EXAMINING THE DETERMINANTS OF OPEN GOVERNMENT DATA ADOPTION: AN INDONESIAN CASE

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Abstract. In response to the growing interest in open government data (OGD) worldwide, there is a pressing need for research that explores the determinants of OGD adoption. This study aims to address this research gap by investigating the factors that influence the adoption of OGD among government agencies, especially in the Indonesian context. Drawing on previous research on innovation adoption, the study develops a comprehensive research model that integrates the technology-organization-environment (TOE) framework and four key factors: perceived benefits, perceived risks, organizational readiness, and external pressures. To empirically examine the research model, survey data from 320 government officials were collected and analyzed through regression and path analysis. The results reveal a significant positive relationship between perceived benefits and external pressures toward the adoption of OGD by government agencies. The findings offer valuable insights for policymakers and agencies seeking to enhance OGD implementation, emphasizing the pivotal role of tangible benefits and external stimuli in driving the adoption of initiatives.

Keywords: open government data, technology adoption, e-government, public information, data democratization.

1. Introduction

One Data Indonesia (ODI, in Bahasa *Satu Data Indonesia*) is one of the key implementations of the Indonesian government's Open Government Data (OGD) commitment. Indonesia's formal endeavour for the open government was dated in 2011 when Indonesia and seven other countries (Brazil, Mexico, Norway, the Philippines, South Africa, the United Kingdom, and the United States) founded the Open Government Partnership (OGP) as a multilateral initiative to foster a more transparent, accountable, and responsive government. Currently, 75 countries as members, 105 local jurisdictions, and thousands of civil society organizations in the OGP demonstrate the emergence of open government worldwide. However, as the founder of one of the open government initiatives, Indonesia's progress in open government implementation has encountered many challenges. In 2017, according to the Global Open Data Index, Indonesia was ranked 61st out of 94 countries (Open Knowledge Foundation, hereinafter OKFN, 2023). The index measures the openness of government data, including government budget, national statistics, draft legislation, national map, water quality, and many others. Similar progress was also reported by the United Nations E-Government Survey in 2020, which ranked Indonesia 88 out of 193 countries (Vereinte, 2020). The ranking is slightly better in the Open Data Index from the Open Data Barometer, in which Indonesia was ranked 36th out of 115 national governments (Tjondronegoro et al., 2022). The index measures openness based on the open data principles for a variety of types of data.

OGD is a major component of the larger open government movement, including more recent areas such as public involvement and citizen experience (Tauberer, 2012) and government accountability and transparency in a broader aspect. The term "open data" suggests both the technological meaning of using computers (or other tools) and the internet to manage information that can be accessed and reused (reproduced) easily and freely, and the philosophical meaning of civic participation and engagement.

The ultimate goal of open government is development through increased government efficiency in providing public services, fostering social innovation, establishing laws, settling conflicts, and fostering cooperation between citizens and civil societies (Tapscott, 2010). Therefore, OGD is necessary for implementing open government as a whole.

Organization for Economic Co-operation and Development (hereinafter OECD) defines OGD as "a philosophy- and increasingly a set of policies – that promotes transparency, accountability and value creation by making government data available to all (OECD, 2023)." The World Bank defines OGD by legal

and technical levels of data openness. First, the data must be legally available (in the public domain with few limits on data access). Second, the data should be technically open (i.e., presented in a machine-readable, non-proprietary format) (World Bank, 2023).

Government data is considered open if it is publicly accessible and complies with these principles: all (electronic) public data should be fully available, except those subject to valid privacy, security or privilege limitations.

Third, open government data also encourage to make non-electronic information available electronically to the extent possible; primary, data is available at the highest level of granularity, without any aggregation or modification; timely, data is made available as soon as is necessary to maintain its value; accessible, data must be made available on the Internet to accommodate the widest range of users and uses and must be published with current and alternative protocols and formats; machine-processable, data must be properly structured and encoded to be widely used, with sufficient documentation available; non-discriminatory, data should be accessible to anyone without registration and anonymity; non-proprietary, data should be available in multiple formats, as proprietary formats add restrictions and non-proprietary formats may not reach a wide audience; license-free, data is not subject to copyright, patent, trademark, or trade secret regulation and should be marked as public domain (Ibrahim et al., 2021)

Literature has documented numerous potential and empirical benefits of implementing OGD in political, economic, social, technological, operational and technical terms (Ibrahim et al., 2021). From a political perspective, the benefits include increased transparency (Theocharis and Tsihrintzis, 2013; Linders, 2013; Kucera and Chlapek, 2014; Kassen, 2014; Dos Santos Brito et al., 2015; Hardy and Maurushat, 2017), improved accountability (Theocharis and Tsihrintzis, 2013; Kassen, 2014; Hardy and Maurushat, 2017), strengthened democracy (Theocharis and Tsihrintzis, 2013), (Jurisch et al., 2015; Vracic et al., 2016; Toots et al., 2017), encouraged trust in the political system (Mutambik et al., 2022) and stabilization and legitimization of policies (Kucera and Chlapek, 2014; Kassen, 2014; Parycek, Höchtl, and Ginner, 2014; Fan and Zhao, 2017). Benefits for the economy such as increased economic growth (Kucera and Chlapek, 2014; Fan and Zhao, 2017; Mutambik et al., 2022), stimulation of innovation (Jurisch et al., 2015; Mutambik et al., 2022), promotion of entrepreneurship (Jurisch et al., 2015), facilitating transformation to a knowledge-based economy (Jurisch et al., 2015) and development of new products and services (Parycek et al., 2014).

In terms of the social aspect, there are improved government services (Kucera and Chlapek, 2014; Theocharis and Tsihrintzis, 2013; Jurisch et al., 2015; Hardy and Maurushat, 2017; Mutambik et al., 2022; Fan and Zhao, 2017), public engagement (Kassen, 2014; Parycek et al., 2014; Fan and Zhao, 2017; Mutambik et al., 2022), improved public relations toward government (Kucera and Chlapek, 2014; Jurisch et al., 2015), unlock collective intelligence (Mutambik et al., 2022), and insights into government mechanisms (Kucera and Chlapek, 2014; Parycek et al., 2014). For the technological aspect, there is an increased standardization of procedures in e-government (Hardy and Maurushat, 2017; Wang

and Lo, 2016). Further, in the operational and technical aspects, the benefits are fair decision-making (Hjalmarsson et al., 2015; Kassen, 2014), improved government data and processes (Kucera and Chlapek, 2014), rapid availability of data (Parycek et al., 2014), high qualitative data (Parycek et al., 2014), and sustainability of data (Vracic et al., 2016). In addition, data use would be optimal if it is supported by organizational culture, digital literacy, trust, and stakeholder engagement (Tjondronegoro et al., 2022).

These benefits have motivated the Indonesian government to promote open government data at all levels of government through One Data Indonesia (ODI). ODI (https://data.go.id/) is a government data governance initiative that seeks to provide high quality data that can be shared between Central and Regional Agencies. This policy was launched in 2012 but was hampered by institutional problems, such as a lack of standard technical norms, bureaucratic procedures and data management skills (Tjondronegoro et al., 2022). In an attempt to overcome these challenges, the government provided a regulation with Presidential Decree No. 39 of 2019. In 2021–2022, there were more than 800 socialization and assistance programs at all levels of government in Indonesia. Additionally, according to the Ministry of National Planning, the readiness rate was 50% at the central government level and 62% at the provincial level (The Indonesian Ministry of National Development Planning, hereinafter MNDP, 2023).

However, institutional problems still arise, such as data standardization and interoperability and exclusion of stakeholders in the overall ecosystem (Tjondronegoro et al., 2022). Other challenges to successful ODI implementation in Indonesia include the problem of data and metadata standardization caused by the massive scale of governance structure (632 data trustees, including 84 ministries and agencies in 34 provinces) (Tjondronegoro et al., 2022), the incongruity of government policies between the central and regional levels (Soegiono, 2018; Tjondronegoro et al., 2022), irrelevant and uncertain regulatory framework (Soegiono, 2018), limited competent human resources in digital technology (Soegiono, 2018; Sayogo and Yuli, 2018; Tjondronegoro et al., 2022), inadequate data and technological infrastructure (Soegiono, 2018; Sayogo and Yuli, 2018), abuse of data (Sayogo and Yuli, 2018), ensuring data credibility (Sayogo and Yuli, 2018) and maintaining public engagement (Soegiono, 2018; Sayogo and Yuli, 2018; Tjondronegoro et al., 2022). Some of these challenges have obscured citizen engagement, indicated by the limited available datasets in the portal and imbalances of user access across Indonesia (Soegiono, 2018).

Most of those past studies offer an understanding of OGD and ODI from three perspectives: policy-making context, implementation context, and impact context. However, studies that explored the determinant factors of OGD, especially in the context of organizational, technological, and environmental factors in a single framework, are scarce. Therefore, the research question of this study is what the determinant factors of OGD/ODI adoption in Indonesia are. The assessment of the determinants will employ the Technology-Organization-Environment (TOE) framework developed by Tornatzky and Fleischer (1990). The TOE is a theoretical framework that explains technology adoption in or-

ganizations and describes how the process of adopting and implementing technological innovations is influenced by the technological context, organizational context, and environmental context.

In the technological context, companies often face the challenges of comparing and contrasting the relative risks and rewards that come with adoption of new technologies (Prasad et al., 1998). This context can be conceptualized into perceived benefits and perceived risks. Scholars (Iacovou et al., 1995; Kuan and Chau, 2001) suggest that benefits as perceived by potential adopters is an important factor that affect innovation adoption. Therefore, we can formulate the first hypothesis as follows:

H1: A higher level of perceived benefits will be positively related to a higher level of OGD adoption.

On the other hand, perceived risks have been influential factors in innovation adoption (Chau and Tam, 1997) and are hypothesized as follows:

H2: A higher level of perceived risk is negatively related to a higher level of OGD adoption.

In the organizational context, organizational readiness has been noted as a significant factor influencing IT innovation adoption processes (Wang and Lo, 2016). Organizational readiness, including organization infrastructure, arguably affects organizational capacities as they provide essential hardware platforms, supporting software programs, physical facilities, and computer networks. It is also a significant aspect of organizational competitiveness (Lee and Shim, 2007). In addition to organizational infrastructure, organization context also explains how top management can offer guidance, support, and commitment to create an environment conducive to innovation (Lee and Shim, 2007). Hence, we can expect this third hypothesis to be:

H3: A higher level of organizational readiness is positively related to a higher level of OGD adoption.

Meanwhile from the environmental context, it refers to the arena where an organization conducts business among multiple stakeholders such as business partners, competitors, and customers. These factors, which are external to an organization, can arguably constrain or promote technological innovation and have served as significant determinants of innovation assimilation, as suggested in many previous studies (Hirt et al., 2001; Somers and Nelson, 2004). Thus, the fourth hypothesis will be:

H4: A higher level of external pressure is positively related to a higher level of OGD adoption.

The findings will make several contributions to the field of study. First, it presents a new perspective on innovation adoption to identify significant determinants of OGD adoption in developing countries. Second, it provides advanced knowledge on OGD adoption by empirically testing a research model that integrates various aspects of the existing framework (Technology-Organization-Environment/ TOE) and includes analysis of the cost-benefit perspectives, organizational readiness, and external pressures of institutional theory in the context of OGD innovation. Third, it provides policy suggestions on the managerial implications that might benefit governmental practitioners.

2. Research methods

2.1 Sample

As outlined above, the present research focuses on government agencies in Indonesia as the target sample. Further, in 2019, the president of Indonesia issued a regulation introducing the One Data Indonesia (ODI) initiative, which aimed to harmonize data collected by various ministries and agencies to ensure accuracy, accessibility, shareability, and accountability. This study, thus, conducted a survey in 2021 involving 45 government agencies in Indonesia to investigate the factors supporting the adoption of the aforementioned ODI initiative. A total of 320 responses were collected, with the sample consisting of ministries (64.05%), non-ministerial institutions (12.82%), and local government (23.13%).

2.2 Measurement Instrument

To measure the relevant constructs, a survey instrument was developed based on existing literature. The survey instrument utilized in this study was adapted from Wang and Lo's (2016) research on Open Government Data policy adoption in Taiwan, with modifications made to align it with the Indonesian context. The survey encompassed questions that assessed the adoption of ODI within different agencies, perceived benefits, perceived risks, organizational readiness, and external factors impacting ODI. Responses to the questions were measured on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Perceived Benefits

Drawing upon the works of Wang and Lo (2016) and Chwelos et al. (2001), perceived benefits refer to the potential advantages that Open Government Data can offer to government agencies. The measurement of perceived benefits in this study included questions evaluating the overall impact of ODI on agencies in terms of transparency, public relations and government reputation, public service, effectiveness and efficiency, and economic growth.

Perceived Risks

Perceived risks pertain to the obstacles associated with the adoption of ODI within government agencies. The measurement of perceived risks involved questions that asked respondents to indicate their agreement with specific risks related to the adoption of ODI within their respective agencies. These risks encompassed the legal framework for data sharing, data quality and format, security risks and data loss, privacy concerns, and potential data and political intervention.

Organization Readiness

Wang and Lo (2016), organization readiness refers to the degree to which agencies receive top management support for ODI adoption. Additionally, it examines the agencies preparedness to implement One Data Indonesia, considering factors such as financial capacity, IT infrastructure, leadership skills for effective implementation, and internal and top management support for ODI adoption.

External Factors

External factors encompass the external pressures that government agencies face when considering the adoption of open government practices. Drawing on the work of DiMaggio and Powell (1983), these factors comprise formal and external pressures exerted by other organizations on which the government agencies are dependent, as well as public expectations within the society in which they operate. To assess the external factors, the survey included questions regarding the support of external leadership, such as the president, the impact of international organizations, public demand for accountability, and the influence of existing laws on transparency.

3. Results and discussions

3.1 Findings

It is imperative to note that during the execution of confirmatory factor analysis, an assessment was conducted on all measures to examine the reliability and validity of the model. The outcomes of the analysis demonstrated a favorable correspondence between the model and the observed data, indicating a strong level of reliability and convergent validity for the measurement scale. In this regard, a reliability test was carried out to test the reliability of the index created, with all indexes having a Cronbach alpha > .65 (α= (.84-.93)).

Additionally, Table 1 below provides information on the composite reliabilities (CR) and average variance extracted (AVE) for all constructs, which surpass the recommended threshold values established (Hair et al., 2004). These outcomes indicate satisfactory internal consistency of the multiple items for each construct and signify that a significant portion of the variance is accounted for by the constructs. Discriminant validity was also assessed by comparing the AVE values with the squared correlations between the constructs (Ab Hamid et al., 2017). The AVE values were found to be higher than the squared correlations between each pair of constructs, indicating discriminant validity and demonstrating that the constructs do not significantly overlap in terms of shared information.

Table 1

Total effects on the adoption of open government data

Independent variable[3]	No. of items	Composite reliabilities	AVE	β	*p*-value
Perceived benefits	9	.93	.68	.14	.03
Perceived risks	10	.90	.54	.04	.47
Organizational readiness	7	.90	.54	.05	.33
External pressure	4	.84	.79	.29	<.001

Notes: [1] R=.42; R^2=.20; F=14.75; *p*-value<001.
[2] Dependent variable is a composite index of 3 items with Cronbach's alpha= .84 and average = 4.19.
[3] Items measured on a 5-point scale ranging from "strongly disagree" (1) to "strongly agree" (5).

Source: Authors' own calculations.

Further, in testing the above-mentioned hypotheses, a path analysis was carried out with the result presented in Figure 1 below. As shown in Figure 1, the standardized path coefficients for perceived benefits, perceived risks, organizational readiness, and external pressures are 0.14, 0.4, 0,5, and 0.29, respectively. These values indicate the relative magnitude of the impact that each variable has on the adoption of OGD. According to this finding, however, the integrated model demonstrates that not all path coefficients are statistically significant. To note, the path coefficients here indicate the strength and direction of the relationships between the variables in the model. The significant variables, according to this result, are perceived benefits and external pressures. Meanwhile, the variables for perceived risks and organizational readiness appear not to be significant in the path coefficient for the adoption of open government data (OGD).
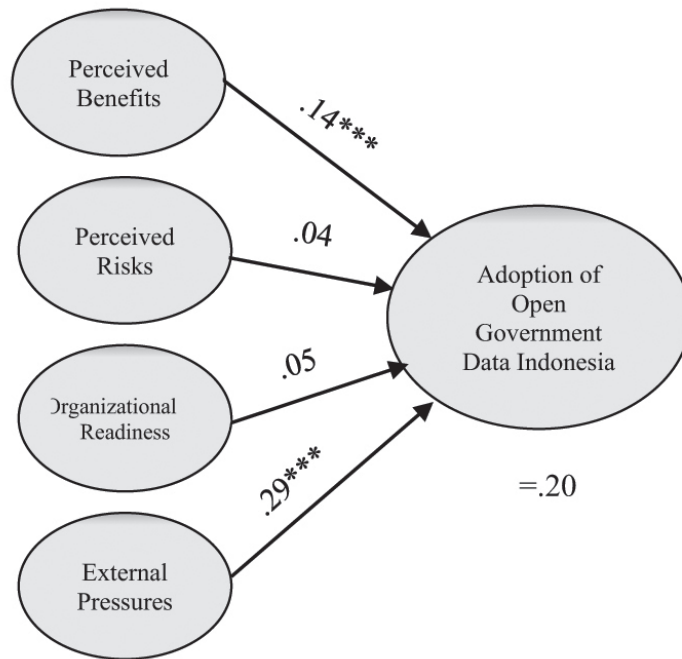

Figure 1: **Path analysis of the integrated model**

Additionally, based on the findings in Figure 1, it is evident that the relationships proposed in hypotheses H1 and H4 are strongly supported. Hypothesis H1 suggests that perceived benefits positively affect the adoption of OGD, and this is corroborated by the moderate path coefficient of 0.14. This implies that individuals or organizations are more likely to adopt OGD when they perceive substantial benefits associated with it. In addition, the external pressures (0.29) also exhibit significant path coefficients, indicating that these factors contribute to the adoption of OGD, supporting the H4. External pressures encompass external influences or demands that drive OGD adoption. These findings suggest that external pressures have a meaningful impact on the adoption of OGD.

On the other hand, H2 and H3, the perceived risks and organizational readiness, appear not to hold statistical powers to be sustained. This indicates that perceived risks and organizational readiness have no statistical influence on the adoption of Open Government Data in Indonesia.

3.2 Discussions

The findings of this study strongly affirm the notion that perceived benefits play a crucial role in influencing the adoption of Open Government Data (OGD) initiatives in the Indonesian context. While previous research on the adoption of various innovations has yielded contrasting results, this study's findings align with prior research on the significance of perceived benefits in the adoption of Electronic Data Interchange (EDI) and e-government (Wang and Lo, 2016). Looking at previous studies on EDI adoption and e-government services adoption (Iacovou et al., 1995; Chau and Tam, 1997; Kuan and Chau, 2001), it becomes evident that perceived benefits have consistently emerged as a key factor in driving the adoption process. These earlier studies support the notion that perceived benefits associated with adopting new technologies and services play a critical role in shaping the decision-making process of government agencies. Accordingly, this study also reinforces the significance of perceived benefits in comprehending the adoption patterns of OGD in government agencies.

Additionally, the findings on the external pressure variable align with those of previous studies that there is a positive correlation between higher levels of external pressures and increased adoption of Open Government Data (Musawa and Wahab, 2012; Basaglia et al., 2009). This observation strengthens the conclusions of previous similar studies, such as those examining the adoption of voice communication technology, Electronic Data Interchange (EDI), e-government services, and network effects. For instance, Basaglia et al. (2009) found similar results in their investigation of voice communication technology adoption. Similarly, Chwelos et al. (2001) and Musawa and Wahab (2012) also discovered a positive relationship between external pressures and EDI adoption.

The outcome of this study is not expected, however, given the context of Indonesia's governance system, where the public and administrative systems, including authorities and agencies at the same level, hold different substantial influences over OGD adoption among government agencies (McCawley, 2005).

Regardless, the finding of this study suggests that the presence of external pressures and the influence exerted by various stakeholders play a significant role in shaping the adoption of OGD within the government sector in Indonesia.

On the other hand, contrasting with previous studies on the adoption of Electronic Data Interchange (EDI) conducted by Chwelos et al. (2001) and Musawa and Wahab (2012), this paper found insignificant effects of organizational readiness on the adoption of Open Government Data. This finding, instead, is in line with the research by Wang and Lo (2016), who explored the relationship between facilitating conditions and the adoption decision of OGD in the Taiwan context. They observed a similar pattern where organizational readiness played a relatively minor role compared to other factors. This suggests that other factors, such as external pressures, may overshadow the organization-

al readiness variable. Additionally, this result also aligns with a previous study on the adoption decision of e-government services, which claims that organizational readiness has no statistical power to infer a causal relationship with the adoption of Open Government Data (Tung and Rieck, 2005).

On these contradictory results, the disparity in defining and measuring organizational readiness might explain the discrepancy in its impact on the adoption decision between this study and the research confirming its significant effects (Chwelos et al., 2001; Iacovou et al., 1995; Musawa and Wahab, 2012). Despite the similarity in the context of government services, the different operationalizations of readiness may have resulted in varying outcomes. As such, it is crucial to consider these differences in future studies to obtain a comprehensive understanding of the role of organizational readiness in the adoption of government initiatives such as OGD.

Finally, this study also did not find a significant relationship between perceived risks and the adoption of Open Government Data (OGD), which contradicts previous research on innovative adoption, including studies on open systems technology innovations (Chau and Tam, 1997).

Several possible explanations can account for these findings. Firstly, it is important to note that most government agencies in Indonesia have opted to outsource their organizational information systems (McCawley, 2005). This strategic decision enables agencies to address and overcome technological barriers and associated risks more effectively by leveraging the expertise of external parties. By relying on external experts, the agencies can readily tackle any technological and technical challenges that may arise during the OGD adoption process. Consequently, the impact of perceived risks on OGD adoption among government agencies is minimized. Secondly, as part of One Data Indonesia project, the government of Indonesia has routinely conducted workshops and provided guidelines and is available for technical assistance, especially to those in local governments. As a result, these approaches likely contributed to reducing the significance of foreseeable challenges, such as technical barriers, as a primary factor influencing the OGD adoption decisions of government agencies.

Taken together, these factors indicate that while perceived risks were found to be influential in previous studies on innovation adoption, their impact on OGD adoption in Indonesian government agencies appears to be diminished. The outsourcing of information systems and the implementation of specific guidelines by One Data Indonesia might have played a crucial role in mitigating the perceived risks and emphasizing other factors that drive the decision-making process regarding OGD adoption, although further studies could provide more justification for this notion.

3.3 Implications

This study has significant practical implications as it identifies the key factors that influence the adoption of Open Government Data (OGD) in Indonesian government agencies. These findings can assist policy practitioners in developing more effective strategies to encourage the acceptance and implementation of OGD while devising appropriate initiation strategies. First and foremost, this study em-

phasizes the importance of highlighting the benefits of OGD adoption to government agencies. Policy practitioners should emphasize the potential advantages that government agencies can gain from releasing their data, such as substantial rewards and positive outcomes for the agency itself. By showcasing these benefits, policy practitioners can create a stronger case for OGD adoption and increase the likelihood of government agency participation.

Further, Government agencies may experience external pressures when considering the adoption of Open Government Data (OGD), including the expectations from higher-level agencies and societal demands. In light of this, policy practitioners are recommended to foster government agency acceptance of OGD through inter-organizational learning. Hence, one practical step that policy practitioners can take is to identify government agencies that have demonstrated successful OGD adoption and examine their approaches, techniques, and policies. By studying these best practices, policy practitioners can gain valuable insights into the challenges faced and the strategies employed during the OGD adoption process.

This knowledge can be used to develop a standard operational process (SOP) or a comprehensive business model specifically designed for OGD adoption in government agencies. An SOP or business model can provide a structured framework that outlines the necessary steps, guidelines, and key considerations for government agencies when adopting OGD. This framework can serve as a roadmap, enabling agencies to navigate through the complexities and potential hurdles associated with OGD adoption. By implementing a standardized approach, policy practitioners can streamline the adoption process, reduce duplication of efforts, and ensure consistency across government agencies.

4. Conclusion

This study has investigated two key factors that impact the adoption of Open Government Data (OGD) by government agencies, namely perceived benefits and external pressures. Notably, the findings emphasize the importance of perceived benefits as a crucial determinant of OGD adoption. The implications of this study are valuable for both academic researchers and policy development practitioners. Academically, this study contributes to the existing body of knowledge by shedding light on the significant determinants that influence OGD adoption among government agencies. By recognizing the prominence of perceived benefits, researchers in the field of OGD adoption can focus their investigations on understanding the specific benefits that drive government agencies to adopt OGD. This knowledge can further enrich theoretical frameworks and contribute to the development of a comprehensive understanding of OGD adoption dynamics.

Practically, the findings of this study have important implications for policymakers and individuals involved in policy development processes. Policymakers should take into account the relative importance of the two significant determinants identified in this study when designing strategic plans for OGD initiatives. By considering the perceived benefits and external pressures, poli-

cymakers can tailor their strategies to increase the motivation of government agencies to adopt OGD. This may involve developing policies and programs that highlight the potential benefits and positive outcomes associated with OGD adoption. Moreover, policymakers can leverage external pressures, such as societal expectations and influences from higher-level agencies, to create an environment conducive to OGD adoption among government agencies. Lastly, for future research, it is worth exploring the adoption of OGD from the perspectives of individuals and business organizations. While this study focuses on government data interchange among government agencies as a critical initial step of OGD initiatives, the OGD policy implemented by the Indonesian government allows for public use of government data, by both businesses and individuals. Future studies can investigate whether there are differences in the factors that influence the adoption of OGD by government agencies, businesses and individuals. Examining these potential differences can offer comprehensive insights into the determinants of OGD adoption across various stakeholders.

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