Citizen's interaction, perceived benefits, and effectiveness of open government data on trust in government

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Abstract. The declining trend of trust in government has received significant attention among scholars in various fields, particularly in efforts to find ways to reverse this decline. This paper investigates the relationship between trust in government and open government data (OGD), through a proposed model that links trust in government and three variables, i.e., citizens' interaction with OGD, citizens perceived benefits of OGD, and perceived effectiveness of OGD. Utilizing the dataset from Pew Research Center's survey on public perceptions of OGD, we test the model using structural equation modeling (SEM). Our findings show that the three variables positively affect trust in government. However, while the three variables are significant, perceived benefits and effectiveness of open government data are more essential determinants of trust than citizens interaction with government data. This study contributes to understanding how open government data initiatives could increase trust in government, by suggesting practical implications. Nevertheless, this study uses 2014 dataset that might not be able to capture changes in society, such political, economic, social, and technological conditions.

Keywords. Open government data, trust in government, structural equation modeling, citizen interaction, perceived benefits, effectiveness

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1. Introduction

Citizens' trust in government has received a great deal of attention from scholars in various fields, ranging from political sciences, public administration, information and technology sciences, and social sciences (Meijer et al., 2012). Their concern was mainly due to the declining trend of trust in government. Tolbert and Mossberger (2006) mentioned that this phenomena has been occurred for the past three decades from the 2000s. A quite recent publication issued by Pew Research (2022) confirmed that the highest trust in government was in 1964, with 77% of citizens trusted the U.S. government. Since then, public trust has declined and remained unstable. The average citizen's trust in government has never reached 30% since 2004.

Distrust in government can be seen from three aspects, i.e., distrust in institutional or political systems (Miller,

1974), personal aspects, such as political leaders (Citrin, 1974), and the combination of institutional and personal aspects (Christensen & Lægreid, 2005). No matter what aspects citizens might feel skeptical about the government, the declining trust could be seen as a positive and negative indication in a democratic country (Chanley et al., 2000). However, it could also lead to serious implications, especially when citizens opt out of their decisions and refuse to participate in government's programs. Ultimately, it could obstruct the process of elections (Orren, 1997), policymaking, and policy implementation (Chanley et al., 2000).

Various studies were undertaken to investigate the causes of the declining trend in trust in government. Chanley et al. (2000) mentioned some causal factors that led to the changes in trust in government, i.e., national economic factors (Citrin & Green, 1986; Feldman, 1983; Hetherington, 1998; Mansbridge, 1997; Miller & Borrelli, 1991), socio-cultural factors including problems in society (Mansbridge, 1997), or political factors such as war, political scandals, and corruption (Orren, 1997). Chanley et al. concluded that "declining trust in government is a complex phenomenon with multiple potential causes." (2000, p. 240).

Not only understanding the causes, but a vast amount of literature also discusses various efforts to reverse the decline in trust in government. Norris (2001) argued that an open and transparent government is expected to remedy the loss of faith in government. Government reform is considered indispensable (Osborne & Gaebler, 1992; Peters, 2001), where it requires citizen participation to get involved in the political process (Barber, 2003; Dryzek, 1990). Electronic government was deemed a solution offering myriad opportunities for achieving government reforms. E-government makes it possible for the government to deliver more effective services online (West, 2004), improve citizen-government communication, and increase citizens' political participation (Mossberger et al., 2003; Tolbert & Mossberger, 2006). There are a considerable number of publications that investigate the influence of e-government on trust, such as the work of Horsburgh et al. (2011), Parent et al. (2005), Porumbescu (2016), and Welch et al. (2005), where most of them show a positive association between trust in government and e-government.

As e-government has been widely adopted by federal, state, and local government institutions, there is a trigger for government to be more open and transparent regarding their activities and performances. Open government was coined as the continuation of e-government which enables the creation of massive government data, including the availability of government documents on websites (Abu-Shanab, 2015). Open government is expected to increase the transparency of government activities, improve citizen participation, and strengthen citizen-government cooperation (Susha et al., 2015; Wirtz et al., 2018). One of the open government initiatives is open government data (OGD), which refers to any government-related data generated and owned by various government agencies. The government data such as budget, education, health, population, technology development, geographical data, meteorological data, etcetera, which are available and accessible for public to use are part of OGD (Ubaldi, 2013).

While many scholars have studied the influence of e-government and trust in government, relatively few studies discuss the effect of open government data on trust in government. In addition, to my best knowledge, there is no literature discussing the influence of open data in government and e-government services on trust in government. This paper explores the interconnection between citizens' interaction with government data and citizens' trust in government. The article begins with discussing the current state of research by reviewing some existing studies on trust in government associated with e-government and OGD. Subsequently, we deduce the conceptual model and hypotheses based on theoretical concepts. Later, findings are presented where we test the model using structural equation modeling (SEM). We use data collected by Pew Research Center (2015) on American Trends Panel Wave 9 Dataset. Finally, we end this article with discussions and conclusions regarding the research implications and future work.

2. Literature, hypotheses, and model

2.1 Trust in government

Trust is a concept that has been discussed in various domains, such as management, public administration, marketing, psychology, and sociology. However, Castelfranchi and Falcone (2010) stated that trust has no clear-cut definition. Focusing on public administration, Hinnant (2007) analyzed various definitions of trust and came up with the concept of trust seen from two perspectives, i.e., trust as behavior and trust as a belief and/or attitude. As a behavior, trust requires taking risks because of uncertainty due to limitations in acquiring information. As an attitude, trust is related to belief which allows an individual to commit even without full knowledge (Luhmann, 2000). As a belief, trust consists of two different attitudes, i.e., attitudes towards the person or object and attitudes towards a specific situation.

Thomas (1998) defined trust based on three conceptions, i.e., fiduciary, mutual, and social. Fiduciary trust occurs when there are asymmetric relationships between a trustee and a trustor. It stands on the principal-agent theory where the principal has limited control over the performance of its agents, and therefore, there are chances for malfeasance. An example of fiduciary trust is trust in professionals such as patients and doctors, clients, and

lawyers. Mutual trust arises from repeated interactions between a trustee and a trustor. This type of trust is always interpersonal, for example, between students and their teachers as well as citizens and street-level bureaucracy. Social trust emerges as a result of social factors within social systems such as cultures, regulations, ethics, and norms, which restrain individual choices to calculate some options.

With regard to trust in government, fiduciary relationships have long been perceived as an essential component of citizens' trust in government (Barber, 1983; Kass, 1994; Thomas, 1998). Citizens have limited knowledge and ability about what the government is doing and how to control their performance. Therefore, the citizens-government relationship is considered asymmetric. Taking the concept of trust defined by Hinnant (2007), the asymmetric relationship makes the citizens take risks and believe that the government will perform in their interests.

The declining trend in trust in government has attracted the interest of many scholars. Many studies were conducted to investigate the causes of falling, such as Citrin and Green (1986), Feldman (1983), Hetherington (1998), Mansbridge (1997), and Miller and Borrelli (1991). They argue that the national economic factor is the reason why citizens distrust their government. Socio-cultural factors such as societal problems are another determinant (Mansbridge, 1997; Pew Research Center, 1998). Wars, political scandals, and corruption are considered political factors that could undermine trust in government (Orren, 1997). The declining trend is complex due to many possible factors (Chanley et al., 2000).

2.2 Citizen's interaction with government data

As a new concept implemented by government institutions, there is limited research investigating the link between trust in government and open government data. Among these few studies, most of them focus on understanding citizens' trust in open government data (Purwanto et al., 2020) and the intention of citizens in using open government data (Khurshid et al., 2022; Souza et al., 2022; Wirtz et al., 2019). To our best knowledge, the study conducted by Gonzálvez-Gallego et al. (2020) is the only study that directly explores the link between open government data and trust in government. The association was investigated through a mediation role, i.e., citizens' satisfaction, measured based on satisfaction with the economy, government, education, health services, and democracy.

While limited research is found on OGD and trust in government, many studies investigated the influence of e-government on trust in government. Parent et al. (2005) found that citizens' transactions with government services positively affect trust in government and external political efficacy. Their findings confirm that trust in government was influenced by several factors, including the quality of e-government experiences. They measured experiences based on questions related to respondents' activities with online government services. Welch et al. (2005) investigated the link between citizen satisfaction with electronic government services and trust in government. Their findings also showed a positive association between e-government satisfaction and trust in government. Later, Tolbert and Mossberger (2006) also explored the influence of e-government on trust and confidence in government. Their evidence suggests a link between the use of government websites and trust in government. They concluded that e-government has the force to increase trust through interactions with citizens. Other scholars who concentrated on public administration corroborate that trust in public administration is positively associated with the perceived quality of electronic services (Gracia & Casaló Ariño, 2015). They asked respondents about experiences and perceptions about e-government services based on four dimensions of service quality proposed by Parasuraman et al. (2005).

We conclude that according to these studies, the interactions of citizens with government digital services influence trust in government. The more the citizens interact with government digital services, the more they trust in government. Interactions can be in the form of accessing government websites (Tolbert & Mossberger, 2006) and other experiences using e-government services (Gracia & Casaló Ariño, 2015; Parent et al., 2005).

As open government data is part of digital government services, we argue that interactions of citizens with open government data influence trust in government. There are some forms of interactions; access to data is one of them. When citizens access government data, it facilitates the principle of transparency which "allows the citizen to see what the government is doing, and how it is doing it" (O'Hara, 2012, p. 226). It shapes the citizens' perception that their government is accountable for what they are doing, and as a result, their trust in government increases. Therefore, we propose a hypothesis to relate the interaction of citizens with data and trust in government.

H1: Citizen's interaction with government data positively influences citizen trust in government.

2.3 Perceived benefits

The perception of benefits has been seen as a determinant of trust in prior studies in the information systems-related field. E-government and OGD have triggered government institutions to treat information as an asset that

offers tremendous benefits for the government and stakeholders, including citizens. The benefits of OGD for citizens are mainly clustered based on political and social benefits and economic benefits (Janssen et al., 2012; Mokobombang et al., 2019; Safarov et al., 2017).

In terms of political and social benefits, opening government data to the public enables the government to be more transparent. Linders and Wilson (2011) argued that transparency is an anti-corruption mechanism to ensure decision-makers' accountability. Transparency in government data makes it possible for citizens to have equal access to the data, participate in controlling the functioning of government, and ensure that government is accountable to public. OGD also enables citizen participation at various policy cycle stages (Galster, 2018), forcing the government to be more aware of their decision-making process as citizens can always get informed about the government's workings. OGD is thus expected to result in better decisions by government officials. Another benefit is to increase the quality of public services. In their paper, Safarov et al. (2017) noted some publications that focus on the use of OGD to improve public services, for example, citizens apps that make use of OGD to solve urban-related issues such as public transportation, public safety, and public utilities (Desouza & Bhagwatwar, 2012). OGD also brings impacts on public engagement with the government that can lead to trust in the government.

We argue that the benefits of OGD perceived by citizens influence trust in government. In trust-related research, some scholars associate trust with benefits and values. Yang (2005) mentioned two theoretical approaches in trust research, the economic and ethics approach. The economic approach assumes that trust is defined by four assumptions, one of which is the logic of calculations where people see benefits and costs before they trust an entity (Hardin, 2002; Williamson, 1996). Concerning OGD, understanding its benefits can help citizens have a better logical calculation to trust their government. The second approach, the ethics approach, assumes that trust is defined by three assumptions (Baier, 1995; Uslaner, 2002), one of which is social and moral relations. In terms of OGD, citizens will tend to trust in government whenever OGD's benefits are associated with social and moral values. The power of OGD as an anti-corruption tool fits the social and moral values. Therefore, we claim that the perceived benefits of OGD positively influence citizen trust in government.

H2: Citizen's perceived benefits of government data positively influence trust in government.

2.4 Effectiveness

Effectiveness is related to evaluation and usually linked to efficiency. When efficiency is defined as completing tasks with little waste, effectiveness reflects achieving the desired results, outcomes, or effects (Kjurchiski, 2014). Effectiveness is not only about achieving the objectives but also the desired results, outcomes, or impacts. A government program is called effective when the actual results achieve the objectives and produce the intended effects.

There is no publication focusing on the effectiveness of OGD. However, some publications discuss the effectiveness of e-government and general information systems (IS). Wang and Liao (2008) mentioned the effectiveness of information systems as the success of IS. An information system is called effective whenever it successfully achieves the intended outcomes. They argued that measuring the effectiveness of IS means measuring the success of IS. Therefore, they referred to the Information Systems Success Model (ISSM) developed by DeLone and McLean (1992, 2003) to measure the effectiveness of IS. The model consists of six dimensions that explain the success of IS. One of the dimensions associated with the definition of effective is net system benefits, which means the ability of the system to deliver impact or values to users as well as the organization. This dimension is seen as the intended outcomes of information systems, including e-government.

Based on the ISSM, OGD is called effective when citizens perceive and feel that OGD brings net benefits or values for them—not only for their government. Having access to open government data, citizens can experience values, such as more transparent government, equal access to government data, ability to reuse data for other purposes, ability to control government, etcetera. For the government, there is a wide range of benefits such as better service delivery to citizens, good governance, an increase in images, more innovations in society, and so on. Therefore, citizens may respond positively following the disclosure of government data. They might perceive OGD as effective because they could know better what the government is doing. As a result, their trust in government increases.

H3: Citizen's perceived effectiveness regarding open government data positively influences trust in government.

2.5 Model

This paper investigates whether citizens' interaction with government data, perceived benefits, and perceived effectiveness of government data are essential indicators of citizen trust in government. The formula to solve the aim of the paper is as follows. Trust in government is a function that consists of three variables, i.e., `Citizen Interaction`, `Perceived Benefits`, and `Perceived Effectiveness`.

Trust in Government = ƒ (Citizen Interaction, Perceived Benefits, Perceived Effectiveness)

3. Data and methods

We use data from a national survey conducted by Pew Research Center on public opinion, taken from the American Trends Panel Wave 9 Dataset (Pew Research Center, 2014) that was undertaken between November 17 and December 15, 2014. The survey topic was post-election of 2014 and US citizens' views of open data/open government. The sample consists of 3,212 respondents, where 2,856 of them participated in Web surveys, and the other 356 respondents participated through the mail. To ensure the representativeness of the population, the sample was weighted in several steps (Pew Research Center, 2015). The margin of error for the total sample is ± 2.3%. The survey asked respondents to answer 192 questions, including demographic. The survey questions were categorized based on three sections, i.e., the post-election section, open government and open data section, and religious demography section. This paper uses data in the open government and open data section.

We realized that the data used in this study are old because it is from 2014. There have been changes in political situation, federal initiatives, technology advancements, and so on that might also change the public experiences on open government data. However, there are at least two reasons that justify the relevance of the data even today for understanding public opinions towards open government data and trust in government. First, the comprehensiveness and representativeness of the data. The dataset provided by the Pew Research Center is large, with extensive demographic representativeness (as seen in Table 1) and a rigorous methodology, ensuring the reliability of the findings. Second, there is no recent dataset that captures public opinion's data on OGD and trust in government as comprehensive as the American Trends Panel Wave 9 Dataset. To my knowledge, this dataset is the most comprehensive and publicly available data source, notwithstanding its age. In addition to its large sample size, this dataset remains relevant to comprehend the phenomena as described in our research question.

Regarding the demographics of the respondents as seen in Table 1, more female respondents participated in the survey than males, with the percentages of female and male respondents being 52.1% and 47.9%, respectively. Regarding the age distribution of the respondents, most of them were within the range of 50-64 years old (32.7%), 30-49 years old (27.2%), and more than 65 years old (25.4%). Only 14.2% of the respondents belonged to the 18-29 age group. With regards to education, half of the respondents were college graduates. Concerning their race/ethnicity, 77.8% of them were white non-Hispanic (77.8%). Other minorities, i.e., black non-Hispanic, Hispanic, and other races, were counted for 8%, 7.6%, and 5.7%, respectively. Almost all respondents (97.9%) were US citizens. There were more Democrat/Lean Democrat supporters than Republican/Lean Republicans who participated in this survey. The respondents' income concentrated on a yearly income up to $75,000 and around $30,000-$74,999. Regarding Internet use, the demographic result showed that most respondents were Internet users (92.4%).

Tab. 1 - Respondents' demographics

Categories	Percentage (%)
Age	
18-29	14.2
30-49	27.2
50-64	32.7
65+	25.4
Sex	
Male	47.9
Female	52.1
Education	
College graduate	52.1
Some college	28.7
High school graduate or less	19.1
Do not know/refuse to answer	.1
Race/ethnicity	
White non-Hispanic	77.8
Black non-Hispanic	8.0
Hispanic	7.6
Other	5.7
Do not know/refuse to answer	.9
Citizenship	
US Citizen	97.9
Not US Citizen	2
DK US Citizen	.1
Party	

Republican/Lean Republican	41.9
Democrat/Lean Democrat	50.6
No Lean	7.5
Income	
More than $75,000	35.6
$30,000 - $74,999	35.3
Less than $30,000	23.6
Do not know/refuse to answer	5.4
Household internet status	
Not Internet user	7.6
Internet user	92.4

The dependent variable in the model is `trust in government`. The data are taken from the survey questions about trust in government which consists of three items. This variable is measured by the frequency of trust in federal, state, and local government on a four-point item scale ranging from 1 (just about always) to 4 (none of the time). The independent variables consist of `citizen interaction`, `perceived benefits`, and `perceived effectiveness`. The variable citizen interaction is operationalized as citizens' access to information or data provided by the federal, state, and local governments, as reported in the survey. The operationalization uses a two-point scale (yes and no). The perceived benefits variable is operationalized as the perception of respondents regarding the impacts that open government data has on public. There are five items with a two-point scale (yes and no). The last variable is perceived effectiveness, operationalized as respondents' perception of whether the government is effective in sharing government data with the public. This variable has three items with a four-Likert scale, ranging from 1 (very effectively shares the data it collects) to 4 (not all effectively).

Regarding the methods, we used IBM SPSS Statistics for descriptive analysis and internal consistency. Subsequently, we conducted a study using structural equation modeling (SEM) on IBM SPSS AMOS 27 to find the causal relationships in the hypothesized model. SEM consists of the measurement and structural models (Fan et al., 2016; Kline, 2015). The measurement model determines the relationship between each unobserved or latent variable and its indicators (observed variables), whereas the structural model describes the relationship between the variables or the constructs in the model. The structural model tests the hypothesized model (Kline, 2015).

For the measurement model, whenever the indicators for each unobserved variable are specified based on relevant theories or prior knowledge, confirmatory factor analysis (CFA) is applicable to the use (Brown, 2015; Harrington, 2009; Jöreskog, 1969). Whenever the underlying latent variables are not yet specified because of little knowledge about them, exploratory factor analysis (EFA) is relevant. In this paper, the proposed model has never been introduced before. However, the underlying latent variables are specified based on prior knowledge and models as described in the previous section. Therefore, we use CFA before the structural model to determine whether there is a relationship between the observed variables and their unobserved or latent variables (Child, 1990; Kline, 2015). We use the maximum likelihood (ML) estimation method for the CFA. We continue with the structural model to test the hypothesized model whenever the result is satisfactory.

However, we acknowledge that the operationalization of the constructs used in this study is based on the survey items provided by the Pew Research Center's data rather than purposeful survey instruments built specifically for this study. Both dependent and independent variables are approximated through existing questions in the Pew Research's questionnaires that are closely related to our theoretical foundations. However, even so, the measures provide a meaningful way to investigate the relationships being studied in this paper.

4. Data analysis and findings

4.1 Measurement Model

We use CFA to measure the quality of latent variables by examining the relationship between the latent variables and their indicators or items before we use them in our structural equation model. The first step is to calculate the factor loadings or the correlation coefficient of the indicators that associate with each latent variable to check the convergent validity of our variables or constructs. Figure 1 presents the measurement model, including the standardized factor loadings. As seen in the figure, the values of the factor loadings range from .640 to .930. Most values are above .7, which indicates essential indicators. There are three items with loading factors between .6 to .7. As the cutoff for standardized factor loadings adopted by many scholars is .5 (Fabrigar et al., 1999), these indicators are retained. To sum up, the convergent validity of our variables is good, indicated by high standardized loadings.

Not only checking the convergent validity of the variables and their items, but we also check the discriminant validity by identifying the correlation of each pair of variables in our model. According to Figure 1, there are six

pairs of variables with correlation value lies between .095 and .430. None of them has a correlation value greater than .85—the cutoff used by some researchers to combine two variables due to discriminant validity.

The final step in reviewing the measurement model is checking the goodness of fit statistics to examine whether the model fits with the data. The summary of the fitness indices is presented in Figure 1. When we set the alpha level at .05 with df 71, we get the result that the chi-square is larger than the chi-square of the critical value, and thus, we reject the null hypothesis. It means that the hypothesized model significantly deviates from the observed model. However, chi-square is sensitive to the number of samples. With a large sample size, a researcher tends to get significant results and thus reject the null hypothesis even though the model is good. Therefore, we also use other indices, i.e., RMSEA, CFI, TLI, and SRMR. We follow the cutoff for fitness proposed by Hu and Bentler (Hu & Bentler, 1999). According to Figure 1, the RMSEA (.072) is less than .05, which indicates a good fit. CFI and TLI are .941 and .925, respectively, which both suggest a reasonable fit (.90 to .95). SRMR (.0419) is lower than .08 and therefore considered a good fit. Finally, we conclude that the fitness indices produce satisfactory results, and thus, it is assumed that the hypothesized model is a valid representation of the data or the empirical reality.

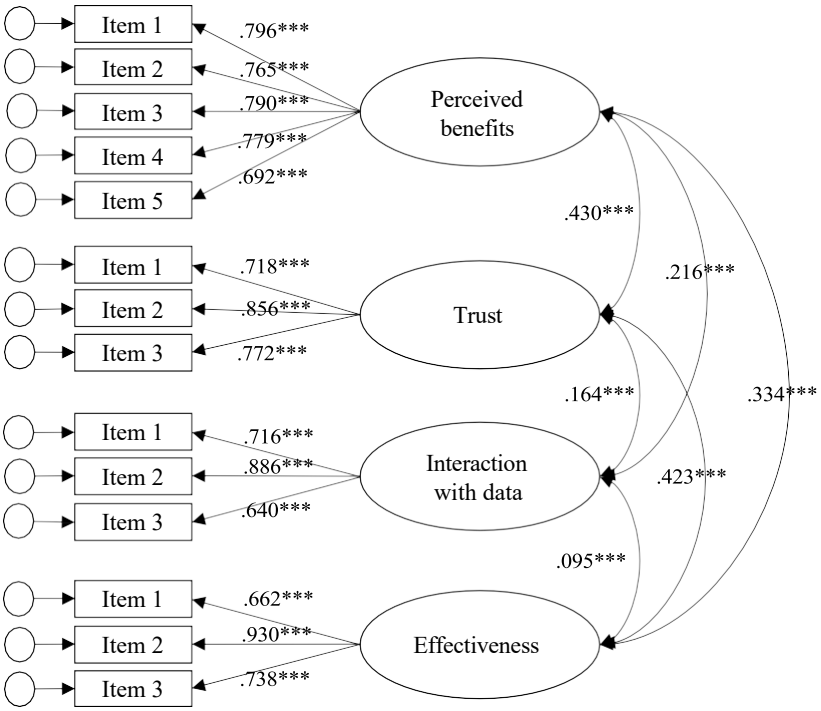
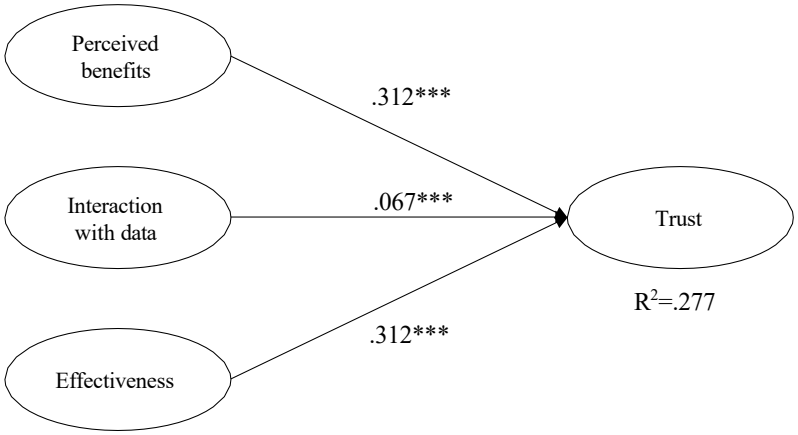


Fig. 1 - The measurement model, including its fit indices

4.2 Structural Model

We summarize the fitness of the model, the path coefficients, and the squared multiple correlations (R^2) in Figure 2 to assess the structural model. The global fit indices indicate a satisfactory fitness of the model because the index meets the cutoff of a good fit. It means the hypothesized model is a good representation of the empirical data.

According to the path coefficients, the three hypotheses are significant; thus, we fail to reject the null hypotheses. The path coefficients confirm the positive and significant impact of perceived benefits, interaction with data, and effectiveness on trust in government. To be more specific, perceived benefits (.312) and effectiveness (.312) appear to be stronger determinants to trust in government, while interaction with data (.067) has relatively lower importance. Altogether, the overall hypothesized model is significant, and the R^2 is .277, which means 27.7% of the variance of trust in government is explained by the three factors, i.e., perceived benefits, interaction with data, and effectiveness.



CMIN/df = 1245.487/71	TLI = .925
CFI = .941	RMSEA = .072
GFI = .947	

Values marked with asterisks (***) are significant at alpha levels of .01.

Fig. 2 - The measurement model, including its fit indices

5. Discussion

OGD increases trust in government through citizens' interaction with the data

The findings of this study support previous findings on e-government and trust in government. Our results confirm Parent et al. (2005), Tolbert and Mossberger (2006), and Gracia & Casaló Ariño (2015), who stated that citizens' transactions with government services had a positive association with trust in government. More specifically, they argue that trust in government is influenced by the quality of e-government experiences (Gracia & Casaló Ariño, 2015; Parent et al., 2005) and interaction with government websites (Tolbert & Mossberger, 2006). Our findings validate the importance of these interactions in building trust in government. While prior studies have highlighted the interaction of citizens with e-government, our findings emphasize that open government data can increase trust in government through citizen engagement with the data. Since no prior study investigates interaction with data and trust in government, our study is the first to confirm that citizens' interaction with government data positively influences trust in government.

Moreover, our results also corroborate the literature on the concept of trust. Interaction has long been perceived as a concept that forms trust in public administration. For example, Thomas (1998) states that mutual trust emerges whenever repeated interaction occurs between individuals or entities. Our findings extend the definition of interaction by arguing that even indirect interaction with government data can influence citizens' trust in government.

Perceived benefits of OGD matter for trust in government

Furthermore, perceived benefits play an essential role in improving trust. Our findings support previous studies in information systems literature on the perception of benefits and trust (Catoiu et al., 2014; Park et al., 2019). Focusing on mobile payment, Park et al. (2019) found that the perception of the benefits of using m-payment positively influences the customer's trust in m-payment. Investigating users' trust in online social networks, Catoiu et al. (2014) reported a positive correlation between the user's perceived benefits and trust in online social networks. Our results are consistent with their findings, indicating a positive and significant correlation between perceived usefulness and trust. Although our domains are different, the three findings confirm that the perception of benefits is an essential determinant of trust. Specifically, in the context of trust in government, our findings highlight that perceptions about the benefits of OGD are a significant determinant.

These findings can be explained by the previous trust theory proposed by Yang (2005), who accentuated that individuals are usually triggered by some logical calculations such as benefits and costs before they trust an entity (Hardin, 2002; Williamson, 1996). Our study confirms that this economic logic is relevant in public administration. Before trusting their government, citizens will consider what benefits they can obtain from specific services. Citizens develop perceptions regarding the benefits that they might get. In the context of open government data, where the data can be obtained freely, many benefits of OGD outweigh the costs, and therefore, it brings citizens to trust their government. This argument is also consistent with the statement of Wirtz et al., who states that "… although citizens seem to be blind to external incentives, they strongly take into account the usefulness of open government data, thus suggesting that to some extent their behavior is indeed also guided by "practical rationality,"

and thus underlies instrumental considerations in terms of maximizing their benefit." (Wirtz et al., 2018, p. 315).

Our results also support the assumption that trust is defined by social and moral relations (Baier, 1995; Uslaner, 2002). Based on this assumption, individuals tend to trust other individuals or entities whenever the offered benefits are aligned with their social and moral values. This logic seems plausible in the context of open government data, as its benefits are linked to social values. For example, government data has the power to improve the accountability, transparency, and good decision-making of government, where all of which are associated with responsibility, honesty, integrity, and justice of the government. These values, in turn, inspire citizens to trust their government. As Hinnant (2007) suggests, trust can be seen as an attitude or behavior. We also agree that social values influence citizens' attitudes toward trusting their government, as these values are reflected in the benefits of open government data. Another possible explanation is the asymmetric relationship between citizens and government (Thomas, 1998), where citizens have limited knowledge about what the government is doing. Given this imbalance, it is plausible that after all, citizens rely on social and moral values when deciding to trust their government.

The significance of OGD effectiveness on trust in government

Our findings provide strong evidence that the effectiveness of open government data has a positive correlation with trust in government. Effectiveness is defined as the achievement of the desired results or outcomes (Kjurchiski, 2014). OGD is called effective whenever citizens both perceive and feel that it delivers the results they expect. Our results confirm that trust in government increases whenever citizens recognize that OGD has met their expectations. These expectations are typically related to accountability, transparency, and good decision taken by the government.

Wang and Liao (2008) denoted the effectiveness of information systems as the success of IS. Over the past several years, some studies have been conducted to investigate the success of IS in various domains, including e-government (Rana et al., 2015; Scott et al., 2009) and open government data (Purwanto et al., 2017). However, to date, no study has explicitly looked at the link between the effectiveness of IS or the success of IS and trust in government. Our study bridges the gap, highlighting the connection between research in public administration and information systems.

Practical implications

According to our research findings, we suggest practical implications for public administrators, public managers, and policymakers that could help increase citizens' trust in government through OGD. Considering the importance of perceived benefits, we find it crucial for practitioners to focus on increasing the understanding of the open data benefits for citizens. The objective is not only to inform citizens regarding possible direct benefits when they participate in open government data but also indirect benefits such as transparency, accountability of government, and so on. In the ladder of citizen participation, informing citizens is "the first step toward legitimate citizen participation" (Arnstein, 1969, p. 219).

There are several approaches that the government can do to inform citizens about OGD's benefits. One of which is to improve the relations between government and media, allowing journalists to use government data to report and inform what the government is doing (Papoutsaki, 2008). Citizens favor this indirect benefit, as confirmed in our study, because they believe that OGD enables journalists to cover government actions in greater detail. Another essential approach is to focus on creating informed and engaged citizens. Milner (2002) stated civic literacy is vital to developing informed citizenship. Creating informed citizens can be done through the collaboration between government and community.

Our finding validates the significance of citizens' interaction with open government data. Thus, a practical implication for the government is to increase the availability of government data and information for public to access and utilize the data. This means that data must be free, available, and accessible for citizens in a standardized format, following the principles of open data. Wirtz et al. (2018) also mentioned that government websites and online platforms used to present the open data must align with citizens' needs, stressing the necessity to design the platforms with usability in mind. By focusing on making more government data accessible to citizens and improving the usability of the online platforms, the government can increase the effectiveness of OGD and ultimately, strengthen citizens' trust in government.

6. Conclusion

This paper aims to investigate the connection between trust in government and three factors, i.e., the interaction of citizens with government data, the perception of benefits of government data, and the effectiveness of government data. Our findings show that citizens' interaction with OGD matters in increasing trust in government. Specifically, the more citizens interact with open government data, the greater their trust in the government. This finding aligns with previous studies in the e-government domain, for example, the work of Parent et al. (2005), Tolbert and Mossberger (2006), and Gracia & Casaló Ariño (2015). Our findings also strengthen the concept of

trust proposed by Thomas (1998), who states that repeated interaction between individuals and entities can create trust.

However, our results indicate that perceived benefits and effectiveness of government data are more essential determinants than citizens interaction with government data. When citizens have a better perception of the benefits of open government data, they tend to trust their government. Therefore, we conclude that government needs to focus on informing citizens about the values of open government data, both direct and indirect benefits. Another important determinant is the effectiveness of OGD. The findings also reveal that the effectiveness of open government data has a positive correlation with trust in government, meaning that when citizens both understand the benefits of OGD and also feel that it delivers their desired expectation, they will tend to trust their government.

Our study has some limitations, especially concerning the data and the questionnaire. First, the data used were taken in 2014. Even though the sample size is enormous, there might be cases where there are some changes in society, such as political, economic, social, and technological conditions. These changes could result in different responses and, thus, different results whenever the same study is conducted using more recent data. We recommend conducting a similar study using more recent data to test the consistency of the results. Second, this study uses existing data provided by Pew Research Center (2014). As a result, the number of items asked in the questionnaire cannot be adjusted according to our needs. For example, there are many types of interactions, but this study only considers the first interaction level, i.e., data access. The number of items for each factor is also limited as we used the Pew Research Center's data. Using the same model to test trust in government, we recommend having a more thorough instrument that includes more items. We also recommend testing the same model in the context of OGD outside the United States to know whether trust in government in other countries is positively influenced by perceived benefits, effectiveness, and interaction with open government data. Third, there is a possibility of reverse causality, meaning that there is a chance that high trust in government might lead to more interaction with government data. This phenomenon has not yet explored in this study. Finally, we recognize that the model of trust in government used in study is notably like the constructs used in technology acceptance, especially the Technology Adoption Model (TAM) (Davis, 1989). This overlap could further be explored to investigate the intersection between trust in government and technology acceptance in the context of open government data. This investigation could provide insights into how public acceptance on open government data influences their trust in government. Therefore, future study to extend the model is worth investigating to enrich the literature of both technology acceptance and trust in government.

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