based on the survey of citizens motivation to engage in open government platform by (Hutter et al., 2011), the respondents are eager to do something for more significant benefits to the country. In addition to that, they also want to do something to help other members by being involved in a relevant discussion.

The second aspect of attracting citizens to engage in OS portals is the platform itself and the community. In this context, the functionality of the platform plays a considerable role. Also, the quality of content on the platform can be a consideration for citizens' attitude towards the platform.

- Fun and enjoyment
  Although fun and enjoyment are often disregarded as a motivation to be involved in open government activities, a survey by Wijnhoven et al. (2015) reveals that citizens often participate in those activities because it is fun and they enjoy being involved in the activities. Another study about pervasive fun support this finding. (Luthiger and Carola Jungwirth, 2007) confirms that fun and enjoyment are motivational tools for people to engage with their works. Also, one of the most critical aspects of a successful co-creation project is a compelling and enjoyable co-creation experience (Franke and Piller, 2004).

- Making friends
  The survey conducted by Hutter et al. (2011) shows that the citizens enjoy meeting new people, especially the like-minded person. Expenditure tracking process is a good opportunity that can bring them together.

- Information seeking
  This factor is related to the functionalities of the platform as well as the quality of its content. In the survey, the citizen shows that among other reasons, looking for particular information is one of them (Hutter et al., 2011). Therefore, the platform must be able to facilitate the citizen's needs and ensure the content is of good quality. In this context, the data is expenditure data, while good quality means that the data must come from official authorities to avoid inaccuracy and incompleteness.
• Improve existing services
  When an individual is dissatisfied with the services they received from the government, they tend to have motivations to look another way to improve this service. Füller (2010) refers to this as need-driven citizens who participate in online co-creation because they are dissatisfied with the existing services.

The last aspect is their motivations for self-improvement. These motivations are more intrinsic, which means that the triggers and the impacts are for those individuals only.

• Intrinsic rewards
  A study reveals that citizens participate in government activities not only because of monetary rewards, but also because they get satisfaction by making contributions to communities (Seltzer and Mahmoudi, 2013). Seltzer and Mahmoudi refer to this satisfaction as intrinsic rewards. Another study on platform complements reveals that "...complementors responds to platform growth even without sale incentives..." (Boudreau and Jeppesen, 2015).

• Intellectual challenges
  The trigger to engage in OS portals is because citizens want to challenge their knowledge, in this case, about data processing or on country trends. Intellectual challenges are one of the factors motivating developers to participate in open data innovations (Juell-Skielse et al., 2014). This factor is also used by Kitsios and Kamariotou (2018) to build a model for open data use by developers.

• Learning and skill development
  Xu et al. (2009) identify skill development as one of the drivers to volunteer in government activities. However, the authors refer to this motivation as future work opportunities, rather than learning goal. Another literature mentions that learning is seen as one of the extrinsic motivations for developers to participate in software development (Wu et al., 2007).

2.4.2. Barriers to Citizen Engagement
In this subsection, barriers to citizen engagement in OS portals for BET exercises are explained. The result suggests that barriers to citizen engagement can be found in every aspect of citizen engagement.

Table 4 Factors hindering citizens to engage in open spending portals and BET exercises

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Explanation</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political barriers</td>
<td>Lack of trust in government</td>
<td>(Kasymova, 2017)</td>
</tr>
<tr>
<td></td>
<td>Lack of trust in citizens</td>
<td>(Yang, 2005)</td>
</tr>
<tr>
<td></td>
<td>Difficulties in interacting with policy-makers</td>
<td>(Tolmie, 2013)</td>
</tr>
<tr>
<td>Institutional</td>
<td>The inflexibility of the existing structure</td>
<td>(Leighninger, 2014)</td>
</tr>
<tr>
<td>barriers</td>
<td>Incomplete financial data publication</td>
<td>(Accountability Initiative, n.d.)</td>
</tr>
<tr>
<td>Social barriers</td>
<td>Lack of access to datasets</td>
<td>(Tolmie, 2013)</td>
</tr>
<tr>
<td></td>
<td>Minimum roles of citizens</td>
<td>(Powell and Colin, 2009)</td>
</tr>
<tr>
<td>Technological</td>
<td>Lack of unique design technology</td>
<td>(Cecez-Kecmanovic et al., 2010)</td>
</tr>
<tr>
<td>barriers</td>
<td>Lack of centralized database</td>
<td>(Accountability Initiative, n.d.)</td>
</tr>
<tr>
<td>Knowledge barriers</td>
<td>Unavailability of guidelines to support e-</td>
<td>(Cecez-Kecmanovic et al., 2010)</td>
</tr>
<tr>
<td></td>
<td>participation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of required skillsets to deal with datasets</td>
<td>(Tolmie, 2013)</td>
</tr>
</tbody>
</table>
First, from the political perspectives. Citizens tend to have lack of trust that the political institutions will seriously take into account their concerns (Kasymova, 2017). Kasymova argues that lack of trust in government can lead to skepticism towards any participatory initiatives affiliated with the government. As mentioned by Tolmie (2013), difficulty in interacting with policy-makers is one of several reasons that hinders CSO’s involvement in BET exercises. On the other hands, the government could also have lack of trust in citizens which results in less commitment to take into account the citizens’ contribution (Yang, 2005), or to interact with them through ICTs (Oecd, 2003). Especially in online engagement, the government must commit that public voice will be used to inform policymakers which might result in the change of government structure and process. Moreover, the government must ensure that online consultations are analyzed, disseminated and used.

Second, from an institutional perspective. The impediments include the inflexibility of the existing structure to adapt and accommodate the e-participation and privacy constraints set by existing legislative, such as outdated public participation law (Leighninger, 2014). Leighninger argues that current participation is costly and resource ineffective. Therefore, there is a need to adapt the law in response to the shift of government to governance. Moreover, incompletely published financial document by the government hinders citizen engagement in BET exercises (Accountability Initiative, n.d.).

Third, from the social perspective. Tolmie (2013) explains that lack of access to datasets usually hinders CSO’s involvement in BET exercises. Powell and Colin (2009) underline the minimum role of the citizen could lead to elite inclusiveness in some engagement exercises. They are convinced that this phenomenon happens because in some cases, focal topics, citizen selection criteria, the goals of the exercise, and decision-making processes are on the power of event organizers.

Fourth, from a technological perspective. The absence of uniquely designed technology could demotivate citizens to engage in a platform. For instance, citizens are more willing to visit a website providing all required information or an all-in-one portal rather than having to visit different websites for different kinds of information. Cecez-Kecmanovic, Kennan, & Hull (2010) argue that citizens are less likely to participate in an online engagement website if they are required to go to another site. A case study in India shows that lack of a centralized database is one of the barriers to citizen’s involvement in BET exercises (Accountability Initiative, n.d.).

Fifth, from the knowledge perspective. One of the impediments is the lack of knowledge transfers between practitioners and researchers, and unavailability of guidelines or support for e-participation Cecez-Kecmanovic, Kennan, & Hull (2010). Another barrier is the lack of capabilities that are required to deal with provided datasets which is one of the stumbling blocks to CSO’s involvement in BET exercises (Tolmie, 2013).

2.5. Conclusion

This is the first phase of this research. The literature review is conducted to define citizen engagement and open spending portals. The definitions are then used as a basis for the entire research. The result of the first step of the literature review answer the first research sub-question.

SQ1: How should OS portals and citizen engagement be defined in the context of BET exercises?

Citizen engagement can be modeled in many different ways depending on the research context. Involving citizens in BET exercises is a common method to achieve greater benefits for both the public and the government. The government can use inputs and feedbacks from citizens to improve the public services and to enhance public accountability. On the other hands, the citizens can exercise
their rights to be heard and to be involved in public matters. Such interaction between the government and citizens is referred to as citizen engagement. The government involves citizens in decision-making processes at different levels, both one-way interaction, and two-way interaction. Information flow is a critical factor that differentiates citizen engagement from citizen participation. Citizen engagement is a two-way interaction between the government and citizens, whereas the public participation is a one-way interaction from one actor to another. A full definition of citizen engagement in this research is as follows: ‘two-way interaction between citizens, and citizens and the government that can facilitate citizens’ interest in tracking budget expenditure and allows the government to involve, collaborate with, and empowers the citizens in decision-making processes.’

To facilitate the engagement digitally, Open Spending project was initiated. This project aims to provide information about government fiscal data. The government can publish its fiscal data whereas the developers can download, visualize and share the data. After that, the end-users can analyze the visualization. All data publishing, visualizing and sharing are in one place. In this research, such portals are referred to as OS portals. However, the definition is not limited to just data portals. Sometimes the government utilizes official websites such as the website of the Ministry of Finance and the Government Procurement website to publish spending data over the past period. These websites are also considered as OS portals. A complete definition of OS portals for this study is formulated as ‘any digital platforms that provide fiscal data about government expenditure information, budget and spending data which can be downloaded, reviewed, processed, and shared with the public.’ The definition suggests that the published data must be downloadable, machine-readable for data processing, and free from copyright issues when it is shared publicly.

**SQ2: What factors can influence citizen engagement in open spending portals for BET exercises?**

Factors influencing citizen engagement in OS portals cannot be analyzed from only one aspect. The analysis must include both the open portal and BET exercises. In this context, factors influencing citizen engagement in OS portal is built from factors influencing citizen engagement in open data portal and citizen engagement in BET exercises process. Some factors are beneficial for enhancing citizen engagement, while other factors prohibit the engagement. Also, some factors contradict the influence of another factor.

**SQ2a: Which factors can incentivize citizen engagement in OS portals during the BET exercises process?**

Motivations for citizens to engage in OS portals can be grouped into four categories: political interest, interest in the platform, community improvement, and self-improvement. It is common for citizens to visit OS portal out of curiosity or fun and enjoyment. Above that, citizens are also interested in the political aspect such as how their country performs compared to other countries, or where the government has spent their tax money. Other motivations to engage in OS portal is because citizens want to improve the quality of their community by addressing the community needs, voicing their complaints and provide suggestions for the government for the benefit of the community. The intention to engage in OS portals are sometimes driven by internal motivations, such as the interests in learning and develop new sets of skills, or the intention to put their passion and ability into good use to receive internal rewards and to challenge their abilities.

**SQ2b: Which factors can hinder citizen engagement in OS portals during the BET exercises process?**

Several factors can also be barriers to citizen engagement in OS portal. These factors can be categorized as political, social, institutional, technological, and knowledge barriers. Political barriers such as lack of trust in government and lack of commitment from the government could jeopardize the efforts for citizen engagement. Citizens are usually skeptic towards any participatory initiatives by the government. Institutional impediments such as the inflexibility of an existing structure and privacy constraints set by existing legislative could influence the data quality. These factors could result in
incomplete financial information that can hinder citizen engagement in BET exercises. Social barriers include the lack of political knowledge, information and technology illiteracy, unequal access to technology, and cultural attitude. Lack of access to datasets can hinder CSO’s involvement in BET exercises. Young people have another barrier which is denied rights to participate because of their age. From a technological perspective, the uniquely designed technology and the lack of a centralized database could demotivate citizens to engage in a platform. Citizens are more willing to visit a website providing all required information or an all-in-one portal rather than having to visit different websites one by one for different kinds of information. Knowledge barriers include the lack of knowledge transfers between practitioners and researchers, unavailability of guidelines or support for e-participation, and lack of capabilities that are required to deal with provided datasets. These factors are stumbling blocks to CSO’s involvement in BET exercises.
3 OBSERVATION OF OPEN SPENDING PORTALS

This chapter provides insights into existing OS portals from several countries. The development of design principles encompasses existing guidelines on how to enhance or stimulate citizen engagement. The government portals evaluation model developed by Tygel et al. (2016) is used to gain insights into existing OS portals. This step is followed by utilizing the strategic framework for mainstreaming citizen engagement by World Bank 4 to develop design principles. The product of this chapter is a set of design principles for OS portals that can enhance citizen engagement which also answers the third sub-question SQ3, which is:

*What functionalities do existing OS portals have that might enhance citizen engagement in OS portals for BET exercises?*

The deliverable of this chapter is functionalities of open spending portals that might enhance or prohibit citizen engagement. The findings of portal observations will contribute to developing design principles that can enhance citizen engagement.

Portal observation is the second phase of this study which allows for knowledge regarding the citizen engagement in open spending portals. Observation of existing OS portals is carried out to identify which functionalities of a portal that can trigger citizen engagement. The literature review of factors influencing citizen engagement from the last phase is used to justify the identified functionalities. These functionalities serve as the basis of design principle formulation. In this phase, seven portals are selected based on selection criteria explained in the next section. The portals are then observed using the observation protocol that has been developed.

### 3.1 Portal Selection

In 2016, Open Data Barometer (ODB) published the ranking of 112 countries in term of data openness level. Budget and spending data are two types of datasets that were used to assess the country ranking. However, the website where the data is published is missing. The selection process for this research encompasses the spending and budget data openness level. The list is then reduced as filtered by the following criteria.

#### 3.1.1 Portal Selection Criteria

Several criteria then filter the list of 112 countries. The selection criteria and the results of the selection process are presented in Figure 12.

---

4 The proposed principles are: it is results-focused, it involves engaging throughout the operational cycle, it seeks to strengthen country systems, it is context-specific, and it is gradual.
1. Availability of budget data
Out of 112 countries from ODB list, only 25 countries are considered open about their budget data. Budget data is one of the important documents to support BET exercises. As has been explained, two types of tracking exercise are considered in this study: comparing the actual spending with the budget plan and investigating the validity of the transactions.

2. Availability of spending data
Out of 25 countries, only ten of them publish spending data. After reducing the list to only ten countries, the country website list by Romero et al. (2016) is utilized as an attempt to complete the list. Romero and colleagues did a survey of 80 countries regarding their efforts on utilizing digital space for fiscal data publication. The authors analyze each country website in four dimensions: scope, accessibility, reliability, and feedback. The report was published by International Budget. However, some website countries are not relevant to this study. Therefore, manual works by scrapping had to be done.

3. Portal accessibility
Several portals or websites are excluded from the list because of a translation problem. For instance, the portal of Thailand does not provide an option for English and utilizing a third-party application to translate the page is not an option because it messes up the portal appearance. This problem leads to difficulty in observing the portal because some contents are overlapping. Out of the ten countries, 7 of them are considered relevant to this study and observable. Except for Greece, Bulgaria, and Thailand, the final selected countries and their portals are provided in Table 3.

Table 5 Overview of selected portals as well as the public participation index based on a survey by International Budget Partnership

<table>
<thead>
<tr>
<th>#</th>
<th>Country</th>
<th>Open Spending Data score</th>
<th>Public participation score</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Uruguay</td>
<td>95</td>
<td>N/A</td>
<td><a href="https://transpareciapresupuestaria.opp.gub.uy/inicio/datos-abiertos?id=presupuesto-nacional">https://transpareciapresupuestaria.opp.gub.uy/inicio/datos-abiertos?id=presupuesto-nacional</a></td>
</tr>
<tr>
<td>2</td>
<td>United Kingdom</td>
<td>95</td>
<td>57</td>
<td><a href="https://data.gov.uk/search?filters%5Btopic%5D=Government+spending">https://data.gov.uk/search?filters%5Btopic%5D=Government+spending</a></td>
</tr>
<tr>
<td>3</td>
<td>Greece</td>
<td>90</td>
<td>N/A</td>
<td><a href="https://diavgeia.gov.gr/">https://diavgeia.gov.gr/</a></td>
</tr>
<tr>
<td>4</td>
<td>Canada</td>
<td>90</td>
<td>39</td>
<td><a href="https://open.canada.ca/data/en">https://open.canada.ca/data/en</a></td>
</tr>
<tr>
<td>5</td>
<td>USA</td>
<td>85</td>
<td>22</td>
<td><a href="https://www.usaspending.gov/#/">https://www.usaspending.gov/#/</a></td>
</tr>
<tr>
<td>6</td>
<td>Albania</td>
<td>80</td>
<td>2</td>
<td><a href="http://spending.data.al/en">http://spending.data.al/en</a></td>
</tr>
<tr>
<td>7</td>
<td>Bulgaria</td>
<td>70</td>
<td>22</td>
<td><a href="http://www.minfin.bg/en/">http://www.minfin.bg/en/</a></td>
</tr>
<tr>
<td>8</td>
<td>Ukraine</td>
<td>65</td>
<td>30</td>
<td><a href="https://spending.gov.ua/">https://spending.gov.ua/</a></td>
</tr>
</tbody>
</table>

5 According to ODB standard.
3.1.2. Selected Open Spending Portals

The final portals are selected based on the availability of machine-readable spending data and the portal accessibility. The accessibility in this context relates to the translated version of portal appearance. Greece OS portal is in Greek, and it is not possible to observe due to mistranslations and inability to translate some texts. The final selection list consists of 7 portals. An overview of the final selected portals is provided below.

- **Portal 1**
  Country: Uruguay
  URL: [https://transparenciapresupuestaria.opp.gub.uy/inicio/datos-abiertos?id=presupuesto-nacional](https://transparenciapresupuestaria.opp.gub.uy/inicio/datos-abiertos?id=presupuesto-nacional)
  Description: The portal is part of the Office of Planning and Budget (OPP). Advising executives in issues on fiscal and budgetary policies is among the main tasks of this executive entity. On the portal, users can view the spending and budget planning. All data published on the portal are licensed under Open Government Data (DAG) of Uruguay.

- **Portal 2**
  Country: United Kingdom
  URL: [https://data.gov.uk/search?filters%5Btopic%5D=Government+spending](https://data.gov.uk/search?filters%5Btopic%5D=Government+spending)
  Description: This OS portal is a dedicated website that serves as a function as data access point. The portal publishes all types of government data, including spending data. The portal was created back in 2010 and aims to provide access for citizens to data. Also, it helps publishers to maintain data. In 2018, Find open data was built that allows users to find data published by the government and local authorities. Download links and creating an account to publish data are also available on Find open data.

- **Portal 3**
  Country: Canada
  URL: [https://open.canada.ca/data/en/dataset/c37d7510-c54c-4652-8e6f-79023e44be62](https://open.canada.ca/data/en/dataset/c37d7510-c54c-4652-8e6f-79023e44be62)
  Description: The portal was first launched in 2011 to support the delivery of open data in machine-readable formats. The development progressed until 2013 with new services, such as open information and open dialogue to facilitate feedback. In 2013, the portal collaborated with open data hackathons, resulting in over 900 developers reused the data to build applications. The portal also provides open government analytics which allows users to view the most visited categories or department.

- **Portal 4**
  Country: United States of America
  URL: [https://www.usaspending.gov/#/](https://www.usaspending.gov/#/)
  Description: USA spending portal aims to show the American public how much money the government has to spend every year and how it does it. The portal is a continuation of previous acts called Federal Funding Accountability and Transparency Act (FFTA) 2006 and Digital Accountability and Transparency
Act (DATA) in 2014. FFTA demands the government to disclose any financial assistance awards more than $25,000 publicly.

- **Portal 5**
  Country: Albania
  URL: [http://spending.data.al/en](http://spending.data.al/en)
  Description: Open Spending Albania is a follow-up project of Open Data Albania. Both projects are realizations of an Open Data Initiatives. OS Albania is a project powered by Open Data Albania and Albanian Institute of Science. All data published on the portal are under Open Knowledge or Open Data license, except if it is defined otherwise.

- **Portal 6**
  Country: Ukraine
  URL: [https://spending.gov.ua/](https://spending.gov.ua/)
  Description: The portal is called E-data which is referred to as an official state information portal aiming to publish information on the use of Ukraine public fund and implement the idea of transparent budget. The project was launched as an implementation of Ukraine Law "On the Use of Public Funds". Since September 2015 the portal has disclosed all transactions of the State Treasury Service.

- **Portal 7**
  Country: Brazil
  URL: [http://transparencia.gov.br/](http://transparencia.gov.br/)
  Description: The portal is an initiative by the Federal Comptroller General Office (CGU) to ensure the correct and proper implementation of public resources. This portal was launched in 2004 aiming at improving transparency of public management and allowing citizens to track how public money is being used and to oversee the budget implementation.

### 3.2. Portal Observation
This section is dedicated to portal observations by first developing the observation protocol and then describe the results of portal observation.

#### 3.2.1. Portal Observation Protocol
The observation is conducted as follows:

1. The observation starts with the first OS portal until finish then continues with the second portal. Observation of the third portal starts after the second portal is finish, and the step is repeated until the last portal. Further observation of one or all portals will be conducted if necessary.

2. The observation is conducted based on the list of portal functionalities in section 3.2.1. During observation, the list is used as a guideline for observation. However, new functionalities that are found during portal observation are noted. Once all portals are observed, the second round of observation is conducted. This round is to observe the availability of new functionalities on the portal.

3. The observation starts at the main portal page. The main page is the page containing information about fiscal information. For instance, if the portal is a government official website, e.g., the website of the Ministry of Finance, the observation will start at the sub-page that is designed explicitly for fiscal information or data.
4. All links provided on the main page are opened. The opened page is observed, and all the links provided on the opened page are opened. The activity continues until there are no more links found in the observed page.
5. Downloading and converting the data are conducted if necessary for observation. For instance, the .csv data is converted to .xls for more comfortable observation.

3.2.2. Results of Portal Observation

In this subsection, the result of portal observation is provided. Each listed functionality is observed in all portals. The results are presented in Table 6.

Table 6 Results of OS portal observations. Description (DES), Technical (TEC), and Administration (ADM) are types of metadata. AGG means data in aggregated level while TRA indicates data are provided in transactional level

<table>
<thead>
<tr>
<th>Data and Portal Functionalities</th>
<th>Portal 1</th>
<th>Portal 2</th>
<th>Portal 3</th>
<th>Portal 4</th>
<th>Portal 5</th>
<th>Portal 6</th>
<th>Portal 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1: Data search techniques</td>
<td>None</td>
<td>Format, publisher, license</td>
<td>None</td>
<td>Award, agency, keyword, amount</td>
<td>Value, agencies, time</td>
<td>Data source, agencies, time</td>
<td>Types of expenditure 6</td>
</tr>
<tr>
<td>F2: Approach to data provision (direct/indirect)</td>
<td>Direct</td>
<td>Direct</td>
<td>Direct</td>
<td>Direct</td>
<td>Direct</td>
<td>Direct</td>
<td>Direct</td>
</tr>
<tr>
<td>F3: Data supply (web view or download)</td>
<td>Download</td>
<td>Both</td>
<td>Download</td>
<td>Both</td>
<td>Both</td>
<td>View and limited download</td>
<td>Both</td>
</tr>
<tr>
<td>F4: Data visualization</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes, treemap</td>
<td>Money map, graphic</td>
<td>Map</td>
<td>Graphic</td>
</tr>
<tr>
<td>F5: Feedback mechanisms</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes, with restriction</td>
<td>No</td>
</tr>
<tr>
<td>F6: Discussion forum</td>
<td>No</td>
<td>No</td>
<td>Yes, comment section</td>
<td>Yes, per topic</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>F7: Help mechanism</td>
<td>yes</td>
<td>Yes</td>
<td>Yes</td>
<td>FAQ</td>
<td>Not available</td>
<td>FAQ</td>
<td>FAQ, contact details</td>
</tr>
<tr>
<td>F8: Glossary</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>F9: Users’ guide</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Video</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>F10: Quick access</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>F11: Data request</td>
<td>No</td>
<td>Yes, under contact us</td>
<td>Yes, suggestion</td>
<td>Yes, under discussion forum</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>F12: Content submission</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semantic</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S1: Types of metadata</td>
<td>DES, TEC, ADM</td>
<td>DES, ADM</td>
<td>DES, TEC, ADM</td>
<td>DES, TEC, ADM</td>
<td>None</td>
<td>DES</td>
<td>DES, TEC, ADM</td>
</tr>
<tr>
<td>S2: Data access (all free/limited/login/paid)</td>
<td>All free</td>
<td>All free</td>
<td>All free</td>
<td>All free</td>
<td>All free</td>
<td>All free</td>
<td>All free</td>
</tr>
<tr>
<td>S3: Level of data openness</td>
<td>3-star</td>
<td>3-star</td>
<td>3-star</td>
<td>3-star</td>
<td>3-star</td>
<td>3-star</td>
<td>3-star</td>
</tr>
<tr>
<td>S4: Portal Multilingualism</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

6 Resource transfers, direct government expenditure, thematic consultations, and budget inquiries
<table>
<thead>
<tr>
<th>S5: Statistics on agencies</th>
<th>No</th>
<th>No</th>
<th>No</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
</tr>
</thead>
</table>

**Content-Based (Scope and Reliability)**

<table>
<thead>
<tr>
<th>C1: Data granularity</th>
<th>AGG</th>
<th>TRA</th>
<th>AGG</th>
<th>TRA</th>
<th>TRA</th>
<th>TRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2: Reference materials</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>C3: Data change track</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Data Usability**

<table>
<thead>
<tr>
<th>U1: Data license</th>
<th>Open</th>
<th>Partially Open</th>
<th>Open</th>
<th>Open</th>
<th>Open</th>
<th>Open</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>U2: Data usage guidance</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Under FAQ</td>
</tr>
<tr>
<td>U3: Data API</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>U4: Application showcase</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>U5: Dataset sharing</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

**Additional functionalities**

<table>
<thead>
<tr>
<th>Supporting tools</th>
<th>No</th>
<th>No</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevant information</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Data dictionary</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

---

**Portal 1: Portal de Transparencia Presupuestaria (Uruguay)**

The portal is in Spanish without an option to switch to English. This portal is part of the official website of the Office of Planning and Budget of Uruguay with a specific topic of National Budget. The Government of Uruguay openly licenses all data published on this portal. A contact form is available to serve as a feedback and help mechanism. Users need to fill in their names, emails, and the messages.

The datasets are divided into two parts: records from 1961 until 2010, and records as of 2011. The main page contains list of data and resources consist of .csv, .xls, .zip and .pdf file. Several documents in pdf are available to assist users in using the data. Unfortunately, the document is only available in Spanish. Information about the author of the data and resource, date of created and updated, frequency update, and the source is available on the main page. There is no search functionality on the portal. Only 13 datasets are available on the portal. The data can only be downloaded; the online display is not an option. However, the visualization is available in an application which can also be accessed via a browser. Budget and execution data can be visualized independently. Users can also select the datasets to be visualized based on the year and program area. Once the data is downloaded, users can view the information regarding the transaction. Unfortunately, there is no institutional information which indicates the lack of information to trace the transactions.

**Portal 2: Find Open Data (United Kingdom)**

The main page of the portal consists of search and filter functionalities, a function for publishing data, support functionality, and information regarding the portal. Under the support functionalities, users can find both help and feedback functionalities. The portal provides two types of help: requesting datasets and report problems. Both options require users to fill in their name, email address, and their message. The feedback mechanism is provided through a form which allows for information collection about users experience on using the portal.

This portal provides datasets under some threads. Therefore, it is possible that one thread contains more than one dataset. The thread can be filtered based on its publisher, relevant topic, the format of datasets under the thread, and the open license status. Among 1853 threads available under
Government Spending topic, 1675 of them contains openly licensed datasets. Information about the data publisher, last updated, and summary of the dataset is available on the main page. Once a thread is clicked, a page containing information on other datasets from the same publisher and related datasets is open. Besides, a link for information about the publisher is also provided. The datasets can be uploaded or edited only by registered users.

Users can both view and download the data. However, there is no option for data visualization. The data can be downloaded in .csv format. The data is not standardized. Some datasets are complete with the invoice number, description, supplier contact details, and account code. Other datasets only consist of the amount of payment, supplier, payment date, and recipient. However, most of the datasets are considered having details of a transactional level.

**Portal 3: Government of Canada Spend Data by Department (Canada)**

This open spending portal is part of an open government portal. Budget data is published in one of many cubes available on the portal. The cube has ten files, consisting of data sets and guides. The datasets are available to be downloaded in .csv. There is no option for viewing the data online. The portal is available in English and French. On the main page, users can find information about the dataset publisher and its license. Also, some functionalities allow them to rate and comment on the data cube. Additional information about data update frequency, date published and modified, and data openness rating is also available. Activity stream on the main page allows users to view the different versions of the cube.

There is a possibility to connect the data with other supporting data by linking to JSON format. The data consists of information on government agencies responsible for the payment, area where the money is invested in, fiscal execution period, and the amount of payment. There is no information on the funding beneficiaries, the exact date of payment, or the payment invoice. The government of Canada openly licenses all data published on the portal.

The portal has a functionality of application showcase. This application showcase allows users to see how the data has been used as a basis to create many applications within the government. However, the applications listed on the portal are not necessarily based on the spending data. Since the spending cube is part of open government Canada, the applications are based on other data, such as agriculture data or healthcare data.

**Portal 4: USA Spending (USA)**

The main page displays five functionalities such as spending explorer, award search, profiles, download center, and glossary. Besides the data, the portal also provides a tool called data lab to visualize the data, portal tour video, and a sign-up quick link. To give an overview of important functionalities to its users, the portal provides snapshots of each functionality.

On the main page, users can also find a data lab tool to visualize the data. Guidance on how to use the portal as well as the data is also available for three user targets: analyst, developer, and student. Inside the data lab, users can also find information on the number of employees along with their occupations, how one federal account is related to other federal accounts, which federal accounts belong to which agencies, how the government categories its purchases which entails the object class of each budget function, and which agencies receive federal contracts and who awards them.

Spending explorer allows users to explore the entire federal budget in increasing granularity and illustrating how awards derive from federal accounts. Interactive visualization is also available to build contexts and clarify the relationships between spending components. The users can view spending from three landscapes: budget function, government agencies, and object class. The budget function allows users to view spending based on high-level categories such as national defense, healthcare, social security, and transportation. The government agency landscape reveals spending based on the involving agencies. Object class categorizes the data based on the types of items purchased by the
The data can be visualized in a treemap or a table. For each component that has been clicked, the portal provides the relationship between the component and the others.

Award search is a functionality that allows users to search the spending data more efficiently. Two search options are available: based on the keyword and advanced search. For each keyword typed, e.g., homeless, the portal reveals all spending at a transactional level. More than that, transaction status is also provided, how many contracts available, how many grants, direct payments, loans, and other types of transaction. Using the advanced search, users can view the data based on selected filters: award type, agency, locations which cover the location of the performance and the recipient location, recipient, recipient type, award amount, award ID, and other filters including types of contract pricing. The search result can be viewed in a table, graph, and map. If the transaction is clicked, the portal will provide information on the awarding agency including the sub-agency responsible for the transaction, recipient covering its address and Data Universal Numbering System (DUNS) identification code, award amounts, and contract details including description, period of performance, place of performance, contract award type, and contract pricing type. An additional description such as transaction history covering modification number and reasons for modification, sub-awards, financial system details and additional details including parent award details, agency details, competition details, product or service details, and executive compensation. For each search summary, users can download the data.

Under profile functionality, users can find information on federal agencies, federal accounts, and states. Information on the recipients will be available soon as the portal is still under development. On the agency profile, users can find information about the agency mission, its website, a budgetary resource as in the portion of US federal budgetary that goes to this agency, an obligated amount which entails the resources spent by making binding financial commitments, its object class, and its federal accounts. For each federal account selected, account description, fiscal year summary, fiscal year snapshot which allows for illustration of the money in and out of the agency are provided. Also, the spending by the agency is available in three categories: over time which covers information on obligated incurred, unobligated balance, and outlay, by categories such as program activity and object class, and by an award. Under the state profile, users can find information on the total amount awarded to the state, the state details including population and awarded amount per capita, award breakdown in an interactive treemap, primary place of performance, awards overtime, and top 5 awards received by the state.

Under the download center, five options are available. First, award data archive which allows users to download the data based on three filters: agency name, award type, and fiscal year. The file is available in .zip which contains two .csv files. Second, custom award data which is a more advanced version of award data archive with more filters such as sub-agency, recipient location, and other filters including file format. All datasets on the portal are available in three formats: CSV, TSV, and XML. Third, agency submission file which covers raw datasets from different agencies. Two categories within the agency submission file are raw financial assistance and raw quarterly DATA Act files. However, the files are available on an external link. Fourth, database snapshots which are also hosted on an external link. Information on data update frequency, data documentation including guidance on how to access USAspending.gov amazon RDS snapshot, contact link which directs users to a GitHub forum about issues found on the data processing, and the usage example of the data is provided.

In addition to the five important functionalities, the portal also has FAQs, community forum, data model, API, and code explorer. Unfortunately, the contact us link is not working when the observation is being conducted. According to information found on the database snapshot, all data provided is under U.S. Government Work license 7. The community functionality allows users to join in any

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7 The license can be found on U.S. official website [https://www.usa.gov/government-works](https://www.usa.gov/government-works)
discussion forum which can be identified by the topics being discussed. A document regarding posting and commenting policy on the forum is available.

New functionalities found on portal 4:

- Supporting tools

**Portal 5: Open Spending Albania (Albania)**

The portal is available in two languages: Albania and English. On the main page, there are several functionalities such as daily bread, budget, treasury transactions, concessionary register, money and power, and electoral spending. In the budget section, users can find information on the annual budget plan from 2013 until 2017, including the money map from 2016 until 2018. The portal provides a quick access link to money map on the portal homepage.

The provision of data describing how the government has spent the tax is available in section treasury transactions. Each transaction can be filtered based on the supplier, payment purpose, transaction value, date registered or date executed. The portal also allows users for sorting the transactions based on local governments. Transaction data from 2014 onwards can be sorted based on expenditure category. The data can be downloaded in .xls. Apart from being downloaded, the data can also be viewed online in a table and visualized in a money map for the budget allocation and bar graphic for the transactions.

In section money and power, users can find a list of people who declare the transactions, including their official positions and affiliated institutions. Once the name is clicked, the portal will reveal general information about the person, including the annual income. The portal has lists of agencies and beneficiaries of all the uploaded transactions.

Relevant information about how the government spends public budget and how the tax was spent is available under the budget article section. In addition to that, treasury articles are also provided to update citizens with recent news about development.

New functionalities found on portal 5:

- Relevant information.

**Portal 6: E-data (Ukraine)**

The portal is in Ukrainian only. On the main page, several functionalities are available: news, content searching, portal statistics, help mechanism, service entrance (login), the highlight of top five transactions, portal partners, glossary, and feedback functionality.

The users can view and download all available transactions filtered by several available criteria. However, the full download is restricted to only portal members. To register on the portal, users are required to have a key of digital signature (EDS) issued by one of the supported ACCs. The portal only allows guests to download top one hundred transactions or download the transactions one by one. When the users click on one transaction, information related to the transaction will be provided. The information includes the transaction number, billing number, payment date, billing system, amount of payment, information on payer and recipients, and the purpose of payment.

The feedback mechanism has different topics which are categorized into several questions. Users can select one of the available categories. However, the feedback or questions are only for the Ukrainian official employees since the identification number is required to submit any complaints or questions. The portal guidance is available under the name of a user manual. The information includes FAQ, getting started with the portal, transaction API, and other options.

**Portal 7: Portal da Transparancia Governo Federal (Brazil)**

The main page shows content inquiries, portal graphics & downloads, and information. The portal inquiries consist of expenses, recipes, covenants, penalties, servers, and consultations. In the portal
information, other functionalities such as about portal, records published on the portal, and links for social control activities.

The portal is in Portuguese. The data search functionality is located on the main page of the portal. The search is based on types of expenditure, such as resource transfers, direct government expenditure, thematic consultations, and budgetary inquiries. Several other criteria can filter each classification. For instance, the resource transfers can be filtered by state, program, action, or entities. The direct expenditure can be sorted based on the type of expense, executing agency, program, action, or entities. Once the criterion has been selected, the users will be directed to a table consist of several document options. Numbers and letters index each document. The steps lead to document viewing which cannot be downloaded. To download the data, the users have to click a download link. Once the link is clicked, a page consists of year options from 2011 to 2017 will be opened. Once the year has been selected, the website will show months as options. The data are provided monthly, directly, and in .csv format.

The portal also provides annual and monthly data visualization. On the same page, there is also details of exact spending. The portal has a functionality of commonly asked questions which allow users to find the necessary information that is not directly provided on the portal. Another help provided in the portal is word glossary which focuses on terms used in the portal in general. A portal handbook is available in Portuguese to help users familiar with the portal; the link is under navigation guide. The quick portal access consists of relevant links that are indexed to both external sites and sub-pages within the portal.

Description of the data is available on the same page where the data can be downloaded. The information consists of the name of the file, information source, file update, and brief description of the file content. However, there is no information on data update activity or data versioning. Most of the information sources are from the Federal Government's Integrated Financial Administration System (SIAFI). The data is provided in transactional level with details on the program, date of payments and document number of payments. Explanations of the terms used in the dataset are provided in a data dictionary. However, the dictionary is in Portuguese.

New functionalities found on portal 7:
- Data dictionary

3.2.3. Findings from Portal Observation

In this subsection, the explanation of additional factors as well as key findings from portal observation is provided. Three functionalities are analyzed to determine whether they could be considered as new functionalities.
- Supporting tools
  Supporting tools allow users to process the data on the webpage or using independent tools. OS portals could provide this function by listing several independent applications that can be used to analyze the data. Therefore, this functionality falls into category data usability aspect.
- Relevant information
  Relevant information is a functionality which allows portal owners to pass more information related to a dataset to citizens. This functionality includes recent news about a specific topic, articles, related datasets, and information on data publishers. By utilizing this functionality, the portal owners can share any relevant information that can help citizens understand the context in which the data is created and how the data has been used. Therefore, this functionality is essential to help citizens understand the context of the data itself.
- Data dictionary
  Data dictionary has a similar function to the glossary. However, it focuses only on the terms used in the file. In the USA spending portal, a data dictionary is within the coverage of functionality
glossary. Both functionalities must be combined to prevent unnecessary document that explains the terms used in the data file.

All observed portals, except Open Spending Albania, provide data along with metadata or brief descriptions about the data. Therefore, the context of the data is clear. Several portals such as transparency portal of Uruguay and Open Data Canada provide spending data in aggregated level. This suggests that these two portals do not support the second type of BET tracking, which is to confirm the validity of claimed transactions. However, transparency portal Uruguay provides data visualization which allows users to understand the message behind numbers easily. On the other hands, open data Canada allows users to connect with the portal owner in an open space. Besides Canada, USA Spending also has a discussion forum which is divided into several topics. This functionality lets users comment on a dataset or ask other questions to the portal owner, and these comments are visible to other users.

Several portals such as transparency portal of Uruguay and Open Spending Albania do not provide data API. This functionality allows users to access the data externally, usually to build a new application. Thus, these portals do not support users’ intention to innovate using the data. Putting a wall between the data and potential newly developed applications hinders developers to reuse the data. However, this does not mean that the objective of creating the portals are neglected. The data provided on the portals can be viewed, downloaded, and legally used for other purposes, such as visualization. Even though Uruguay only provides data in aggregated level, the first type of tracking which is to compare the budget planning and actual spending can still be conducted.

Among seven portals, OS Albania is the only portal without any mechanisms for information exchange either between users or users and the portal owner. This indicates that this portal is not built to facilitate interaction between users or users and the portal owner. Since it provides various types of data visualization, this portal can be seen as a tool to inform citizens about the public spending, instead of to encourage citizens to collaborate.

3.3. Analysis of Portal and Data Functionalities

In this subsection, the explanation of each functionality and how it could enhance citizen engagement in open spending portals are provided. As has been explained in chapter 2, enhancing citizen engagement means to level up from passive citizens to active citizens or from active citizens to pro-active citizens. The first level of enhancement can be achieved by providing means to facilitate citizen-citizen and citizen-government interaction, whereas facilitating data reuse, in this study, for BET exercise can achieve the second level of citizen engagement. Analyzing each functionality can give a better understanding of how it may enhance citizen engagement and which level it is. The result of this analysis is presented in Figure 14.

In order to perform successful BET exercise regarding resource availability, several steps must be taken into account in analyzing these functionalities. Modifying the lifecycle of data analytics, the process starts with data retrieving, data understanding, data processing, and data reusing. The initial lifecycle of data analytics combines data understanding and data processing in one step, namely data analyzing. In this study, data understanding refers to the extent to which functionalities and information help users understand the abstraction of the data.

Facilitating two-way interaction

- Citizen-citizen interaction

The interaction between citizens is rarely recognized as a critical aspect of citizen engagement (Powell and Colin, 2009). However, if they intend to collaborate and collectively involved in government activities, this lack of attention could be changed. Citizen-citizen interaction happens when the users are interacting and connecting with each other. The interaction could be about the datasets, knowledge sharing, or information exchange.
The feedback mechanism, discussion forum, and dataset sharing are three functionalities that can facilitate citizen-citizen interaction. By providing spaces to facilitate interaction between citizens, the government has stimulated their interest to keep exchanging information and knowledge. One of the success stories of deploying ICTs for user participation claims that discussion forum can encourage citizens to be more active and discuss various aspects of citizen-based initiatives (Gurumurthy et al., 2017). Dataset sharing can also facilitate information sharing between citizens. By sharing the datasets or findings from using the data to their social media, citizens can inform other citizens about how they used the data and what they have learned from it (Zuiderwijk-van Eijk and Janssen, 2015). The feedback mechanism is usually provided to facilitate information exchange between users and data providers of portal owners, but this functionality could also facilitate interaction between citizens. However, the feedback must be transparent. By making the feedback visible to anyone, citizens can share their thoughts about a dataset or information. Other users can review the submitted feedbacks and share their thoughts on the same topic.

- Citizen-government interaction

The interaction between citizens and the government have been enhanced through ICTs (Cegarra-Navarro et al., 2014). The authors believe that portals must not be seen only as a tool to provide information and services to citizens, but also as a tool to facilitate information and knowledge exchange between citizens and the government. These interactions could help the government to enable participation in collective decision makings on public affairs. Among the observed portal functionalities, feedback mechanism, help mechanism, dataset request and related content submission can facilitate this interaction.

Feedback mechanism allows users to provide inputs regarding the portal, its content, and the process to retrieve the content. This functionality allows for interaction between citizens and the data providers if the government is who provides the data. Feedback mechanism allows for effective consultation (Martijn et al., 2015). Another functionality to enable effective consultation is a help mechanism. Users can communicate with the government and discuss their spending activities to gain a better understanding of budget execution. The feedback from users can be used to identify and trace errors (Orr, 1998) in platforms or portals. Dataset request functionality is utilized when citizens do not find the dataset they are looking for. Sometimes, this functionality is combined with feedback functionality because of the similar interaction form. Submitting content related to original datasets allows citizens to contribute to the data quality.

**Encouraging data usability for BET exercise**

- Data retrieving

Retrieving data from OS portals is the first interaction between citizens and data in BET exercise (Tolmie, 2013). According to Tolmie, data retrieving must be done after mapping resource flow to collect only necessary data and information for BET exercise. Several functionalities that can provide effective data retrieval are searching techniques, users’ guide, multilingualism, and access to the data.

Data search techniques are the most important aspect in finding the datasets. A report published by International Budget Partnership states that the availability of search query can help users to explore information and data (Romero et al., 2016). The more filters to be used, the more options users have that allows for dataset custom-view. Also, filters allow users to extract only necessary information or data. Therefore, this filter can help users to find necessary information. Free data access allows citizens to download unlimited datasets. Limited data access only lets the users download several transaction records in one bundle. This type of access can be found in Ukraine spending portal where the users can only download top 100 transactions in one file. Data access which requires a login and paid suggests that there is a wall between the citizens and the resources. Another functionality that supports data retrieval is a users’ guide. This functionality refers to a document, information, or media that help users understand how to use the portal. By having guidance, users can become more familiar with the portal which decreases the searching time. A study about human behavior reveals that
familiarity with one environment influence information searching time (Zhang and Ghorbani, 2004). Portal multilingualism has the same function as users’ guide, which is to familiarize users with the portal.

- **Data understanding**

Understanding the data can also be done before retrieving the data. For instance, OS Albania provides many types of data visualization. Using this functionality, ones can roughly understand what the data is about. Functionalities that can help citizens understand the data are data visualization, glossary, related information, metadata, and data in aggregate level.

As explained by (Sun et al., 2015), visualization is the most important techniques in data analytics that can help make knowledge patterns and information for the decision-making process. Moreover, visualization allows users to understand bigger scenarios and can provide clear connections between elements (Mubarak and Suomi, 2015). Sometimes, interactive visualization allows for better understanding of the relationships between one spending component with others. Data in aggregate level has the same influence as this functionality. Since the data is not too detailed, it is easier to see the bigger picture of the whole data. These functionalities become even more useful for users without advanced knowledge in data analytics. For example, a scholar without knowledge in data analytics finds data visualization more helpful to understand the spending situation than raw data. Also, data with the only amount of money and involved agencies are more helpful to understand the bigger picture than data with too many details. The better insights about the spending data can make an insightful material to start a discussion or to initiate a debate.

A study about e-democracy shows that glossary can help citizens or users understand ‘strange’ words (Oecd, 2003). The purpose of a glossary is to make citizens have a common understanding of the terms used in the datasets and on the platform in general. The sooner the users understand the information and terms used in the dataset, the stronger foundation they have for analyzing the datasets. Types of metadata give data overview to citizens. The overview could be a description of what the data is about, the format in which the data is available, and revision history of the data. Metadata is required to give meaning to the data by turning the data into understandable information (van Helvoort and Weigand, 2015). Also, the availability of metadata in participatory exercise offers the ability to see the patterns (Gurumurthy et al., 2017). This information helps citizens to understand the context better and proves the data reliability since the revision history can be traced.

- **Data processing**

Data processing is when citizens analyze the data using tools or applications. These tools are classified into three categories: exploration tools, analytic tools and mashup tools (Chatfield and Reddick, 2017). Analytic tools allow users to visualize the data to identify data patterns hidden behind numbers. Whereas the visualization functionality provided by the portal allows users to understand the surface of the data, data processing allows for understanding beyond the surface. Functionalities that support data processing are downloadable data supply, data in a machine-processable format, data in transactional level, data usage guidance, and supporting tools to process the data.

In order to start the data processing phase, data must be in a machine-processable format, such as .xls, .csv, or .rdf. Data in machine-processable formats is defined as "...reasonably structured to allow automated processing" (Davies et al., 2013; Ubaldi, 2013). This feature is essential for BET exercise, as it is the main materials to be analyzed. Another important aspect that must get more attention is data granularity. While data in aggregated level helps citizens to understand the whole data roughly, transactional data allows for accurate BET exercises. Spending data must be published in a transactional level with descriptions of every transaction including value, period, and recipient (Tygel et al., 2016). Data usage guidance helps users to process data by providing step by step on how to work with the data. Supporting tools shows numerous tools that can be used by users to process the data. Both functionalities assist in data processing.
- Data reuse

Data reusing refers to using the existing dataset for another purpose. Open data promotes the benefit to be reused without barriers and restrictions (Jetzek et al., 2014; Kassen, 2013). Functionalities that support data reusing are open-licensed data, data usage guidance, data API, and application showcase.

In this phase of PET exercises, data usage guidance can be helpful in assisting users how to use the data for another purpose. Openly licensed data ensures the data can be reused freely and legally for any purposes including commercials (Public Sector Transparency Board, 2012). The feature can also be understood as the data being freely shared without any restrictions except the intellectual property right of the creators (Atenas and Havemann, 2015). The definition of openly-licensed data suggests that only when it is licensed openly can it be reused legally. Application Programming Interface (API) is a tool or protocol to develop software or applications (Chatfield and Reddick, 2017). Application developers require this tool to access the data provided by third parties. Application showcase is essential to inform users how the data has been used. By knowing existing innovations in place, users can use them as a reference to also innovate using the data.

**Functionalities that do not influence citizen engagement**

In this subsection, several functionalities that are not enhancing citizen engagement in OS portals for BET exercise are explained. These functionalities are data provision, quick access, statistics on agencies, reference materials, and data change track.

Data provision refers to how the data is provided. The options could be directly on the portal or indirect which requires users to go to another portal. This functionality does not fit into any categories of citizen engagement as has been explained earlier in section 3.3. Users can still find the dataset even though it is not available on the portal since the link to download the data is there. This functionality is different from data supply. Data supply emphasizes whether the data is available for web-view, download, or both. However, data provision refers to how the data is brought to citizens.

Quick access does not allow users to explore the portal since the link to the information they are looking for is provided. This functionality is beneficial for users who know exactly the types of data they are searching. However, the effective searching time has been covered by search filters. Also, based on the observation, quick links mostly redirect users to external websites or to other functionalities that can be easily found, such as data download.

Statistics on agencies allow users to know the number of agencies that have published their spending data. This information is useful to see how many percentages of agencies are implementing the concept of transparency. However, it is not useful for either two-way interaction nor BET exercises. This exercise focuses more on the data itself, not the number of agencies disclosing their spending data.

Reference materials and data change track are two functionalities that support data reliability. However, using the assumption that the data is from the government, these functionalities are not
required. Also, the resource of spending data is usually from within the government agencies which suggests that reference materials are not relevant.

![Feature Diagram]

### 3.4. Conclusion

Portal observation is the second phase of the research which focuses on portal functionalities. The phase starts by determining portal selection criteria. In the end, seven open spending portals are selected to be observed: USA spending, open spending Albania, spending Ukraine, portal of transparency Brazil, open data portal the UK, portal of transparency Uruguay, and data portal Canada. The next step is to establish an observation protocol. The observation uses the list of portal functionalities as a reference. The result of this phase provides an answer to SQ3.

**What functionalities do existing OS portals have that might enhance citizen engagement in OS portals for BET exercises?**

Data processing refers to analyzing data with tools. The end-product would be a data visualization. Group of functionalities that support data processing might not be essential anymore if the portal provides interactive data visualization. The interactivity allows users to modify the visuals based on selected inputs and shows the relations between one element and the others.

Several functionalities that can facilitate two-way interactions between citizens and the government are a feedback mechanism, discussion forum, dataset sharing, help mechanism, dataset request, and related content submission. To encourage data reuse for BET exercises, the portal must facilitate several activities: data retrieving, data understanding, data processing, and data reusing. Functionality that supports data retrieving are search techniques, users’ guide, data access, and multilingualism. Visualization, glossary, related information, metadata, and aggregated data help users understand the data better. To support data processing, portal owners need to incorporate in the portal downloadable data supply, machine-processable format, data in transactional level, data usage guidance, and supporting tools. The last activity is data reuse which is supported by data license, data API, data usage guidance, and application showcase.

Based on the available functionalities, the observed OS portals can be categorized into two groups: to promote data reuse and to inform citizens about what happens inside the government. The examples of the first group are USA Spending, open data Canada, UK, and Spending Ukraine. Data published on these portals are open-licensed which allows citizens to reuse the data legally. Also, these portals provide API to encourage data reuse for another purpose. The portals that only inform citizens are portal of transparency Uruguay and Open Spending Albania. Spending data on these portals are openly-licensed. However, the API is missing. Regardless, these two portals are keen to help users understand the data by providing visualizations.

While conducting this phase of the research, several limitations were identified. First, the limitation regarding the portal selection approach. Since ODB does not provide information on which websites
or portals the spending and budget data are published, the list of country websites by Romero et al. was used as an attempt to complete the ODB list. However, the research conducted by Romero et al. investigates how ICTs can be used as a bridge between citizens and the government. Many official websites on the list are considered irrelevant to this study since the fiscal datasets do not accompany the published fiscal information. Therefore, manual work had to be done to complete the ODB list. The limitation lies in the uncertainty of the observed portals. There is no guarantee that the observed portals are the main portals that were used by the countries to publish fiscal data. There might be another portal which provides more detailed and more complete datasets.

Second, the number of countries that publish both budget and spending data are very limited. Therefore, there are not many options are available to select the countries based on preference. This limitation is the main reason why the observation stops after seven portals.

Third, limitations while observing the portal. Several portals do not provide options for a universal language, such as English. For instance, the transparency portal of Brazil is only available in Portuguese. Therefore, the observation has to utilize a third-party option, such as google translate. Even though the content of the portal is understandable, the datasets are still in Portuguese, and there is no option to understand the datasets fully. Other than the datasets, information regarding country budget is also available only in Portuguese.
DEVELOPMENT OF DESIGN PRINCIPLES

This chapter is the documentation of the third phase of the research. In this chapter, the design principles for OS portals are developed. This chapter also provides an answer to the third sub-question SQ4.

*What design principles can potentially enhance citizen engagement in the BET exercises?*

As has been explained in the second and third chapters, this research is carried out to develop design principles for OS portal that can enhance citizen engagement in expenditure tracking process by combining several aspects.

4.1. Design Principles Development Process

Design principles are developed by synthesizing the analysis of the second and third chapters. All aspects of citizen engagement are analyzed to draw a clear picture of how each factor, functionality or functionality influence citizen engagement. The definition of citizen engagement and expenditure tracking are also considered in developing design principles.

The first step of developing design principles is to formulate key characteristics of the desired OS portal. This step involves analysis from chapter 2 and chapter 3. The inputs for this process consist of two components, as follows:

- Factors enhancing citizen engagement from chapter 2
  Since the design principles are expected to enhance citizen engagement, only factors theoretically proven to support citizen engagement are taken into account.
- List of portal functionalities and data functionalities from chapter 3
  The portal functionalities and data functionalities are translated into

All components are analyzed and combined to develop key characteristics of the desired OS portal. The desired characteristics must support both definitions of citizen engagement and BET exercises process. Further information on the characteristics is available in the next section.

The second step is to analyze the current design principles for open data by (Marta, 2016) and crosscheck the set of design principles with the developed characteristics. As explained in chapter 2, citizen engagement is seen from a portal’s ability to facilitate two-way interaction and to support BET exercises. Therefore, some of the developed design principles by Marta (2016) would likely support this aspect of citizen engagement. The output of this step is a set of existing design principles for open data which address the desired characteristics of an OS portal.

The third step is to identify the gap between existing design principles and the desired characteristics of design principles. Based on this gap, an additional set of design principles is developed.

The last step is to classify the combined design principles based on their purposes. The developed design principles must be able to enhance citizen engagement in OS portals. This purpose breaks down into two sub-purposes: enhancing citizen engagement in open data portal and enhancing citizen engagement in BET exercises process. Therefore, the output of this step is two sets of design principles
that can enhance citizen engagement in open data portal and BET exercises. The whole development process is illustrated in Figure 15.

4.2. Characteristics of OS Portals that Enhance Citizen Engagement

4.2.1. Characteristics from Portal and Data Functionalities

In this part, portal and data functionalities that can enhance citizen engagement will be used as an input to extract desired characteristics of an OS portal.

Data retrieving

Based on the analysis results of chapter 3, three functionalities can help with retrieving the data: data search query [F1], portal guide [F8], and data access [S2].

Citizens visit OS portal to find necessary information or data that can address their problems or attend their needs. However, a database consists of a large number of datasets which makes it difficult to find what we are exactly looking for, even from a well-organized data archive. Therefore, a search query is required [F3]. Users tend to make use of this functionality once they know what they are exactly looking for. This functionality can eliminate irrelevant data or information from the result. The more filters available, the quicker citizens can find the data they are looking for. Also, being familiar with the portal offers a great opportunity for finding the right information or data [F8]. The following characteristics are proposed to attend to this need.

Characteristic 1 To be equipped with various search queries

Characteristic 2 Availability of portal guide

Once the data has been discovered, the next step for citizens is to access the data [S2]. Accessing data is not always easy. There are barriers between the users and the data. Some portals require users to register before accessing the data. Some of them provide data only for internal use, such as for government workers. Some of them put charges on the data. Citizens prefer the data to be free of charge and without or minimum barriers to access the data. The following characteristic is proposed to address this need.

Characteristic 3 Free of charge and publicly available data, and no need for registration

Data understanding

Based on the analysis on Chapter 3, six functionalities contribute to understanding the data: data visualization [F4], glossary [F7], relevant information [F11], metadata [S1], multilingualism [S4], and data granularity [C1].

Understanding the data can help citizens to decide how to use the data for their benefits, e.g., how the data can be used to address their problems. Citizens are required to understand the terms [F7, S4], and the context in which the data is published [S1]. Also, citizens need to understand the data in a bigger picture with fewer details but a broader area to be covered [C1]. One way to obtain a good understanding of the data is through a visual representation of the data [F4]. According to literature in psychology, human brain spends less time and efforts in understanding the visual representation of data rather than in a table [source]. Relevant information about the data [F11] is required to
understand the data even better. The following characteristics are proposed to address several needs above.

**Characteristic 4** Availability of interactive data visualization
**Characteristic 5** Data in the aggregate level
**Characteristic 6** A complete list of glossaries
**Characteristic 7** Portal in a universal language, such as English
**Characteristic 8** Availability of metadata catalog
**Characteristic 9** Availability of information relevant to the disclosed data

**Data processing**
The analysis in Chapter 3 shows that five functionalities can influence the activity of analyzing the data: data supply [F3], data openness level [S3], data granularity [C1], data usage guidance [U2], and supporting tools [U6].

To analyze the data, citizens first need to be able to have the data [F3], preferably independent from the portal. Portals deliver data in different ways. Some of them let users only to view the data, a majority of them have a download option, and some of them provide the data in both ways. Also, citizens would prefer to process the data by machine [S3]. Above all, the availability of guidance on how to use the data [U2] and a list of tools that can be used [U6] can help citizens to start analyzing the data. To support BET exercises, citizens require the data to be at the finest level of granularity [C1]. Therefore, the following characteristics are proposed to attend the described needs.

**Characteristic 10** Downloadable data supply
**Characteristic 11** Data in a machine-processable format
**Characteristic 12** Data in transactional level
**Characteristic 13** Availability of data usage guidance
**Characteristic 14** Availability of the information on supporting tools to analyze the data

**Data reusing**
Several functionalities that can support data usability are data license [U1], data usage guidance [U2], data API [U3], and application showcase [U4].

Citizens can use the data to create innovations if several functionalities support it. First, citizens may need to access the data from a third-party application; this requires the portal to be equipped with data API [U3]. More than just an ability to access the data from other application, citizens need to be able to do this legally [U1]. Also, a guide on how to use the data [U2] and examples of current innovations by other people [U4] can help them to understand how to use the data and how the data has been used. This can trigger creativity to develop innovative ideas. To attend to these needs, the following characteristics are proposed.

**Characteristic 15** Availability of data API for all disclosed data
**Characteristic 16** Clear data Terms of Use (ToU) and license-free data
**Characteristic 17** Availability of example of existing data-based applications

**Facilitate two-way interaction**
Functionalities that can facilitate two-way interaction between citizens and the government are feedback mechanism [F5], help mechanism [F6], discussion forum [F10], dataset request [F12], related data/document upload [U4], and dataset sharing [U7].

In chapter 3, it has been explained that to enable active citizens; the portal is required to facilitate a two-way interaction. The interaction could be between the citizens and between citizens and the government. Citizens need to communicate with each other for information or knowledge exchange [F10]. Another importance of interaction between citizens is that they can share the data on other digital platforms [U7]. The interaction with the government is required to address complaints or provide suggestions [F5], or to ask for clarifications and helps [F6]. Also, citizens may need to notify the government about the missing value of the data and request for more complete data [F12]. Aside from requesting the data from the government, crowdsourcing on providing related data or document [U4] can deal with missing data. The following characteristics are proposed to address the described needs.
4.2.2. Characteristics from Barriers to Citizen Engagement

By considering barriers to citizen engagement as one of the inputs for extracting characteristics of an OS portal, the design will indirectly minimize the barriers for citizens to engage in an OS portal. Several types of barrier that have been identified in Chapter 2 are politico-strategic, organizational, social, technological, and deployment.

First, politico-strategic barriers include the lack of trust from citizens that their concerns will be taken seriously by political institutions, difficulty to interact with policy-makers, and the lack of commitment from the government to consider citizens’ contribution or to interact with them through ICTs. The main point of this type of barrier is a lack of trust in both sides of engagement activity. According to Warren et al. (2014), problems with trust can be solved through online civic coordination. Citizens are not confident that the government will take into account their concerns. Online coordination for civic activities allows citizens to feel important by letting them organize citizen-based initiatives, starting with planning until monitoring exercises. Warren and colleagues believe that online civic coordination can also solve the problem of difficulty to interact with policymakers. Enabling the coordination suggests that the government needs to establish a means to interact directly with citizens where they can attend to the citizen’s needs. This need has been covered by characteristic [21]. Concerning the issue of trust in the government and the difficulty in interacting with policymakers, the following characteristics are proposed.

- **Characteristic 24** Enable feedback update tracking
- **Characteristic 25** Inform impact of contributions
- **Characteristic 26** Effective communication between citizens and the government

Second, impediments from an institutional perspective include incompletely published financial document by the government, inflexibility of the existing structure to adapt and accommodate e-participation, such as outdated public participation law. Sometimes privacy concern prevents the government from disclosing complete and detailed spending data. In order to ensure that the required data is within the safe area of privacy issues and citizens do not have any difficulties in finding the required information or data for BET exercises, the following characteristic is proposed.

- **Characteristic 27** Standardized formats for spending data

Third, the barriers from a social perspective include lack of political knowledge, information and technology illiteracy, unequal access to technology and datasets, and the minimum role of the citizen. Minimum role of citizens which can be solved by allowing for online coordination for civic activities. Lack of political knowledge can prevent citizens to understand the context in which the data is published. This problem can be solved by updating citizens with current political issues. This need has been covered by characteristic [9]. Unequal access to datasets can hinder the BET exercise. Characteristic [3] has been proposed to tackle this issue.

Fourth, impediments from a technological perspective include the absence of uniquely designed technology and lack of a centralized database. These problems generate the same effect which is scattered places to disclose spending data. Scattered information forces citizens to go from one website to another to retrieve the required information. Therefore, the following characteristic is proposed.

- **Characteristic 28** Data on one portal

Fifth, from the knowledge perspective, the identified barrier is the lack of capabilities that are required to deal with provided datasets. This problem results in the lack of activities from the citizens’ part.
There is a gap between their intention to engage in the OS portal and their capabilities to give a meaningful contribution to the society. Therefore, the government needs to address this gap by providing a means for developing their capabilities to deal with datasets. This need has been covered by characteristic [13].

4.2.3. Characteristics from Motivations for Citizen Engagement

Another way to enhance citizen engagement in OS portals is by ensuring that the portal can satisfy the needs and requirements of its users. In this case, citizens’ motivations to engage in an OS portal can be used as an input to generate desired characteristics of an OS portal. A product or service that does not involve users’ values and motivations is not acceptable at all since the characteristic is not thoroughly examined (Kujala, 2008).

Between several motivations for citizens to engage in OS portals, only several can be attended by the portal. They are: to address political issues, make friends, seek information, improve existing services, improve the current situation, communicate community needs, and learn and develop skills.

The first motivation to be attended is to address political issues. This motivation requires citizens to understand the political issue correctly. After acquiring adequate knowledge about political issues, then citizens can express their opinions or concerns to the government. Both needs have been attended by characteristic [9] and characteristic [21]. The second motivation is concerning social benefit, which is to make friends. To attend this motivation, the portal needs to allow citizens to interact with other citizens or with people in different roles and from different backgrounds. This need has been covered by characteristic [18].

The third motivation to be attended by OS portals is information seeking. Citizens want to find specific information by visiting the portal. Citizens quit exploring OS portal when the required information is hidden or not published. Therefore, the following characteristic is proposed to attend to this need.

**Characteristic 29 Well-organized information or data**

The fourth motivation is to improve existing services. Based on their experience with other portals or their knowledge on spending data, citizens can help the portal owner improve the portal performances, or help data provider to provide data that suits their needs. This motivation is highly related to citizens providing feedback to portal owners or data providers. This motivation has been addressed by characteristic [21]. Therefore, the following characteristic is considered necessary.

The next motivation is their interest in a community, specifically in expressing the community needs. For instance, citizens want to complain if they think the government does not well attend their community need, or if they spot unfairness in welfare distribution. Citizens are interested in improving their community situation, and one way to attend this interest is by communicating with the government. This need has been covered by characteristic [2].

The last motivation is for the benefits of learning and skill development. Citizens expect the data can be used as learning material and they can develop their skills. This skill could be to analyze or process the data or to utilize the data for other purposes. For instance, the citizens want to create a database application, and they need to access the data from other application. This need has been covered by characteristic [15].

Table 7 Characteristics of OS portals, extracted from portal and data functionalities that can enhance citizen engagement, motivations for citizens to engage in OS portals, and barriers to citizen engagement in OS portals.
### 4.3. Development of Design Principles

In this section, the explanation about existing design principles is provided. Two sets of design principle are considered relevant to this research: design principles developed by Marta (2016), and principles for open data.

#### 4.3.1. Design Principles for Open Government Data Portal

The set of design principles is the deliverable of an open data portal research. The principles are developed to incorporate transparency, accountability, and data quality. However, some of them are still relevant to this research. Relevant principles are provided in Table 6.

Table 8 Existing design principles for open data portal. Based on previous thesis work by Marta (2016). The bold ones are considered relevant after minor adjustment or improvement

<table>
<thead>
<tr>
<th>#</th>
<th>Design Principles</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Provide a mechanism for users to request datasets and to track whether their request has been approved</td>
<td>22, 24</td>
</tr>
<tr>
<td>2</td>
<td><strong>Provide a mechanism for users to give feedback to datasets</strong></td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td><strong>Stimulate knowledge exchange between users by providing space for interaction between users</strong></td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Assist users in understanding and using datasets as well as using the open data portal by providing FAQ, a channel for users to ask questions, tutorials, and examples of dataset usage</td>
<td>2, 13, 20</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>5</td>
<td>Tag datasets with relevant keywords to allow faster searching of datasets</td>
<td>23</td>
</tr>
<tr>
<td>6</td>
<td>Allow users to download and request datasets without having to register first</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Assist users in searching datasets by providing filtering and suggestion functionality on the search function</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Provide API when users need to access datasets through external applications</td>
<td>15</td>
</tr>
<tr>
<td>9</td>
<td>Provide datasets in open, machine-processable format and allow users to download datasets in the format that they prefer</td>
<td>10, 11</td>
</tr>
<tr>
<td>1</td>
<td>Provide context on datasets through metadata, including data owner, semantic rules, update frequency, and history of changes to datasets</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td>Provide the function to visualize datasets to allow quick viewing of datasets</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>Use the user-friendly interface to ease navigation by categorizing datasets into different topics, …, and providing the user interface in the language that the users need</td>
<td>29, 7</td>
</tr>
</tbody>
</table>

Explanation of existing design principles and several design principles that need to be modified to be relevant to this research are provided below.

1. Existing principle #1.
The design principle is in line with characteristic #22 and #24. The modification is not required for this principle. Therefore, the current principle is proposed as the first principle to enhance citizen engagement.

**Principle 1** The portal provides a mechanism for users to request datasets and to track whether their request has been approved.

2. Existing principle #2.
Provide feedback but does not demand openness [characteristic 21]. Existing design principle emphasizes on user feedback about a dataset which is only between one user and the portal owner or data, provider. There is no option for other users to read the feedback. Therefore, the principle needs to be modified as follow.

**Principle 2** The portal allows citizens to submit feedbacks and view other users’ opinions or submitted feedbacks about a dataset.

3. Existing principle #3
The principle is about stimulating knowledge sharing. However, knowledge sharing can start only if the portal facilitates the activity. Also, this research focuses more on active and pro-active citizens which means that the willingness to share the information or knowledge is there but not well attended yet. Therefore, the principle is modified as follow.

**Principle 3** The portal facilitates knowledge exchange between users by providing space for interaction between them.

4. Existing principle #4
The current principle combines portal characteristics which serve different purposes as one. For instance, channel to ask questions [characteristic 20] is leaning more towards facilitating a two-way interaction between citizens and the government rather than to understand the data. From this characteristic, the following principle is proposed.
Principle 4 The portal enables effective communication between citizens and the government.

The next characteristic is to data usage tutorials [characteristic 17], which support data analyzing and usability. To incorporate this characteristic, the following principle is proposed.

Principle 5 The portal assists users in understanding and using datasets.

Characteristic [2] is explicitly incorporated in this design principle. This characteristic can help users to retrieve the data effectively. The following principle is proposed to ensure characteristic [2] is incorporated in the portal design.

Principle 6 The portal assists users in understanding how to use the OS portal.

5. Existing principle #5
This principle attends characteristic [23]. However, the only identified supporting information here is tags for metadata. Other important information is considered relevant to this research, such as necessary documents or information for BET exercises. Therefore, the newly proposed principle is as follow.

Principle 7 The portal allows citizens to submit necessary information or documents to support BET exercise.

The identified barrier between users and the resource is only registration [characteristic 3]. The existing design principle does not deal with paid data or data available only for few people. Therefore, the principles need to be modified as follow.

Principle 8 The portal ensures minimum barriers between citizens and data.

7. Existing principle #7 and #8
The design principles are in line with characteristic [1] and [15]. The modification is not required for these principles. Therefore, the existing principles are proposed as principles that can enhance citizen engagement.

Principle 9 The portal assists users in searching datasets by providing filtering and suggestion functionality on the search function.

Principle 10 The portal provides API when users need to access datasets through external applications.

8. Existing principle #9
This principle suggests the data needs to be provided in the machine-processable format [characteristic 11], such as XLS, CSV, and RDF, to name a few and let users download the data [characteristic 10]. Another characteristic is data needs to be open. This characteristic has been covered by Principle 8 which is to ensure minimum barriers between citizens and the data. Therefore, the modified version of this design principle is proposed as follow.

Principle 11 The portal provides datasets in machine-processable format and allow users to download datasets in the format that they prefer.

9. Existing principle #10, #11, #12
The design principles are in line with characteristic [8], [4] and [7, 29]. The modification is not required for these principles. However, existing principle #10 is about understanding the dataset, which has been covered by Principle 5. Therefore, the other two existing principles are proposed as principles that can enhance citizen engagement.

Principle 12 The portal provides the function to visualize datasets to allow quick viewing of datasets.

Principle 13 The portal uses a user-friendly interface to ease navigation by categorizing datasets into different topics and providing the user interface in the language that the users’ needs.
4.3.2. Principles for ICT-enabled Citizen Engagement

The second input to be analyzed is principles for ICT-enabled citizen engagement. The Australian Government develops these principles. The principles are selected as one of the analysis inputs because, among countries with their engagement principle, Australia is the one with specific engagement through ICTs.

Table 9: Existing design principles for ICT-enabled citizen engagement by Australian Government. N/A means that the principle is not relevant with the perceived principles for OS portal.

<table>
<thead>
<tr>
<th>#</th>
<th>Principles</th>
<th>Explanation</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Commitment</td>
<td>Governments need to be committed to ensuring the citizens have proper mechanisms to communicate and participate effectively. The commitment can be developed through a partnership between citizens and the government.</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>Community focus</td>
<td>Governments need to facilitate information access, knowledge-sharing, and discussion among participants.</td>
<td>3, 18</td>
</tr>
<tr>
<td>3</td>
<td>Community capability and inclusiveness</td>
<td>Governments need to include all people, including those who have limited access to ICTs or those who have other barriers to participate.</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Mutual respect, confidence, and trust</td>
<td>Governments and citizens need to agree on the same standard for communication. Governments should facilitate clarity of understanding and transparency of gathering inputs and how the inputs will be used in decision-making.</td>
<td>25, 26</td>
</tr>
<tr>
<td>5</td>
<td>Interactivity and flexibility</td>
<td>Governments need to promote active engagement and discussion while enabling innovative ICT-enabled mechanisms to consider the citizen's circumstances, such as capability and location.</td>
<td>18</td>
</tr>
<tr>
<td>6</td>
<td>Responsibility and accountability</td>
<td>Governments should be clear about how citizens' inputs will be received and how they will be used in the policy-making process.</td>
<td>26</td>
</tr>
<tr>
<td>7</td>
<td>Security and privacy</td>
<td><strong>Governments should implement privacy protection and comply with relevant security and privacy legislation</strong></td>
<td>27</td>
</tr>
<tr>
<td>8</td>
<td>Evaluation and efficiency</td>
<td>Governments need to identify and measure the impact of online engagement in policy-making.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Several existing principles for ICT-enabled citizen engagement address the same characteristics as first input does. The characteristics that are attended by this input are characteristic 25, 26, and 27. This leaves only two principles that need to be analyzed. They are principle #4 and principle #7. The principles developed by the Australian Government is expected to enhance citizen engagement in general, not necessarily through a portal. The principles are relevant to the engagement process, but not suitable to be incorporated in designing an OS portal. Therefore, they need to be modified to attend the characteristics 25, 26, and 27 of an OS portal.

1. Existing principle #7
   This principle only cover small parts of the characteristic [27]. However, privacy is best to be separated from the data standard since it is a big concern when dealing with data, especially spending data on a transactional level. This suggests that another principle needs to be established to attend characteristic [27]. The proposed principles are as follows.

   **Principle 14** The portal has a standard for data to be disclosed online
   **Principle 15** The portal complies with relevant privacy and security concern
4.3.3. Unattended Characteristics
In this section, the characteristics that have not been addressed by existing design principles are provided. Based on these characteristics, the new design principles are developed. The unattended characteristics and developed principles to attend to these characteristics are provided below.

- **Characteristic [5], [6] and [9]**
  Characteristic [5], [6], and [9] are to help citizens understand the data accurately, effectively, and gaining insights beyond the disclosed data. To attend these characteristics, the following principle is proposed.
  
  **Principle 16** The portal provides mechanisms that allow citizens to understand the content and the context of the data

- **Characteristic [12] and [14]**
  Both characteristic [12] and [14] are derived to support data analysis. Data in transactional level and supporting tools are required as materials to be analyzed and means to analyze the materials. Therefore, the proposed principle to attend these characteristic is:
  
  **Principle 17** The portal provides mechanisms that allow citizens to perform accurate BET exercise

- **Characteristic [16]**
  This characteristic is derived to support data usability. The data needs to be an open license so that citizens are free to use it for any purposes without violating any rules associated with the data. The following principle is proposed to address the legal concern.
  
  **Principle 18** The portal allows citizens to analyze and share the data legally

- **Characteristic [19]**
  This characteristic is derived to facilitate interaction between citizens. Sharing the datasets can notify or remind other portal users that the data has just been uploaded. The proposed principle to attend this characteristic is as follow.
  
  **Principle 19** The portal provides options for citizens to share the data or information to other digital platforms

- **Characteristic [17]**
  This characteristic is to advertise that the data has been used for different purposes. Providing application showcase can trigger citizens to generate creative and innovative ideas about how the data can be used. The following principle is proposed to incorporate this characteristic
  
  **Principle 20** The portal encourages citizens’ creativity to innovate using the data

- **Characteristic [28]** The data needs to be available on the main portal
  This characteristic is derived to ensure minimum efforts for data retrieving. By having all the data available in one place, the citizens can save time in finding the right data. The following principle is proposed to incorporate this characteristic.
  
  **Principle 21** The portal ensures minimum efforts in retrieving the data

4.4. Analysis of the Developed Design Principles
In this section, the developed design principles from section 4.3. are analyzed. All relevant existing design principles, modified or newly developed design principles are included. The list of design principle can be found in Appendix A.

After listing all relevant design principles for enhancing citizen engagement in OS portals, the next step is to group the principles into two categories: to enable active citizens and to enable pro-active
citizens. Some principles serve similar function since they are derived from the same characteristic. Therefore, it is important to divide the principle that can enable active citizens into several groups, and the same treatment is given to principles that can enable pro-active citizens. The result of the analysis is provided in Figure 16.

![Figure 15 Developed design principles and how they enhance citizen engagement. A complete list of design principles is provided in Appendix A](image)

The next two subsections are dedicated to providing explanations about Figure 16.

### 4.4.1. Facilitate Two-way Interaction

In this subsection, the three categories of design principles that can enable active citizens are explained. Facilitating two-way interaction is the entry step to online citizen engagement. Countries with passive can level to active citizens by facilitating two-way interaction between citizens and the government.

Lack of trust in government and vice versa is an entry barrier to citizen engagement (Kasymova, 2017). Citizens are skeptics that the government will not take their concerns and feedback seriously. This barrier is even more challenging to overcome in online engagement since the citizens cannot talk to the government face to face. In order to win the citizens' trust, the government needs to ensure that their concerns are heard and followed up. As suggested by one of the principles for ICT-enabled citizen engagement by Australian Government, governments need to be transparent about how concerns and feedbacks are collected, will be used, and what impacts they have on the decision-making process. Citizens need the transparency approach to put trust in the government again. As mentioned by Wirtz et al. (2017), transparency in OGD not only increases trust in data quality but also in the government itself. Transparency and citizen engagement are two related aspects with different purposes; transparency ensures access to spending data, while citizen engagement ensures access to the government bodies (A. J. Meijer et al., 2012). Another barrier that hinders CSOs to engage in BET exercise or open spending portals is difficulties or the lack of means to communicate with policymakers (Tolmie, 2013). Assuming there is no activity outside of the portal, the only way to
communicate is through portals. Effective communication between citizens and the government is required to ensure no delay in responding to citizens’ questions.

Another way to facilitate two-way interaction is by ensuring that the portal can be a platform for knowledge sharing. Citizens with capabilities in data analytics can help other citizens who are facing difficulties in the same field. The sharing is not limited to skill development; data can also be a material to be shared with other people. Zuiderwijk-van Eijk and Janssen (2015) propose that a portal must allow its users to share the datasets or knowledge from using this data to other digital platforms in support of data widespread.

Another means to facilitate two-way interaction is through collaboration. The government can collaborate with citizens by allowing them to make contributions to improve data quality. Linders (2012) explains that there are three types of collaboration in the public sphere: citizen sourcing, government as a platform, and a DIY government. Regarding spending data for BET exercises, citizens can make contributions by completing the missing information related to the data. Another way to contribute in fixing missing information is by suggesting or requesting new data sets. After all, one of their motivations to engage in open data portal is to improve existing services (Füller, 2010).

Table 10 Design principles that can enable active citizens

<table>
<thead>
<tr>
<th>#</th>
<th>Design Principle</th>
<th>Rationale</th>
<th>Example functionalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Facilitate trust and confidence building</td>
<td>The first step towards active citizens is by winning their trust and building their confidence through transparency</td>
<td>Contribution-policy mapping; Government chatroom</td>
</tr>
<tr>
<td></td>
<td>#4 Enable effective communication between citizens and the government</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Facilitate knowledge sharing</td>
<td>Citizens are encouraged to share their knowledge and information if an exchange space provided</td>
<td>Data sharing on social media; Discussion forum</td>
</tr>
<tr>
<td></td>
<td>#19 Provide options for citizens to share the data or information to other digital platforms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>#3 Facilitate knowledge exchange between users by providing space for interaction between them</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Provide room for collaboration</td>
<td>Citizens feel more confident about their significance when they contribute to the improvement of dataset quality. Also, it is in-line with their motivation to improve existing services</td>
<td>Submit/upload invoices; Open feedback; Commenting on the dataset; Request missing data</td>
</tr>
<tr>
<td></td>
<td>#7 Allow citizens to submit necessary information or documents to support BET exercise</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>#2 Allow citizens to submit and view other users’ feedback about a dataset.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>#1 Provide mechanism for users to request datasets and to track whether their request has been approved</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4.2. Encourage Data Usability

As has been explained in chapter 2 and 3, one way to enable pro-active citizens is by encouraging data reuse, in this case, for BET exercise. At the beginning of the analysis of chapter 3, several activities required to encourage data reuse are also provided. In this subsection, each activity is divided into one or two groups.

- Data retrieving

The first step to support effective data retrieving is to make sure that the data is easy to find. Citizens often lose confidence and interest when they cannot find the budget information they concern about
Several ways can be options to prevent this issue. Data searching technique, data categorization, and data standardization are three aspects that need to be seriously considered. These three aspects influence the convenience in finding the necessary data or information (source). Assisting users to be familiar with the portal can also help them find the data in a shorter time. As has been explained in chapter 3, familiarity with the portal increases the effectiveness of information seeking (Zhang and Ghorbani, 2004).

The second step is to ensure minimum barriers between citizens and the data that could hinder citizen engagement in BET exercises. Some of the barriers are lack of centralized database and incompletely published budget expenditure documents. These two impediments are also stumbling blocks to citizens’ involvement in budget expenditure tracking\(^8\) (Accountability Initiative, n.d.). Citizens are less likely to participate in an online engagement website if they are required to go to another site to retrieve necessary information (Cecez-Kecmanovic et al., 2010). Also, the portal needs to comply with the definition of open data provided by Open Data Handbook\(^9\), which is the data must be accessible to anyone and downloadable without charge. Opening government data can provide rooms for citizens, especially developers, to explore and play with the data (Janssen et al., 2012; Kapoor et al., 2015; Ubaldi, 2013).

- **Data understanding**

Data understanding is required to sort which data needs to be analyzed, or which data can be combined. According to Schröder et al. (2018), understanding the data can make users aware of surfaced patterns of the data. Understanding the data can be defined as understanding the content of the data and the context of the data. To understand the data content means that citizens have to be familiar with all the terms used in a dataset. As has been explained in chapter 3, a glossary is a portal functionality that is built for this purpose. Another way to define data understanding is by knowing the data context. This can help citizens to use the data the right way. Functionalities that can help citizens understand the data context are data visualization (Sun et al., 2015) and metadata (van Helvoirt and Weigand, 2015).

- **Data processing**

Data processing is when citizens analyze the data using tools or applications. These tools are classified into three categories: exploration tools, analytic tools and mashup tools (Chatfield and Reddick, 2017). Analytic tools allow users to visualize the data to identify data patterns hidden behind numbers. Regarding using the tools, portals need to assist citizens on how to process the data. Aiding means providing mechanisms for capacity building to develop the citizens’ skill. In their study about public participation, Grant and Curtis (2004) list capacity building as one the success criteria for both process and outcome evaluation.

The next step is to ensure the disclosed data can be processes for BET exercises. This means that the data must be in processable formats, such as .xls, .csv, or .rdf. Another important thing is to ensure that all required information is available, in this case, the data must be as detailed as possible. Spending data must be published in the transactional level with descriptions of every transaction including value, period, and recipient (Tygel et al., 2016).

- **Data reuse**

Data reuse refers to using the existing dataset for another purpose. Open data promotes the benefit to be reused without barriers and restrictions (Jetzek et al., 2014; Kassen, 2013). Two aspects need to be considered to ensure data usability. First, the legal aspect which refers to data license data terms

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\(^8\) Based on a case study in India, focusing on challenges and the way budget can be tracked using Sarva Shiksha Abhiyan (SSA) as an example.

\(^9\) The resource can be found here http://opendatahandbook.org/guide/en/what-is-open-data/
of use. In order to ensure the data can be used legally, the portal needs to provide openly-licensed data and non-ambiguous terms of use. Usually, the legal aspect that needs to be carefully considered is privacy.

Another important aspect that supports data reuse is innovations. The portal and data disclosed on it must be innovation-friendly. In order to ensure this, first data API must be available. Application Programming Interface (API) is a tool or protocol to develop software or applications (Chatfield and Reddick, 2017). Application developers require this tool to access the data provided by third parties. Also, portals can inspire or encourage citizens to creatively innovate using the data by providing examples of existing data-based applications.

Table 11 Design principles that can enable pro-active citizens

<table>
<thead>
<tr>
<th>#</th>
<th>Design Principle</th>
<th>Rationale</th>
<th>Example of implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Easy to find</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>#6 Assists users in understanding how to use the OS portal</td>
<td>The portal consists of a large number of datasets that results in confusion and long searching time.</td>
<td>Open data standard; Portal in English; Data based on agencies; Filters such as date and amount of transaction</td>
</tr>
<tr>
<td></td>
<td>#9 Assist users in searching datasets by providing filtering and suggestion functionality on the search function</td>
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<td></td>
<td>#13 Use the user-friendly interface to ease navigation by categorizing datasets into different topics and providing the user interface in the language that the users need</td>
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<td></td>
<td>#14 Have a standard for data to be disclosed online</td>
<td></td>
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<tr>
<td>2</td>
<td><strong>Minimum barriers to data</strong></td>
<td></td>
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<tr>
<td></td>
<td>#8 Ensure minimum barriers between citizens and data</td>
<td>Portal must comply with the definition of open provided by Open Data Handbook</td>
<td>Data in one place; No registration; Free of charge;</td>
</tr>
<tr>
<td></td>
<td>#21 Ensure minimum efforts in retrieving the data</td>
<td></td>
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<tr>
<td>3</td>
<td><strong>Data understanding</strong></td>
<td></td>
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<td></td>
<td>#12 Provide the function to visualize datasets to allow quick viewing of datasets</td>
<td>Citizens need to understand what the data is about, its content and context before using it</td>
<td>Relevant information; Aggregate data; Treemap data visualization</td>
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<tr>
<td></td>
<td>#16 Provide mechanisms that allow citizens to understand the content and the context of the data</td>
<td></td>
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<tr>
<td>4</td>
<td><strong>Data processing assistance</strong></td>
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<td></td>
<td>#5 Assist users in understanding and using datasets</td>
<td>Citizens need to understand how to process the data</td>
<td>Data usage tutorial; Portal walkthrough</td>
</tr>
<tr>
<td></td>
<td><strong>Support BET exercise</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>#11 Provide datasets in open, machine-processable format and allow users to download datasets in the format that they prefer</td>
<td>The portal must enable both types of tracking processes; compare actual spending with the budget plan and confirm the validity of claimed transactions</td>
<td>Transactional data; Supporting tools; Data in XLS, CVS, RDF; Downloadable data supply</td>
</tr>
<tr>
<td></td>
<td>#17 Provide mechanisms that allow citizens to perform accurate BET exercise</td>
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<td>5</td>
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<td></td>
<td></td>
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<tr>
<td>6</td>
<td><strong>Ensure legality of data reuse</strong></td>
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</tbody>
</table>
4.5. Conclusion

This chapter focuses on the formulation of design principles for open spending portals. The principles are developed to enhance citizen engagement in budget expenditure tracking exercises. The analysis of chapter two and three are used as inputs to develop design principles. The development process starts by analyzing motivations and barriers to citizen engagement as the result of the literature review. These determinants are then combined with the list of portal functionalities that might enhance citizen engagement that was obtained from portal observation. The output of this step is a list of key characteristics of open spending portals. Next, existing design principles are used to see which characteristics have been addressed and which are not. Existing design principles might be selected, modified or ignored depending on the key characteristics. For every unattended characteristic, new design principles are proposed. The final result which combines existing and newly developed design principle provide an answer to SQ4.

What design principles can potentially enhance citizen engagement in the BET exercises?

The design principles are developed to level up form passive citizens to active citizens, or from active citizens to pro-active citizens. In order to stimulate active citizens, governments need to gain citizen’s trust and confidence. After that, rooms for collaboration and media for knowledge exchange need to be in place. All three activities could be catalysts for two-way interaction between citizens and governments. The design principle that can help to level up from passive to active citizens are 1, 2, 3, 4, 7, and 9.

In order to level up from active to pro-active, governments need to support BET exercises by citizens. This means that all steps to perform BET exercises need to be supported. The first step is data retrieval. The portal needs to ensure that the data can be easily found. Also, the barriers between citizens and the data need to be kept the minimum. Principle 6, 9, 13, 14, 8, and 21 can support this step. The next step is understanding the data. Principle 12 and 16 are developed to ensure that citizens are assisted in understanding the data. The third step is data processing. Portals need to provide assistance for citizens to understand how to process the data. Moreover, citizens need to perform accurate BET exercises. Principle 5, 11 and 17 ensure that the two needs of citizens are attended. The last step is data reusing. In this step, the portal needs to make sure that it complies with all legal aspects based on the law in that country. Another important point is to ensure that the portal is innovation-friendly to promote data reuse. Principle 15, 18, 10, 5 and 20 are developed to ensure the two aspects.

It is important to allow citizens to submit related information, data, or document to the data archive. Usually, documents such as transaction receipt or invoice are missing from the data archive. Meanwhile, invoices and receipts are considered primary documents that allow citizens to track BET exercises. Specifically, these documents allow citizens to trace the executed transactions or confirm the truth of claimed payments. Therefore, the uploading or related documents or information is considered important. However, uploading the data is considered irrelevant to the OS portal since the data is from the government. Therefore, allowing citizens to upload the data will increase the quantity
of data archive but decrease the data reliability. Even though there is a mechanism that allows citizens to collaborate on reviewing the uploaded data, there is no guarantee the information is correct.

Different levels of data granularity have different impacts on citizen engagement in OS portals. However, both serve the function to enable pro-active citizens. It is easier for citizens to understand the bigger picture of the data when it is provided in aggregate level. However, this data at this level has a drawback; it does not support BET exercises. Citizens may obtain insight into how much the government has spent on education for the last few years, but there is no information on which aspects of education have been improved. On the other hands, data at the transactional level serves a function in BET exercise. Since this exercise requires the data as detailed as possible, transactional data allow citizens to track the budget expenditure accurately. By assuming the data is correct, the more detailed the data, the more accurate the tracking results.

One problem must be anticipated due to the provision of transactional data. Openness is indeed essential in BET exercises. It can help citizens to exercise their right to information. However, the detailed data can harm, if not violate, the privacy of the people involved in the transactions. For instance, uploading receipts or invoice of a related transaction could disclose personal information of the people is doing or receiving the payment, such as their signatures. As restricted by the Privacy Act of 1974 by the U.S., any identifiable-identity of an individual not permitted for disclosure. Together with the Freedom of Information Act (FOIA), Privacy Act allows even the most personal information to be disclosed. However, this matter highly depends on the country situation. Whether the country adopts FIOA, or what aspects are covered by privacy law in one country could influence the level of data granularity.

It is not feasible to develop design principles for OS portal that can enhance citizen engagement in BET exercises only by taking into account the portal itself. The research must consider the quality of the datasets being published on the portals. Both portal functionality and data quality are determinants of the success of BET exercises.

To implement the developed principles, all actors involved in BET exercises have to collaborate. Also, they have to commit to improving data quality as well as portal functionalities. Starting with governments, they need to establish a standard for data publication; not only the standard for data such as completeness and timeliness but also the underlying privacy concerns of the publishing process. Portal owners need to pay attention to its users’ interests and needs; what data they need, what topic they are interested in, and what they want to do with the data. Citizens need to be more active in seeking information and vocal in voicing their opinions through feedback. Above all, governments and portal owners need to encourage citizens to reuse the disclosed data and ensure fewer cases of data misuse.
5

EVALUATION OF DESIGN PRINCIPLES

In this chapter, the developed design principles are evaluated. The evaluation process is conducted with experts with different expertise. The selected experts are based on the relevant aspects while developing the design principles. The chapter is dedicated to answering the last question of this research.

SQ5: To what extent could the developed design principles potentially enhance citizen engagement in BET exercises?

In this chapter, the guidelines for evaluating design principles is provided along with the criteria to measure the engagement effectiveness.

5.1. The Purpose of Evaluation

The evaluation is conducted to evaluate how the design principles may help users in achieving their objectives in visiting open spending portals. Since the developed design principles are not yet implemented in real life, the evaluation will focus on interviewee’s opinions about design principles, and to what extent the developed design principles would enhance citizen engagement once they are implemented. Evaluating the design by enquiring feedbacks form experts is regarded as a standard method (Baldwin et al., 2008).

The interview is conducted with seven people from various backgrounds who work in different roles. According to Blaxter et al. (2006), the interview allows the researchers to uncover information that is probably not accessible using other techniques, such as observations and questionnaires. Unlike questionnaires, interviews ensure the mutual understanding between interviewers and the interviewee since the interviewers can simplify and explain further about the questions (Alshenqeeti, 2014).

The results of this interview are used to determine whether the developed design principles can enhance citizen engagement in open spending portal. Any findings from the interview are analyzed to determine whether additional design principles must be developed. The deliverable is a set of a final design principle for open spending portals that can enhance citizen engagement as well as how they enhance it.

5.2. Selecting Interviewees

The roles of the interviewee are selected based on their unique perspectives. This is meant to gain knowledge on how the developed design principle could potentially help them solve problems with their unique capabilities. The interviewees are selected based on several criteria;

1. Academia
   Researchers on open data and citizen engagement are both academia who have knowledge of the two aspects. They give opinions on the developed design principles from their perspectives as academia.

2. Citizens who work directly with data
   Citizens who work directly with data are considered as potential users of open spending portals. Their experience in visiting open spending portals or their expectations towards open spending
portals are valuable insights to this study. Since they are the most likely the main target of open spending portal, their opinions could provide insights in assessing the potential impact of the developed design principles.

3. Government workers

This role gives a different perspective towards the development of open spending portal design principles since it is from the other side of the portal. They have insights into the internal governments regarding open spending data. Their opinions are helpful to know government agencies’ expectations towards the portal which might be different from those of citizens’. Knowing expectations from both sides could be a great ingredient to develop adaptable design principles.

4. Open spending portal manager or organizers

They also have a unique perspective towards the developed design principles. They have insights on the internal side of the portal. They can provide insights on motivations behind portal functionalities.

The criteria are fixed, which means the only interviewee that falls into one of those criteria is considered relevant to this study. For each criterion, interviewees with different roles become a priority. However, having two or more interviewees within the same role is not out of the option. Therefore, the number of interviewees are not exact. Based on the criteria, seven interviewees are selected. The background of the interviewees is provided below.

1. Interviewee 1

Interviewee 1 is a post-doctoral researcher who has been working with open data for almost seven years. She studied the use of open data, the design of open data infrastructure, how they improve coordination between data providers, users, and policymakers. Interviewee 1 has researched how to develop virtual research environment, add functionalities that allow people to visualize the data and share their findings. She visited one of the open spending portals several times and interested to know what kind of visualization it has.

2. Interviewee 2

Interviewee 2 is a researcher of citizen engagement topic for two years. Before beginning his research on citizen engagement, interviewee 2 worked in supreme audit portal in Indonesia and dealt with financial statement data. The point of interest of his research is a combination of both aspects: open government data and citizen engagement topic. The research concerns citizen engagement with Open Government Data initiatives. Interviewee 2 visited one of open spending portal to look for specific information.

3. Interviewee 3

Interviewee 3 is a data scientist who started to work with open government data almost three years back before started to study different open government data initiatives. When she started to work in ETH Zurich, she sees a lot of data published by the government and use a lot of data about government investments. Interviewee 3 does not have any experience in visiting open spending portals.

4. Interviewee 4

Interviewee 4 is currently a researcher on the transparency of open data. He has experience working with open data since 2009. After a few years of working as a devocacy in Brazil, Interviewee 4 started to work for the government and get involved with the portal of transparency Brazil. At the moment, he is a researcher with research interest to develop design principles for
5. Interviewee 5
Interviewee 5 is a data journalist from Brazil. She was working by following the rhythm of the information in Brazil. Interviewee 5 often represents civil society several times. She encourages federals to make the data more open by publishing the data in machine-processable formats. She participates in open government locally and offers federals training on data journalism formats. She is using the data on a daily basis, specifically public spending to create budget stories. She has visited numerous open spending portal ranging from city level to national level.

6. Interviewee 6
Interviewee 6 is a data journalist from the Netherlands. In his role, he creates news based on datasets. Interviewee 6 has an interest in data, government spending, and open spending portal. He started working as a data journalist five years ago before starting to be involved with open spending data three years ago.

7. Interviewee 7
Interviewee 7 is an interim director of the Open State Foundation. The foundation is working towards data openness. He and his team are working to get the municipality to open more data. Also, they promote information reuse. Open spending is one of the platforms that was created to promote data reuse. Interviewee 7 has a lot of experience dealing with both open spending portals and government workers to open the data.

Table 12 The summary of selected interviewees

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Role</th>
<th>Date of Interview</th>
<th>Medium of Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewee 1</td>
<td>Researcher on open data</td>
<td>July 16th, 2018</td>
<td>Face to face</td>
</tr>
<tr>
<td>Interviewee 2</td>
<td>Researcher on citizen engagement</td>
<td>July 18th, 2018</td>
<td>Skype</td>
</tr>
<tr>
<td>Interviewee 3</td>
<td>Data scientist</td>
<td>July 20th, 2018</td>
<td>Skype</td>
</tr>
<tr>
<td>Interviewee 4</td>
<td>Government worker</td>
<td>July 18th, 2018</td>
<td>Face to face</td>
</tr>
<tr>
<td>Interviewee 5</td>
<td>Data journalist</td>
<td>July 25th, 2018</td>
<td>Skype</td>
</tr>
<tr>
<td>Interviewee 6</td>
<td>Data journalist</td>
<td>July 31st, 2018</td>
<td>Telephone</td>
</tr>
<tr>
<td>Interviewee 7</td>
<td>Portal organizer</td>
<td>August 1st, 2018</td>
<td>Face to face</td>
</tr>
</tbody>
</table>

5.3. Interview Process

The interview takes around 45 minutes and is semi-structured. The main part of the interview is all about the developed design principles. The list of developed design principles is provided in Appendix A. The focus of the interview is to get the interviewees’ opinions about the developed design principles. The interview consists of three sections. First one is a short section to assess which direction the interview will go. This is determined based on the interviewee’s experience of using open spending portals. The second section is the main part of the interview, which is to ask their opinions on developed design principles. The last section is to ask about BET exercises. List of questions for the whole interview session is available in Appendix B

5.4. Interview Results

In this section, the results of the interview are provided. The experts’ opinions are included as a descriptive analysis.

- Principle 1 The portal provides a mechanism for users to request datasets and to track whether their request has been approved.
This principle allows users to request datasets and see how their request is handled. Depending on whether the standard has been applied or not, for a portal to allow citizens to request datasets could be important or not. If the standard has been implemented and all data has been published, it is not required for portals to allow citizens to request new datasets. On the other hands, if the standard has not yet been implemented, this principle can be very useful for citizens whose daily activities involve a large amount of data.

Based on experience, Expert 3 claimed that it would be nice to have this functionality and even better if the portal can link to other portals that provides missing datasets. Allowing citizens to request new datasets is also helpful for citizens who work with data. For instance, a data scientist is a role that works closely with a large amount of data. “As a data scientist, the more data the merrier” (Expert 3, 2018). Another role that is highly related to a large amount of data is a data journalist. “Data journalist always strive for data” (Expert 6, 2018). According to Expert 6, data journalists do not always get data they are looking for because sometimes the governments are afraid of stories.

However, Expert 2 has another opinion regarding this principle. “In my experience, when we are dealing with financial data, they have a standard. The government should publish all public data required by the laws. All data should be disclosed already, so the mechanism is not very important” (Expert 2, 2018).

- **Principle 2** The portal allows citizens to submit feedbacks and view other users’ opinions or submitted feedbacks about a dataset.

This principle has two goals: to enable feedback submission and to view other users’ opinions. Feedback submission is considered an important point that governments are expected to organize this mechanism. On the other hands, users’ opinions are useful to see how the data has been used, but not very important to look for data review.

According to a researcher on citizen engagement, a feedback mechanism is the most important feature that can facilitate two-way interaction. Through this mechanism, citizens can deliver positive feedback to the government. The expert continued.

*Users can share their findings and they can comment on the data or other users’ findings. So (it’s) important for the government to organize this mechanism. The government should assign people on feedback mechanism so that the feedback can be collected and followed up* (Expert 2, 2018).

Other purposes of open feedback mechanism are it allows users to see how other people use the data to solve their problems (Expert 1, 2018) and to determine whether the data is exactly what they are looking for (Expert 5, 2018).

However, Expert 3 and Expert 6 have different opinions about this principle. According to Expert 3, being able to view other users’ opinions is tricky. “The opinions are required in terms of data quality, but it is subjective” (Expert 3, 2018). For example, someone from the energy sector reviews a transportation dataset. The comment might not be accurate. Expert 6 mentions that this principle is not very important since there are not many data journalists use the same datasets.

- **Principle 3** The portal facilitates knowledge exchange between users by providing space for interaction between them.

Open spending portal users benefit from this principle in learning how other users analyze the data, to make better sense of the data, and even to encourage collaboration. Also, the government can use this mechanism to check about the data quality and trace how the data has been used.

This principle is useful because it allows users to learn from other users about the analysis on spending data, and collaborate to either question the government or to innovate using the data (Expert 2, 2018). A researcher on open data mentions that this principle is really important “…to make better sense of
the data, how the data is collected, ..., how to use it, especially for developers to know when new data is coming in.” (Expert 1, 2018). However, Expert 3 has a different opinion. According to this expert, for knowledge exchange between users, commenting section on the dataset is enough. From the government's perspective, this principle can help them to assess the data quality. “It (discussion forum) is a good thermometer to check the data quality or what they have been doing with the datasets” (Expert 4, 2018).

- **Principle 4 The portal enables effective communication between citizens and the government.**

This principle is important to maintain communication between citizens and the government. Sometimes people tend to submit complains through this channel rather that feedback mechanism. Based on experience, communication with the government has facilitated a data journalist to complain because the data that is provided on the portal was not in machine-readable format (Expert 5, 2018). Expert 3 mentions that based on experience, it is important for the portal owner to take several questions from users because sometimes when visiting a foreign portal, the translation can be confusing.

- **Principle 5 The portal assists users in understanding and using datasets.**

Based on the interview results, this principle is helpful to achieve different goals such as to reduce searching time, to better visualize the data, and to translate the data into normal languages. This principle covers metadata, and tutorials on using the data. This principle could be beneficial to make the visualization more interactive, probably by taking a look into one municipality in details (Expert 1, 2018). Having a brief description of the data is also helpful for a data journalist. "It is good to have a preview of the data, so you can skip the data that doesn’t match your search” (Expert 5, 2018). Another data journalist (Expert 6) mentions that data visualization contributes to finding the right data. Expert 6 mentions that visualization is the objective within journalist roles. “A good summary and normal language is my objective…. Translating the concept of government to normal language” (Expert 6, 2018).

- **Principle 6 The portal assists users in understanding how to use the open spending portal.**

The importance of this principle depends on the users and the portal itself. Users with a clear goal on which data they are looking for do not see this principle useful. Also, the usefulness of this principle is also determined by the complexity of the portal. If the portal is too complex, a comprehensive guideline is required to cover all parts of the portal. As the statement suggests, this principle helped a data journalist understand how to use the portal (Expert 6, 2018). A government worker mentions that depending on who the users are, this principle could be useful or not (Expert 4, 2018). Based on experience, Expert 2 mentions that since the website is quite simple, it was not difficult to navigate the portal.

- **Principle 7 The portal allows citizens to submit necessary information or documents to support BET exercise**

This principle has both positive and negative impact. On the positive side, it allows citizens to submit additional and may be important documents or information. This means that the government has partially supported citizens’ contribution by opening doors for collaboration. However, this principle comes with a consequence. Allowing citizens to upload data or information may affect data reliability and its quality.
An expert in citizen engagement do not think uploading the data is not important. "The main thing is for a portal to have mechanisms for users to provide feedback. Uploading features can be included in the feedback mechanism and review the data." (Expert 2, 2018). According to Expert 3, it is important to allow users to upload data because sometimes citizens or NGOs have data that is not yet available on the portal, but it can also affect the data quality. Therefore, it is important to have a review section to determine which information is worth being kept on the portal or to separate data by citizens from data by officials.

The different opinion comes from Expert 4. According to the expert, financial data is the type of data that doesn't need crowdsourcing. This suggests that information submitted by citizens must not be allowed since the data came from an official database and was double-checked before being uploaded.

- **Principle 8 The portal ensures minimum barriers between citizens and data.**

This principle is related to direct data access. Open data entails the data is provided without any barriers, including fee and login screen. However, it is also important for the government to know who use the data. Therefore, registration could be an option as long as the data is free of charge.

One of the examples of barriers is registration, which requires users to fill in information about themselves before downloading the datasets. Experts have different opinions about whether the login mechanism is required or not. Citizens indeed want the barrier to be as minimum as possible since open data means publicly available. On the other hands, the government wants people who view and download the data to register first. “In the government, I want to register them (citizens) because then I can control and double check what’s happening with my website.” (Expert 4, 2018).

A data scientist also confirms this dilemma. “Should be publicly free. If they are spending on something I don't see a reason why they don’t publish it, unless it is about security.” (Expert 3, 2018). The expert then explained that the option to put a login screen between citizens and the data is acceptable since it can prevent spam users from commenting on datasets. However, the data itself needs to be free of charge, in accordance with the definition of open data. Another expert who supports this dilemma is Expert 2. The expert agrees that citizens need to have direct access to the data since it is the government right to open their public data. Also, both data journalists agree that this principle is useful for them since they are always looking for data.

- **Principle 9 The portal assists users in searching datasets by providing filtering and suggestion functionality on the search function.**

Most interviewees find this principle favorable. It can save them from clicking on links one by one, or downloading all data when only data within a specific time frame is required. However, too many filters and suggestions on the search function do not appear to be very user-friendly. Users would focus only on their goal and would not explore the portal for more.

Expert 3 mentions that the search query depends on the types of the portal. However, several possible search filters that can be used are a geographical filter, categories of expenditures, and the national and local amount or expenses. Expert 4 adds a hired company, registry number of a company and a person. A data journalist mentions that this principle is very helpful because it saves users from having to click on a different link (Expert 5, 2018). A different opinion comes from another data journalist. "The most specific ways. But if you want to interact with users like that, it's not success.... A platform with many filters is not very user-friendly" (Expert 6, 2018).
• **Principle 10** The portal provides API when users need to access datasets through external applications

This principle is absolute, especially if most of the users are developers.

Data API allows users to access the data from other applications (Expert 6, 2018), develop application easily without having to convert the data manually (Expert 2, 2018), and help you create a visualization. "It opens the world for developers because they can retrieve (data) automatically and they can create insightful web applications on the internet" (Expert 4, 2018).

• **Principle 11** The portal provides datasets in machine-processable format and allow users to download datasets in the format that they prefer

This principle is related to data openness level. It is important for a portal to provide data that is machine processable. This principle supports data reuse.

According to Expert 6, this principle is used to provide data in the most common format. Expert 5 mentions that this principle allows for data access from third-party apps to process the data and visualize them.

• **Principle 12** The portal provides the function to visualize datasets to allow quick viewing of datasets

This principle is highly related to data visualization. Users find this principle useful. For users without the skillset to analyze raw data, this principle brings them information in a language that is easier to understand. For users with advanced skill, this principle is still useful to understand the data quickly.

Expert 4 mentions that this principle is important for people who don’t have skills to visualize the data. Data visualization makes it easier to understand the whole data. “Human being is driven by their eyes, (by) what they see” (Expert 4, 2018). Expert 6 also agrees that visualization is helpful to know which data we are looking for.

• **Principle 13** The portal uses a user-friendly interface to ease navigation by categorizing datasets into different topics, and providing the user interface in the language that the users’ needs

This principle has two focuses: data being well-organized and portal in the language that users need. Interviewees find both are favorable. Well organized data allows users to find the necessary data sooner. Portal in another language allows more users to use the portal. However, the original language needs to be there as well.

Expert 6 mentions that data being well organized is helpful in finding out a municipality’s spending on a specific subject. Another expert mentions that the search function of an open spending portal has failed to meet her expectation. “I didn’t have autonomy in telling what types of data I want, I had to download all the data” (Expert 5, 2018). As for the language, Expert 7 states that the reason for providing the data section in English and not in Dutch is the high number of developers who do not speak Dutch.

• **Principle 14** The portal has a standard for data to be disclosed online

Having a standard is necessary to obtain the data uniformly. One of the benefits of having data standard is the published data can be used right away, such as for the comparison between one municipality and another.

A standard for data publishing is important to ensure all necessary aspects are covered. Municipalities and provinces in the Netherlands are obliged to provide budget and spending data which is usually referred to as Information for Third Parties (Iv3)\(^\text{10}\). The Iv3 information contains data about the budget, create insightful web applications on the internet. \(^\text{10}\) Based on the explanation by the Dutch government. Complete information can be retrieved from the Dutch government website.
quarterly figures, and annual accounts. However, this information does not provide detailed data; the data is at the aggregated level. Responding to this downside, the organizer of an open spending portal had the initiative to ask the municipalities and provinces to provide more detailed data. However, the data they received from the municipalities are not standardized. “The downside is it’s very hard to understand because it still has no context and it’s different from every municipality so you cannot compare this information…. Normal citizens have no idea what the data means, (municipalities were) using too many abbreviations.” (Expert 7, 2018). This fact suggests that the portal organizer has difficulty in understanding the data due to the lack of standard and so might the portal users.

- **Principle 15 The portal complies with relevant privacy and security concern**

This principle is necessary to ensure that no individual privacies are harmed. Detailed data is important, but so is privacy. Providing data at a detailed level is prone to privacy compromise. In some countries with the Right to Information Act, citizens can ask for any datasets and the government is obliged to disclose the data as long as it does not jeopardize the country security. Even under the right to information act, any identified personal data is prohibited to be disclosed. Providing spending data at the transactional level can potentially compromise the privacy of individuals involved in the transactions. “Transaction is too low because it gives out identified personal information” (Expert 7, 2018). Portal owners or organizers need to pay attention to the data published on their portal. “Detailed data should be as detailed as possible without infringing privacy and competition lost” (Expert 7, 2018).

- **Principle 16 The portal provides mechanisms that allow citizens to understand the content and the context of the data**

This principle is related to metadata. Most interviewees agree that this principle is useful in terms of metadata, which is used to understand the context of datasets. Therefore, understanding the content is removed from the principle.

Expert 6 states that this principle is quite useful because the expert does not always know where to find the right information. According to Expert 3, this principle is useful because it can tackle the problem of missing metadata. Expert 3 mentions that the data is provided in categories but the publishers forgot to explain the meaning of the categories. “Metadata is important only after you know what you want to do. Normally only people who are specialized, such as researchers know exactly what they want with that information. I think regular people just want to know regular things” (Expert 4, 2018).

- **Principle 17 The portal provides mechanisms that allow citizens to perform accurate BET exercise**

This principle is related to the level of data granularity that is published on the portal. In order to perform BET exercise accurately, the data needs to be as detailed as possible.

According to expert 4, detailed information is required to know more than a just higher level of spending. “the deepness of transparency is not good because I can know how much they spend on education, but I do not know which schools are receiving (the money). Not only the data, but also the deepness of it is (also) important, otherwise it becomes useless for me” (Expert 4, 2018).

- **Principle 18 The portal allows citizens to analyze and share the data legally**

This feature is important since it ensures the legality of using and sharing the data. The portal needs to ensure the legal data sharing by users.

The organizer of one of the existing open spending portals mentions that uploading datasets to the portal has its challenges. The spending data of each municipality was collected by the national statistical bureau.

However, the bureau could not share the data to open spending portal due to authority issues because it is not their data. “The data belongs to municipalities and provinces …, CBS did not have permission to share the data with us” (Expert 7, 2018).

- **Principle 19 The portal provides options for citizens to share the data or information to other digital platforms**

This principle is related to dataset sharing to other digital platforms. Interviewees do not all agree on this principle. Most of them do not find this principle necessary because the data are usually shared on that online platform discussion, not on the public digital platform. Therefore, this principle is removed from the list.

According to Expert 2, this principle is important because it allows citizens to let the government know which spending data to consider when they evaluate the government performance. Also, it allows audiences to examine the data directly. Expert 4, 5, and 6 do not think that this principle is significant for them. “I share it on online platform discussions” (Expert 6, 2018).

- **Principle 20 The portal encourages citizens’ creativity to innovate using the data**

This principle is related to the provision of application showcase to inform users about existing applications built based on datasets. It is useful to gain insights on how other users have used the data. This principle is helpful for a data scientist in doing her job. “I work with data directly. I should know how other people have used it (read: data)” (Expert 3, 2018). She added that this specific information is helpful for a portal or other applications development.

- **Principle 21 The portal ensures minimum efforts in retrieving the data**

This principle is related to data in one place. Interviewees agree that this principle is useful because most of them work with extensive data. Having all data in one place saves them from downloading different data and combine them. Moreover, all data in one place allows for simultaneous observation of different snapshots.

“Most of my job is to look for differences of dimensions. A specific data set is quite useful, all work can be done once time” (Expert 6, 2018). According to expert 5, this principle is useful because sometimes the expert had to go to some unofficial websites to get the data. Expert 3 confirms that this principle is helpful because it saves the expert from clicking on every single from one year to another year. “Usually, when you do the analysis of the data, you just don’t do it in one snapshot. In big data, you do it on a lot of files. It’s not possible to click on the records one by one.” (Expert 3, 2018).

### 5.5. Analysis of Interview Result

In this subsection, the analysis of interview results is provided. The analysis starts by listing key findings from the interview activities. These findings are analyzed whether they could be integrated into existing principles.

#### 5.5.1. Findings from Interview

In this part, the key findings from the interview are provided.

- **Information on involving agencies**

This functionality becomes important for citizens in different roles, such as data journalist, data scientist and researcher in citizen engagement. Data journalists analyze this data to see if it is a potential input for news. Expert 6 explains that this information can help the expert compare municipality A with municipality B and see if there is an outlier. For instance, the reasons why municipality A performs better than municipality B. Another data journalist claimed that this information is crucial for their job. “If I don’t have information on what they do, I cannot do my job” (Expert 5, 2018).
Data scientist explains that proper analysis requires additional information on the involving agencies. Such information includes how they perform from year to year. The expert suggests that if there are any changes, the portal must be updated right away. The suggestion is meant to prevent misinformation and the widespread of false information.

- Statistics of transaction records
A data journalist mentions that this functionality is important to find out which agencies are transparent and how they follow up the transparency regulations.

- Additional functionalities regarding data upload
Allowing citizens to upload the financial data means to facilitate collaboration. On the other hands, this can also affect data reliability. This dilemma needs a solution. An expert suggests the portal owner include a quality rating on the newly-uploaded datasets. This rating system is built to ensure that the uploaded datasets are of good quality so that it does not affect the reliability of original datasets. Another suggestion is to separate data by citizens from data by the government. This automatically ensures that the reliability of original datasets is not affected at all.

- Essential features to achieve ones' objective
As a data scientist, Expert 3 states that essential features to support good analysis is searching query and one simple email from the portal owner to the user about which functionalities are not working at the moment. According to this expert, continuous interaction between citizens and the portal owner is not necessary. A data journalist mentions that essential features to support the analysis from a journalistic perspective are dataset update frequency and ability to download third party software or applications. Another data journalist mentions that easier to understand language is essential for this expert.

- Principles that are removed or modified
Principle 16 needs to be modified since it to only metadata, not visualization. Most interviewees agree that this principle is useful in terms of metadata, which is used to understand the context of datasets. Understanding the content of the data has been covered by visualization. Therefore, the modified version of Principle 16 is as follow: the portal provides mechanisms that allow citizens to understand the context of the data. Another change happens to principle 19. This principle is seen as unnecessary since the data are usually shared on online platform discussion, not on the public digital platform.

5.5.2. Final Set of Design Principles
Key findings from the previous part are analyzed. The results of this analysis are additional principles to cover additional findings.

1. Information on involving agencies. This information helps citizens to have a better understanding of the data context. By knowing how one agency performs in the past years, citizens can write a better analysis. Therefore, this feature is considered a part of Principle 17.

2. Statistics on transaction records are required to understand how many agencies have implemented transparency act. This information is required to understand the data better. Therefore, this feature is covered by Principle 16.

3. Regarding data upload. Two options are proposed to tackle data reliability issue: quality rating mechanism and separate sections for data by citizens. The first option has no guarantee that the reliability of the original dataset will not be affected. However, the advantage is it can provide another mechanism for collaboration, which is through peer-review. The second option can guarantee that the original datasets are not affected. However, a mechanism for collaboration is not provided. Using both options looks may solve this problem. The portal still
allows citizens to upload data, but to a separate place where citizens can review the uploaded data. Therefore, the following principle is proposed to tackle this issue.

**Principle 22. The portal has separate files from citizens and from officials**

4. One simple mail from data owner on which functionality is not working is covered by the interaction between citizens and the government. Downloadable third party software or applications are covered by supporting tools. More normal language is leaning more towards data visualization which can be easily understood by citizens without data analytics skills. Any developed principles do not cover dataset update frequency. Therefore, the following principle is proposed.

**Principle 23. The portal allows for tracking data update history.**

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**Figure 16** Final set of design principles and how they enhance citizen engagement. A complete list of design principles is provided in Appendix A

Both newly-developed design principles are related to maintaining data reliability. Revisiting previously developed design principles, the four activities supporting data reuse are data retrieving, data understanding, data processing, and data reusing. Base on a definition of each activity, the newly developed design principles do not suit any of the mentioned activities. Therefore, the two principles fall into another category called maintaining data reliability. The final set of design principles are presented in Figure 16.

### 5.6. Conclusion

The evaluation phase is conducted with several interviewees, consisting of six roles: a researcher in open data, a researcher in citizen engagement, a data scientist, two data journalists, a government worker with experience in the portal of transparency and a portal organizer. The result of the interview
shows a high variability in terms of the similarity of response. For some principles, the interviewees agree on one statement. For other principles, their responses are very different. However, usually journalists and a data scientist have similar opinions towards the developed design principles. The result of this phase answers the last sub-question, which is:

**SQ5: To what extent could the developed design principles potentially enhance citizen engagement in BET exercises?**

In general, almost all principles can enhance citizen engagement. The experts are benefitted from the developed design principles in different ways, depending on their roles and objectives for visiting citizen engagement. However, several experts have different opinions about the importance of a specific design principle. For instance, according to data journalists, requesting new datasets is an important feature because of their profession. On the other hands, a government worker states that the design principle does not significantly influence their works. Other than that, there are cases where the developed design principles create problems. For instance, allowing citizens to upload data may affect the reliability of original datasets. However, to prevent this issue from arising, another principle is created.

Green-boxed principles are principles that might not deliver added value at all, depending on the users or the portal situation. Principle 1 – *The portal provides a mechanism for users to request datasets and to track whether their request has been approved* – is not necessary if officials have published all their spending data. This could be a case in a country where government bodies are obliged to publish all their spending data, such as the United Kingdom. By then, functionality to request new datasets is no longer necessary. Principle 6 – *The portal assists users in understanding how to use the open spending portal* – create another doubt. If the users are familiar with the portal, this principle might not have added value. Also, the necessity to have guidance depends on the complexity of the portal itself. If the portal is simple and using common terms, the tutorial on how to use the portal is not necessary.

Orange-boxed principles are marked as principles with a major drawback. The drawback could be a clash between one principle with another, compromising other values, or a dilemma. Principle 7 – *The portal allows citizens to submit necessary information or documents to support BET exercise* – proposes a good point by opening a door for collaboration for citizens. However, the submitted information or document might not be reviewed beforehand. In BET exercise, one false document could lead to a different outcome. Thus, allowing citizens to submit relevant information or document might affect the reliability of the datasets. However, this issue can be tackled by separating information or data by citizens from data by officials. Principle 8 – *The portal ensures minimum barriers between citizens and data*—suggests that the data should be free of any barriers, including fee and login screen. This concept is in line with the definition of open data. However, the government might want to know who have used the data, for what purposes, in which roles. One of the ways to obtain this information is by putting a login screen between users and the data. Also, registration can minimize the number of spam in the discussion forum. Principle 17 –*The portal provides mechanisms that allow citizens to perform accurate BET exercise*—is related to the provision of detailed data. In order to perform accurate BET exercises, the data needs to be as detailed as possible. However, too detailed data can be a potential threat to privacy.

Two more design principles are developed because maintaining data reliability is not included in any activities before. The most important point for citizen engagement in OS portals is a feedback mechanism. This mechanism needs to be organized as transparent as possible so that the citizens know how their concerns are handled. Another important point is the data API. This tool opens many doors for creativity and innovations. Portal with data API also encourages data reuse for any other purposes.
6 CONCLUSIONS AND DISCUSSIONS

This chapter includes conclusions and discussions about all chapters and phases of this research. The chapter starts by revisiting all the research questions. From there, the chapter goes to research relevance both academic and technical, then limitation and future research. The last part of the chapter is a reflection. The reflections on design choices, reflections on the project process, as well as reflections on the relevance of this topic with CoSEM are provided to end this chapter.

6.1. Conclusions

6.1.1. Revisiting Research Questions

In this section, the answers to all research questions are provided to remind and inform readers about the outline and the key findings of this research. The objective of this study is to develop a list of design principles for OS portals that can enhance citizen engagement. The following main research question is formulated to achieve the objective.

Which principles need to be incorporated in designing an OS portal so that it can enhance citizen engagement in BET exercise?

The main research question is important because it defines the focus of this study. The effort to answer the question is divided into five phases. The focus of each phase is defined by one or two sub-questions. For each phase, the method and deliverables are clearly defined. Each sub-question is related to each other and the answer to one question is often used for the analysis in the next phase.

Phase 1: Research Scope Definition

The first phase of the research is to establish a strong research background. This phase consists of two steps. First, to define the terms of citizen engagement and OS portal. Since citizen engagement and OS portals cover quite a wide area, the definition of these two terms is usually extended based on the context. The same case is also adopted in this research. To cover the intended area of the study, the definition of both terms is constructed based on elements found in the literature review about citizen engagement and budget execution process. The constructed definitions were used as a basis for the rest of the research. Definition of citizen engagement and OS portals serve as a common ground of this research. The first step of this phase is reflected in SQ1.

SQ1: How should OS portals and citizen engagement be defined in the context of BET exercises?

The first sub-question is to establish the common ground of this study. The answer to this question is divided into two categories: definition of citizen engagement and OS portal. An OS portal is usually a dedicated website that is used by governments to publish their spending data. However, the data is published in different digital space, such as country official websites, dedicated websites, or other online platforms. Therefore, the definition of OS portals is constructed as any digital platforms that provide fiscal data about government expenditure information, budget and spending data which can be downloaded, reviewed, processed, and shared with the public.

Regarding citizen engagement, factor encouraging to construct a new definition is the lack of one-fit-all and agreed definition of citizen engagement. Previous studies define citizen engagement
differently based on the objective of the study. Therefore, the definition of citizen engagement needs to be constructed to suit this study.

A literature review is conducted to formulate a definition of OS portals and citizen engagement. The definition of citizen engagement considers different approaches and established definitions. One type of scholar believes that citizen engagement entails two-way interaction between citizens and the government. Another type argues that citizen engagement does not necessarily mean two-way interaction. However, interaction is not the only concern in formulating a definition of citizen engagement. The citizens’ desire to be actively involved in decision making or government policy development are also considered as important factors. Therefore, citizen engagement is defined as a two-way interaction between citizens and between citizens and the government that can bridge and facilitate citizens’ interest in tracking budget expenditure and allows the government to involve, collaborate with, and empowers the citizens in decision-making processes.

This definition is used to build the model of citizen engagement. The model is provided in Figure 17. Using this model, the researcher defines enhancing citizen engagement as leveling up the engagement from passive to pro-active citizens by facilitating two-way interaction between citizens and the government and providing support for BET exercise.

**Figure 17 Model of citizen engagement in open spending portals for BET exercises**

Second, to provide comprehensive knowledge of factors influencing citizen engagement through desk research. This step focuses on identifying factors that can encourage or hinder citizens to be engaged in BET exercises through OS portals. From the citizens’ perspective, their motivations for being engaged in expenditure tracking will be listed as incentives. On the other hands, challenges between citizens and OS portals are categorized as factors that hinder the engagement. The second step of this phase is reflected in SQ2.

**SQ2: What factors can influence citizen engagement in OS portals for BET exercises?**
The second sub-question focuses on different factors that can influence citizen engagement in OS portals. A literature review is conducted to answer this question. Factors influencing citizen engagement in opens spending portals cannot be analyzed from only one aspect. The analysis must include both the open portal and BET exercises. In this context, factors influencing citizen engagement in OS portal is built from factors influencing citizen engagement in open data portal and citizen engagement in BET exercises process. Some factors are beneficial for enhancing citizen engagement, while other factors prohibit the engagement. Therefore, the focus of the second sub-question is split into two: on factors motivating citizen engagement and factors prohibiting citizen engagement.

**SQ2a: Which factors can incentivize citizen engagement in OS portals during the BET exercises process?**

Motivations for citizens to engage in OS portals can be grouped into four categories: political interest, interest in the platform, community improvement, and self-improvement. It is common for citizens to visit OS portal out of curiosity or fun and enjoyment. Above that, citizens are also interested in the political aspect such as how their country performs compared to other countries, or where the government has spent their tax money. Other motivations to engage in OS portal is because citizens want to improve the quality of their community by addressing the community needs, voicing their complaints and provide suggestions for the government for the benefit of the community. The intention to engage in OS portals are sometimes driven by internal motivations, such as the interests in learning and develop new sets of skills, or the intention to put their passion and ability into good use to receive internal rewards and to challenge their abilities.

**SQ2b: Which factors can hinder citizen engagement in OS portals during the BET exercises process?**

Factors hindering citizen engagement can be categorized as political, social, institutional, technological, and knowledge barriers. Political barriers such as lack of trust in government and lack of commitment from the government could jeopardize the efforts for citizen engagement. Citizens are usually skeptic towards any participatory initiatives by the government. Institutional impediments such as the inflexibility of an existing structure and privacy constraints set by existing legislative could influence the data quality. These factors could result in incomplete financial information that can hinder citizen engagement in BET exercises. Social barriers include the lack of political knowledge, information and technology illiteracy, unequal access to technology, and cultural attitude. Lack of access to datasets can hinder CSO’s involvement in BET exercises. Young people have another barrier which is denied rights to participate because of their age. From a technological perspective, the uniquely designed technology and the lack of a centralized database could demotivate citizens to engage in a platform. Citizens are more willing to visit a website providing all required information or an all-in-one portal rather than having to visit different websites one by one. Knowledge barriers include the lack of knowledge transfers between practitioners and researchers, unavailability of guidelines or support for e-participation, and lack of capabilities that are required to deal with provided datasets. These factors are stumbling blocks to CSO’s involvement in BET exercises.

**Phase 2: Observation of existing design**

This phase aims to investigate the relevant factors from the first phase that have been implemented in existing OS portals. The observation starts by developing portal selection criteria. Portals that are considered corresponding with the established criteria will be observed and analyzed further. The next step is to build a protocol for portal observation, which serves as an observation guideline. The findings of observation will be compared to the reference. The output is a list of functionalities of existing portals that might trigger the citizen engagement. The result of this phase is an answer to the third sub-question SQ3.

**SQ3: What functionalities do existing OS portals have that might enhance citizen engagement in OS portals for BET exercises?**
The third question focuses on OS portals. The goal is to identify what functionalities a portal has that can enhance citizen engagement. Portal observation is carried out to achieve the objective of this phase. This phase started by selecting several OS portals. The selection criteria are the availability of budget data, availability of spending data, and portal accessibility. Seven portals are selected, namely: transparency portal of Uruguay, UK data portal, Canada open data, USA spending, Albania spending, Ukraine spending, and transparency portal of Brazil.

The list of portal functionalities that has been established in chapter 2 is used as a checklist. The observation is conducted through observation protocol. From the observation, the list of functionalities of the portals is created. This list is then analyzed to determine whether the functionality can enhance citizen engagement, and how it does so. However, enhancing citizen engagement is not only depending on portal functionalities. The observation needs to consider the data functionalities. Therefore, the result of this observation is a list of portal functionalities and information provided on it that can enhance citizen engagement by enabling active citizens and pro-active citizens. Functionalities that can enable active citizens by facilitating two-way interaction are a feedback mechanism, help mechanism, discussion forum, dataset request, dataset sharing, and data/document upload.

Enabling pro-active citizens means that the portal can facilitate the BET exercises. This statement suggests that the portal needs to be able to provide the data, make citizens understand the data, let them process or analyze the data, and allow them to share the data legally. These four steps are used as categories to identify which functionality helps which step. The analysis result shows that functionalities such as search technique, users’ guide, data access, and multilingualism play an important role in helping citizens retrieve the data. In support of data understanding, citizens would require data visualization, glossary, information related to datasets, metadata, and data granularity in aggregate level. To help citizens with data processing, the portal needs to provide downloadable data supply, minimum 3rd star of data openness level, data in transactional level, data usage guidance, and supporting tools. Functionalities such as data license, usage guidance, API, and application showcase can ensure legal use of the data and encourage citizens to innovate using the data.

In an effort to answer this question, the researcher gains insight on the state of the art of the seven portals. Several portals are created only as a tool to publish government information. These portals have a good point in making citizens understand about the data. Although metadata is not complete, these portals provide different kinds of data visualizations. Unfortunately, they do not support data reuse. While API is essential for developers to reuse the data for another purpose, these portals do not provide this tool.

**Phase 3: Development of design principles**

The third phase is to develop design principles. This phase is a synthesis part of the previous two phases and encompassing several steps within designing activities, including creating the design principles. The development of design principles will focus on existing guidelines on how to enhance or stimulate citizen engagement. The aim is to provide insight into what design principles need to be adopted by an OS portal to enhance citizen engagement. The output of this phase is an initial set of design principles for OS portals that can potentially enhance citizen engagement. This phase is reflected in SQ4.

**SQ4: What design principles can potentially enhance citizen engagement in BET exercises?**

The fourth question is the focus of the third phase of the research, which is to develop design principles that could potentially enhance citizen engagement in OS portals for BET exercise. The term potentially is the highlight because the developed design principles are not evaluated yet. The
principle development is based on the literature review and portal observation. The process to develop design principles starts by analyzing the motivations for citizens to engage in OS portals, barriers to citizen engagement, and portal functionalities and information provided on it that can enhance citizen engagement. These three inputs are used to generate key characteristics of an OS portal. The next step is to analyze existing principles that are related to citizen engagement or open data portal. The goal of this analysis is to relate existing principles to key characteristics of OS portals. The next step is to identify the gap between existing principles and key characteristics. New design principles are built and several existing principles are modified to close this gap.

Using the definition of enhancing citizen engagement, the developed design principles are grouped into two categories: to enable active citizens and to enable pro-active citizens. The latter category is divided into four classifications: data retrieving, understanding, processing, and usability. In each category and classification, the principles are grouped based on the similarity of their impacts.

The principles that can enable active citizens by facilitating two-way interaction are categorized into three groups: facilitate trust and confidence building, knowledge sharing, and provide rooms for collaboration. The first group consists of two principles: Principle 4 and Principle 5. The second group consists of Principle 3 and Principle 19. The last group of this category is built by Principle 1, Principle 2, and Principle 6.

The principles that can help citizens retrieving the data are categorized into two groups: facilitating easy means to find the data, and promoting minimum barriers between citizens and the data. The first group consists of Principle 8, Principle 12, and Principle 14. The latter consists of two principles: Principle 7 and Principle 21. Principles that can help citizens understand the data consists of Principle 11 and Principle 16. Two groups of principles that can support data processing are to assist data processing and ensure the content of the data can be used for BET exercises. The first group consists of Principle 13. The latter consists of Principle 10 and Principle 17. The last classification in enabling pro-active citizens is data usability. Principles that are related to this classification is categorized into two groups: ensuring legal use of the data and encouraging citizens to innovate using the data. Principle 15 and Principle 18 are developed to ensure the legality aspect of using the data. Principle 9 and Principle 20 are innovation-friendly that can encourage citizens to innovate using the data.

Phase 4: Evaluation of design principles with experts

The fourth phase is to evaluate the design principles with experts. Since the evaluation is to confirm how effective the design principle would be in the future, interviewees would be from citizen itself. Several experts that will be interviewed are researchers with a background in open data and citizen engagement, data scientist, journalists focusing on open spending data, and portal owner. Since the design principles are not yet implemented in real life, the evaluation will focus on what experts say about these design principles, and to what extent the developed design principles could enhance citizen engagement once it is implemented. This phase will provide an answer to SQ5.

SQ5: To what extent could the developed design principles potentially enhance citizen engagement in BET exercises?

The last question determines the focus of the fourth phase of this study. The developed design principles are evaluated with experts in different roles. The evaluation process starts by selecting experts familiar with citizen engagement, open data, and have experience with open spending data. Those experts are mostly potential users of OS portals. Perspective from portal owners is also included to understand the rationale behind several functionalities of the portal. Total interviews conducted to evaluate the developed design principles are seven with details: one interview with a researcher on open data, one interview with a researcher on citizen engagement, one interview with experts from
the government, one interview with data scientist, two interviews with data journalists, and one interview with the portal owner.

The results of the interview show that in general, almost all principles can enhance citizen engagement. The experts are benefitted from the developed design principles in different ways, depending on their roles and objectives for visiting citizen engagement. However, several experts have different opinions about the importance of a specific design principle. For instance, according to data journalists, requesting new datasets is an important feature because of their profession. On the other hands, a government worker states that the design principle does not significantly influence the effectiveness of government works. Other than that, there are cases where the developed design principles create problems. For instance, allowing citizens to upload data may affect the reliability of original datasets. However, to prevent this issue from arising, another principle is created.

After answering all sub-question, the main research question can now be answered.

**Which principles need to be incorporated in designing an open spending portal so that it can enhance citizen engagement in BET exercise?**

Basically, the principles are grouped into two categories: to enable active citizens by providing means for two-way interaction and to enable pro-active citizens by supporting BET exercises.

First, to enable active citizens, governments need to gain citizens’ trust and confidence. Citizens have a lack of trust in governments because they are unsure that their concerns will be well attended. Then, the media for knowledge sharing and rooms for collaborations need to be available. Supports for BET exercises need to be shown to stimulate pro-active citizens. The supports are required at any step of Bet exercises. To help with the data retrieval, the portal needs to ensure that the is easy to be found and the barriers between citizens and the data need to be kept to a minimum. Next, the portal needs to ensure that citizens understand the data, provide support for data processing, enable Bet exercises, ensure its compliance with existing legal framework, as well as to ensure that the portal is innovation-friendly to promote data reuse. The list of final design principles that can enhance citizen engagement is presented below.

- Principle 1 The portal provides a mechanism for users to request datasets and to track whether their request has been approved.
- Principle 2 The portal allows citizens to submit feedbacks and view other users’ opinions or submitted feedbacks about a dataset.
- Principle 3 The portal facilitates knowledge exchange between users by providing space for interaction between them.
- Principle 4 The portal enables effective communication between citizens and the government.
- Principle 5 The portal assists users in understanding and using datasets.
- Principle 6 The portal assists users in understanding how to use the open spending portal.
- Principle 7 The portal allows citizens to submit necessary information or documents to support BET exercise
- Principle 8 The portal ensures minimum barriers between citizens and data.
- Principle 9 The portal assists users in searching datasets by providing filtering and suggestion functionality on the search function.
- Principle 10 The portal provides API when users need to access datasets through external applications
• Principle 11 The portal provides datasets in machine-processable format and allow users to download datasets in the format that they prefer
• Principle 12 The portal provides the function to visualize datasets to allow quick viewing of datasets
• Principle 13 The portal uses a user-friendly interface to ease navigation by categorizing datasets into different topics and providing the user interface in the language that the users’ needs
• Principle 14 The portal has a standard for data to be disclosed online
• Principle 15 The portal complies with relevant privacy and security concern
• Principle 16 The portal provides mechanisms that allow citizens to understand the content and the context of the data
• Principle 17 The portal provides mechanisms that allow citizens to perform accurate BET exercise
• Principle 18 The portal allows citizens to analyze and share the data legally
• Principle 20 The portal encourages citizens’ creativity to innovate using the data
• Principle 21 The portal ensures minimum efforts in retrieving the data
• Principle 22 The portal has separate files from citizens and from officials
• Principle 23 The portal allows for tracking data update history.

Figure 18 The changes made to the list of the developed design principles after the evaluation process

Green-boxed principles are principles that might not deliver added value at all, depending on the users or the portal situation. Principle 1 – The portal provides a mechanism for users to request datasets and to track whether their request has been approved – is not necessary if officials have published all their
spending data. This could be a case in a country where government bodies are obliged to publish all their spending data, such as the United Kingdom. By then, functionality to request new datasets is no longer necessary. Principle 6 – The portal assists users in understanding how to use the open spending portal – create another doubt. If the users are familiar with the portal, this principle might not have added value. Also, the necessity to have guidance depends on the complexity of the portal itself. If the portal is simple and using common terms, the tutorial on how to use the portal is not necessary.

Orange-boxed principles are marked as principles with a major drawback. The drawback could be a clash between one principle with another, compromising other values, or a dilemma. Principle 7 – The portal allows citizens to submit necessary information or documents to support BET exercise – proposes a good point by opening a door for collaboration for citizens. However, the submitted information or document might not be reviewed beforehand. In BET exercise, one false document could lead to a different outcome. Thus, allowing citizens to submit relevant information or document might affect the reliability of the datasets. However, this issue can be tackled by separating information or data by citizens from data by officials. Principle 8 – The portal ensures minimum barriers between citizens and data—suggests that the data should be free of any barriers, including fee and login screen. This concept is in line with the definition of open data. However, governments might want to know who have used the data, for what purposes, in which roles. One of the ways to obtain this information is by putting a login screen between users and the data. Also, registration can minimize the number of spam in the discussion forum. Principle 17 – The portal provides mechanisms that allow citizens to perform accurate BET exercise—is related to the provision of detailed data. In order to perform accurate BET exercises, the data needs to be as detailed as possible. However, too detailed data can be a potential threat to privacy.

Figure 19 The model of citizen engagement and how each group of design principles enhances the engagement

Figure 19 depicts the citizen engagement model combined with the list of design principles. Facilitating two-way interaction indeed opens a window for active citizens. The media for information exchange and rooms for collaborations are provided. This effort to enhance citizen engagement also applied in a more general context. Just like in open spending, the first step to enable active citizens is by being transparent and gain their trusts.
6.2. Research Relevance

6.2.1. Academic Contribution
This research contributes to the field of citizen engagement in various ways. First, it fills the knowledge gap between how to design an open spending portal that can enhance citizen engagement. Existing principles for OGD portal focus more on the portal and data itself. This study developed design principles by taking into account citizens’ motivations to engage in portals, or in BET exercises. The developed design principles consist of seven principles to enable active citizens and sixteen principles to enable pro-active citizens.

Second, this research contributes to Citizen Engagement and Participation literature by identifying citizens’ motivations to engage in open spending portal as well as barriers to it. Existing literature identify the motivations to engage in government projects in general, not specifically in OGD portal (Sierra Gonzalez, 2017; Wijnhoven et al., 2015). Also, they focus only on data. This study takes into account both data and portal functionalities to develop design principles.

Third, still in CEP literature. This study provides another alternative on how to define citizen engagement as well as what it means to enhance it. The results of the first and second phase can be used as a stepping stone for further research. Also, in regards to portals, this study provides knowledge on how each portal functionality contributes to enhancing citizen engagement.

Lastly, this study contributes to design science research by providing a way to derive design principles. The approach has proved that it can produce a set of design principle that can enhance citizen engagement.

6.2.2. Practical Relevance
The practical relevance of this research can be pointed out by several points. First, the developed design principles can help the government to engage more citizens to use open spending portals. Governments with the current state of passive citizens or active citizens can use the developed design principles to enhance citizen engagement. Policymakers can use the developed design principles as a guideline to ensure the effort for citizen engagement. Following the guideline, the designed OS portal can help the government to achieve its goal of mainstreaming citizen engagement to improve public services.

Second, the government and portal developers can select which functionalities they want the portal to have in order to enhance citizen engagement. Since the principles are not too technical, they leave some rooms for creativity and modification.

Third, the citizen engagement model can be used as a reference to identify how to engage the government or companies with citizens or their customers. Also, this model can be used to promote and encourage data reuse. Data reuse can initiate innovations.

6.2.3. Recommendations for Agencies
This research produces recommendations for two types of agencies: agencies with passive participation that wants to level up to active participation, and agencies with active participation as the current state that wants to level up to pro-active participation.

The first recommendation is provided for countries that want to level up to active participation. The biggest entry barrier to citizen engagement is lack of trust in the government agencies. This barrier is even bigger in online citizen engagement where the citizens cannot talk to people from the agencies face to face. Also, citizens are usually skeptics about that agencies will not hear and process their concerns. Therefore, to start the online engagement exercise, the agencies must first win the citizens’ trust in them. Instead of trying a top-down approach, the agencies need to try to understand citizen’s needs, requirements, and expectations. This suggests that the citizens need to be treated as an important element.
Practical recommendations for agencies are to win citizens’ trust and build their confidence as a starting point. This can be done by being responsive to citizens’ questions and feedback and making sure that citizens know how their feedbacks have helped them in making decisions. Simultaneously with fostering trust and building confidence, agencies need to provide as many spaces as possible for citizens to interact with each other and share information or knowledge. This can be done by allowing citizens to share spending data to other digital platforms. Once the trust has been established and space for interactions have been provided, the agencies can look for means to enable collaboration within citizens. The collaboration can start by allowing citizens to submit relevant information to published data, or by allowing citizens to request missing datasets. In general, the agencies need to treat citizens as an important part of decision-making process and ensure the transparency on how their feedbacks are processed.

The second recommendation is for governments that want to climb from active citizens to pro-active citizens. To do this, governments need to encourage data reuse, in this case, spending data for BET exercises. Several important points to level up to pro-active citizens lie in data processing and data reusing activities. To support data processing for BET exercises, governments need to ensure that the spending data is as detailed as possible and in a machine-processable format. During the data reusing activity, governments need to ensure that the portal corresponds with the open definition. Also, the portal needs to be innovation-friendly to speed up data reuse activity. On the other hands, data understanding is also important to give an illustration of the whole spending activity in a glimpse. Therefore, it is better for portals to present data in both ways: in machine-processable formats and in visualization forms.

6.3. Limitations and Future Research

In this section, the limitations that were found during the research journey are provided. Based on these limitations, suggestions for future research are provided. The limitations are grouped into three categories: limitations on citizen engagement model, limitations on portal observation, limitations on the developed design principles and the evaluation. The limitations are listed as follow.

Limitations on citizen engagement model

1. The model of citizen engagement only focuses on the online part. Meanwhile, engagement in BET exercises can also happen offline.
2. One strict assumption was made during the development of citizen engagement model. This assumption indicates that BET exercise is the only intention for citizens to participate in OS portals. Thus, the motivations to engage in OS portals are considered as a combination between motivations to engage in open data portal in general and motivations to engage in BET exercise. However, the assumption is used to draw a clear scope of this study.

Limitations on portal observation

1. The concept of open spending is still quite new. This statement is supported by the number of countries that open their spending data in Open Data Barometer. Only ten out of 115 countries publish the spending data which are considered open. Some of the countries publish the data but only authorized users; usually, people who are working on the government, are entitled to have access to the data. This fact results in very limited options for portal observation.
2. Open Data Barometer provides information on countries ranking based on the openness of several datasets, two of them are spending and budget data. However, the information on websites or portals where the governments publish the datasets is missing. The list of portals per country was completed manually using google search. There is no guarantee that the observed portals are the main portals of each country.
Limitations on the developed design principles

1. The developed design principles can be adopted only by countries that have published their spending data. In other words, the country needs to at least be at passive participation.

2. The evaluation process through expert interview has its own limitation. The roles are not entirely covered. Several missing roles that need to be interviewed are CSOs, app developers, students with interest in open data, and economists. CSOs are the main important users of the portals. In the beginning, this role is included in the interview list. However, due to unavailability of contacts, the role is removed from the list.

3. The developed design principles are meant to level up from passive to active citizens or from active to pro-active citizens. However, the model includes the Arnstein ladder of participation. From the perspective of Arnstein ladder of participation, facilitating two-way interaction could also mean climbing the ladder from informing to consultation or placation. Unfortunately, the exact level of Arnstein ladder that could be climbed by facilitating two-way interaction is unknown. The same situation applied to efforts in supporting BET. Within the context of open spending, the real connection between BET exercises and the top three levels of participation ladder is not yet known.

Future research
Recommendations for future research:

1. Due to a strict assumption made during the research, the developed design principle can only be adopted by countries with at least at the level of passive citizens. Based on the ladder of participation by Arnstein, there are two levels lower than informing, namely manipulation and therapy. These two levels are called non-participatory. The model of citizen engagement of this research can be extended to non-participation. Using the extended version, the research can be further developed to investigate how the countries with no participation trigger citizen engagement in the budget cycle. Therefore, the research question for the future research could be “What principles should be adopted by countries at a non-participatory level to trigger public participation?”

2. One of the successful ingredients for accurate BET exercises is detailed data. However, detailed data is very prone to compromising privacy. Too detailed data might endanger the privacy of individuals involved in the transaction. On the other hands, too aggregate data does not help with BET exercises. Therefore, there should be a middle ground where one value can be achieved without compromising another value. Further research on this topic could be interesting since it deals with not only the technical part but also institutional. The proposed research question for this topic is “How detailed should detailed-data be to perform accurate BET exercise without compromising individual’s privacy?”

3. This research can be further developed to construct a framework that can be used by the government and companies to evaluate how can their organizations engage with more citizens. The research question for this recommendation would be “How can private sector companies evaluate their performances in terms of citizen engagement?”

6.4. Reflection

In this section, reflections on different aspects of the research are provided. The reflections are grouped into three categories: reflections on design choices, project process, and the project relevance with CoSEM.
6.4.1. Reflection on Design Choices

Citizen engagement model
The citizen engagement model is developed after defining the term citizen engagement. The definition entails a two-way interaction between citizens and the government. Also, the engagement must facilitate citizens’ interests in BET exercises. The model of citizen engagement is developed by incorporating both perspectives, the government, and citizens. The link between the two perspectives is the type of interaction that happens between citizens and the government. This model is then used to define enhancing citizen engagement. In this study, enhancing citizen engagement means to level up from passive citizens to active citizens, or from active citizens to pro-active citizens. The means to enable active citizens is two-way interactions. While to enable pro-active citizens, the portal must support BET exercises.

Citizen engagement can be defined in many ways, depending on the objective of the study. By limiting the definition only to two-way interaction, this study excludes activities such as informing citizens from examples of citizen engagement. Meanwhile, several studies also consider one-way interaction as a type of citizen engagement.

Selecting portals
Portal selection criteria are established to narrow down the portal list. In the beginning, there are 115 members of open data barometer. The list is then shortened by the availability of budget data. Budget data is one of the important documents to support BET exercises. As has been explained, two types of tracking exercise are considered in this study: comparing the actual spending with the budget plan and investigating the validity of the transactions. Budget data contributes to the first type of BET exercise. The second criterion is the availability of spending data. This is the most important criterion. Only countries that provide open spending data will be selected. The last criterion is portal accessibility in terms of the language problem.

A gap exists in the second step of the selection process. Since the beginning, the list of Open Data Barometer is used as a reference. The portals which are used to rank these countries are not provided. Therefore, another reference containing a list of websites or portals from different countries is used. The consequence of combining the two lists results in the uncertainty that the observed portals are the main portals used by countries to publish their spending data.

Categories of developed design principles
The design principles are developed based on three inputs: motivations for a citizen to engage in open spending portals, barriers to citizen engagement, and functionalities that can enhance citizen engagement in OS portals. The analysis of these three inputs generates key characteristics of OS portals. The characteristics are then used as a checklist in analyzing existing design principles. Each existing design principle incorporates one or more characteristics. New design principles are developed to incorporate uncovered characteristics. The developed design principles are categorized based on how they enhance citizen engagement. Those categories are then divided into several groups and classifications. The developed design principles are categorized into several groups based on the similarity of their objectives.

The consequence of using this approach to develop design principles and to categorize them into several groups leads to principles with overlapping groups. For example, a principle related to providing data usage guidance falls into several groups, such as Principle 5 assist users in understanding and using datasets. This principle contributes to both data understanding and data usability. The principle is derived from characteristic 17, which is data tutorials functionality. Since the functionality provides help for both data understanding and data usability, the principle is proposed. Therefore, the categorization of design principles is not strict.
Method for evaluating design principles

The interviews are conducted to gain insights on how the developed design principles help them achieve their objectives for visiting OS portals. The interview direction is determined by the expert’s experience with open spending portal. If they have visited open spending portal at least once, the interview would be to assess their experience. Otherwise, it would be to assess their expectations towards OS portals. Among seven interviewees, one of them does not have experience with open spending portals. Therefore, the interview with this respondent is to assess the expectation about OS portals.

6.4.2. Reflection on Project Process

The thesis project is a mandatory course for students to graduate from Complex System Engineering and Management (CoSEM). The load is worth one semester of the study period. The authors learned a lot from this project. Writing one chapter after conducting one step helps us stay in line and clarify the research structure. However, based on the author’s experience, the writing can be done simultaneously as long as all the research steps are conducted in order. Based on the author’s opinion, the most important parts of conducting a thesis are defining clear steps, relations between each step, and conduct the research orderly. Also, taking important notes on each step is an essential and helpful activity. The thesis book can be written simultaneously with the research steps. So, it’s best not to wait writing one complete chapter to continue with the next step of the research.

Second, during the research, desires to redo our work may occur because the further the research is conducted, the better understanding we have about our own study. This could cause us to want to include everything we know on the thesis book. However, the author’s experience suggests that we need to always keep in mind that every research has limitations. Also, it is best always to remind ourselves about the research scope.

Third, the desires to do the best is indeed a positive trait. For example, evaluating the developed design principles in this thesis is best done if CSOs opinions are also included. However, the time and resource constraints do not support the author’s intention. Other research activities or design choices might also not be able to be carried out because of several reasons, such as limited information or thinking capacity. During a time like this, it is best to keep in mind that decisions sometimes depend on the reality, which is commonly known as bounded rationality.

6.4.3. Reflection on the Relevance with CoSEM

Complex System Engineering and Management (CoSEM) deals with designing an intervention in a socio-technical environment. The focus is not just on the technology itself, but also the social aspects. This fact suggests that the program prepares students to look at a problem from different aspects, not just the technical part. After all, the success of technology deployment and adoption highly depends on social aspects, such as cultures and regulations. The next skill being taught on this program is to look at a problem from different perspectives. Designing in a dynamic socio-technical environment deals with different opinions and interests of involved actors. Therefore, a designer needs to take into account all those opinions to prevent disputes from arising in the future.

Relating to CoSEM program, this research satisfies both characteristics of CoSEM program that are described above. As has been explained in chapter 2, the success of BET exercise is not only encouraged by the completeness of the data, but also the understandability of the data. Some portals provide complete data, but the context is missing. This could lead to difficulty in understanding what the data is about. Also, this could give rooms for users to understand the data differently which leads to misinterpretation. Another point that is relevant to CoSEM is defining OS portals. As had been defined in chapter 2, an OS portal is any online platforms, websites, or dedicated portals where the government can publish its spending data. Through this portal, citizens can view, download, edit, analyze, and reuse the disclosed data. Citizens visit this portal because of different reasons, depending on their roles and initial objectives.
The study demands the researcher to understand how citizen engagement in OS portal must be defined. Once the definition has been constructed, the model of citizen engagement in OS portals is built. This model is required to explain what it means by enhancing citizen engagement. The researcher incorporates different perspectives in the model. The level of engagement is seen from citizens' and the government's perspectives. These two perspectives were combined to produce the concrete analysis.

The next step was to identify motivations and barriers to citizen engagement in OS portals. Different aspects were considered when carrying out this step. The motivations for being engaged in OS portal were categorized into motivations to participate in open data portal and BET exercises. Therefore, both definition and motivations to citizen engagement in OS portal were analyzed from the combination of open data portal and BET exercises. In conclusion, defining and identifying motivations to citizen engagement in OS portals cannot be seen from one perspective only.

The same approach was used to develop design principles that can enhance citizen engagement in OS portals. The researcher combines the results from portal observation, motivations and barriers to citizen engagement in OS portals. Once the initial list of design principles has been established, the researcher performs expert interviews to evaluate the developed design principles. These experts come from different backgrounds and are in different roles. Their perspectives are different from one another, so are their experiences of using and expectations towards OS portals. The researcher takes account of all those perspectives, experiences, and expectations toward OS portals to revise the initial list of principles. Some of the experts are potential users of the portal. Therefore, their perspectives are important to evaluate the developed design principles. The final list of design principles is based on their experiences and expectations towards the OS portals.
Appendix A: Initial Set of Design Principles

Principle 1 The portal provides mechanism for users to request datasets and to track whether their request has been approved.

Principle 2 The portal allows citizens to submit feedbacks and view other users’ opinions or submitted feedbacks about a dataset.

Principle 3 The portal facilitates knowledge exchange between users by providing space for interaction between them.

Principle 4 The portal enables effective communication between citizens and the government.

Principle 5 The portal assists users in understanding and using datasets.

Principle 6 The portal assists users in understanding how to use the OS portal.

Principle 7 The portal allows citizens to submit necessary information or documents to support BET exercise.

Principle 8 The portal ensures minimum barriers between citizens and data.

Principle 9 The portal assists users in searching datasets by providing filtering and suggestion functionality on the search function.

Principle 10 The portal provides API when users need to access datasets through external applications.

Principle 11 The portal provides datasets in machine-processable format and allow users to download datasets in the format that they prefer.

Principle 12 The portal provides the function to visualize datasets to allow quick viewing of datasets.

Principle 13 The portal uses user friendly interface to ease navigation by categorizing datasets into different topics, and providing the user interface in the language that the users’ needs.

Principle 14 The portal ensures the citizens are told about their contributions.

Principle 15 The portal has a standard for data to be disclosed online.

Principle 16 The portal complies with relevant privacy and security concern.

Principle 17 The portal provides mechanisms that allow citizens to understand the content and the context of the data.

Principle 18 The portal provides mechanisms that allow citizens to perform accurate BET exercise.

Principle 19 The portal allows citizens to analyze and share the data legally.

Principle 20 The portal provides options for citizens to share the data or information to other digital platforms.

Principle 21 The portal encourages citizens’ creativity to innovate using the data.

Principle 22 The portal ensures minimum efforts in retrieving the data.
Appendix B: Interview Questions

Thank you for agreeing to participate in this interview. My name is Rina Elvira. I am conducting this interview as part of my master thesis project to evaluate the principles I have developed. I believe I sent an email containing the list of design principles. The purpose of this interview is to help me better understand people opinions towards the developed design principles and how they could be beneficial in helping people to achieve their intended purposes for visiting OS portal.

It is important that you respond to all the interview questions based on your experience and perspective as a potential user of OS portals. This interview consists of three sections. First one is a short section to assess which direction this interview will go. The second section is the main part of the interview, which is to ask for your opinions on developed design principles. The last section is another short section to ask about BET exercises. This interview will not take longer than 1 hour. Do you have any questions before we begin?

During this interview, I would like to record our conversation until the interview is finished. The recording will help me to accurately transcribe our conversation and for the effectiveness of this interview. This recording will be destroyed after I submit the final version of my thesis book, and will not be published anywhere. Only your relevant experiences and the type of institutions you are or were working with will be published on my thesis book. Do you have any objection on this matter?

Section 1
This section is to determine which objective the interview will achieve
1. How long have you been working with [open data]?
   Depending on the interviewee’s background.
2. What is your responsibility, which role?
3. Have you ever visited OS portals before? When?
4. Could you describe to me a little bit about the content of the portal you have visited?
   If users have ever visited OS portal, go to Section 2A.
   Otherwise, go to Section 2B.

Section 2A
This section is to assess how portal functionalities and information help users achieve their initial goal to visit OS portal.
1. From your perspective, what is the main purpose of OS portals?
2. For what purposes did you visit OS portals?
   a. What benefits did you expect to achieve by visiting the portals?
   b. When you were visiting the portals, were you looking for a specific solution or were you just interested in expanding your knowledge about the portal?
3. How would you describe your experience in finding specific information or data on the portal?
   Was is easy, was it difficult?
   a. Which search functionalities were provided?
      To what extent do you think search functionality is essential to find desired information?
   b. Which information were provided on metadata?
      To what extent do you think metadata is essential to find desired information?
   c. To which extend were portal guideline useful?
      To what extent do you think portal guideline is essential to find desired information?
4. Was the data provided in one place?
   How important is it for all data to be in one place?
5. How was the data or information provided to you?
   In terms of:
a. Money. Did you have to pay to get the data?
b. Effort. Were you redirected to another website to get the data? login
c. Time. Did you have to wait for day(s) until you get the data?

In your opinion, how important is free and direct data access?

6. Were you able to view other people opinions about a dataset?
   *If yes, to what extent does it help you to successfully achieve your goal?*
   *Is it necessary to reveal one’s opinions to other users?*

7. On scale from 1 to 5, how often did you use these functionalities when you visit the portal;
   *With 1 means never and 5 means very often.*
   a. Discussion forum
   b. FAQ
   c. Contact form

Was there any other functionality which can help you to communicate with other users?
How important is the availability of an information exchange mechanism on a portal?

8. To what extent did help mechanism useful in achieving your goal?

9. To what extent have you benefitted from the following data and information published on
   the portal;
   a. Data itself?
   b. Information on government agencies?
      *To what extent do you think this information needs to be released?*
   c. Statistics on transaction records?
      *To what extent do you think this information needs to be released?*

10. What did it take you to fully understand the data?
    a. How did brief description help you understand the data?
    b. To what extent did the data visualization help you to understand the data?

   *Are there any other functionalities that can help you understand the meaning of data?*

11. Have you been able to innovate using the data?
    *If so,*
    a. How would you describe your innovation?
    b. What were the most important data functionalities you needed to innovate?

   *To what extent do you think innovating from the data (or data reuse) help enhancing online
   participation?*

12. On scale of 1 to 5, how important are the following functionalities or data functionalities in
    achieving your objectives:
   *With 1 indicates not important at all, and 5 means too important*
   a. Data API?
      *How important is API in a data portal?*
   b. Machine-readable format
      *How important is data format in data reuse?*

13. How did you contribute to the data archive?
    a. Data upload?
       *What were the requirements to upload a dataset that is not yet available?*
       *How important is this functionality?*
    b. How did you review data editing history?
       *To what extent have you benefitted from data editing history?*
    c. What was the procedure on requesting a new dataset?
       *How important is this functionality?*

14. Were there options to share the data to other digital platforms?
   *To what extent do you think data sharing functionality helpful for online engagement?*

15. In your opinion, what functionalities should the portal have in order to preserve and
    intensify the interactions between users and portal owner?
16. In what way(s) has the portal met your expectations or needs?
17. In what way(s) has the portal failed to meet your expectations or needs?
18. In what way(s) do you think OS portal can be beneficial for;
   a. You, as an individual? 
      *If necessary, relate to intrinsic motivations, such as making new connections and skill development.*
   b. You with societal responsibility?
   c. Society in general?
19. In your opinion, what would be the most impactful outcome of OS portal?
20. What is your general opinion about OS portals?
   *If necessary, ask how the portal would fit in solving societal problems.*

Section 2B
This section is to assess potential users' expectations of OS portals.

1. From your perspective, what is the main purpose of OS portals?
2. For what purposes would people visit OS portals?
   a. What benefits would you expect to achieve by visiting the portal?
3. On scale from 1 to 5, how do you think these functionalities would help find specific information or data on the portal?
   *With 1 indicates not important at all, and 5 means too important*
   a. Search functionality which offers numerous options
   b. Complete metadata
   c. Portal guideline
   How necessary is it for a portal to have those functionalities?
4. To which extent are other people’s opinions about a dataset useful? Is it necessary to reveal one’s opinion to other users?
5. On scale from 1 to 5, how often would you use these functionalities if you visit the portal;
   *With 1 means never and 5 means very often.*
   a. Discussion forum
   b. FAQ
   c. Contact form
   Can you think of other functionalities which can help you to communicate with other users? How important is the availability of an information exchange mechanism on a portal?
6. To what extent would help mechanism useful in achieving your goal? Is it necessary to have help mechanism on a portal?
7. From your perspective, how would you be benefitted by this data/information published on the portal;
   a. Dataset itself?
   b. Information on government agencies?
      *Do you think this information needs to be released?*
   c. Statistics on transaction records?
      *Do you think this information is important for user participation?*
8. How important is it for all data to be in one place?
9. How important is free and direct data access?
10. What would it take to fully understand the data?
    a. To what extent would brief description help people to understand the data?
    b. To what extend would the data visualization be helpful?
    *Is it necessary for a portal to have brief description of the data and its visualization?*
11. To what extend do you expect the portal would let you innovate with the data?
    What would be the most important data functionalities you need to innovate?
12. On scale of 1 to 5, how important are these functionalities or data functionalities in achieving your objectives:
   *With 1 indicates not important at all, and 5 means too important*
   a. Data API?
   b. Machine-readable format

   How important is data API and machine-readable data format for data reuse?

13. To what extend would the following activities contribute to the data archive?
   a. Uploading datasets that are not yet available on the portal yet
      *Is it necessary for a portal to allow users to request datasets?*
   b. Reviewing the data editing history
      *Is this function necessary?*
   c. Requesting new datasets
      *Is it necessary for a portal to allow users to request datasets?*

14. In your opinion, what functionalities should the portal have in order to preserve and intensify the interactions between users and users and between users and portal owner?

15. In what way(s) do you think OS portal can be beneficial for;
   a. You, as an individual?
      *If necessary, relate to intrinsic motivations, such as making new connections and skill development.*
   b. You with societal responsibility?
   c. Society?

16. What is your general opinions about OS portal?
   *If necessary, ask how the portal would fit in solving societal problems.*

Section 3
In this section, I will ask for your opinions on BET exercises. One of the reasons the government publishes spending data is because people are wondering how the government spent their tax, whether the spending is based on the approved budget plan or not. In order to satisfy this curiosity, some people are involved in an activity called BET exercises. The exercise is mostly about crosschecking the spending with budget plan and making sure that the transactions were conducted properly.

1. Have you ever been involved in the activity?
   If so, ask for their opinion on what it takes to successfully track the spending
2. How would you describe your interest in public spending?
3. With your expertise, how would you like to be involved in BET exercises?
4. Linking to section 2, which portal functionalities would be the most essential for BET exercises?
5. What is your general opinion on BET exercises? What advantages and disadvantages would this activity have from your perspective?

Conclusion
Those are all questions I have for you today.
1. Are there any comments you would like to provide?

Thank you very much for your time

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Reference


