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Smart city based on community empowerment, social capital, and public trust in urban areas

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ABSTRACT

BACKGROUND AND OBJECTIVES: Urbanization has been causing many problems for the environment and society. An ineffective and inefficient government also contributes to urban problems by increasing public dissatisfaction and distrust of government. Technological Improvements makes it possible for local governments in Indonesia to implement the concept of “Smart City” as a solution to solve urban problems. This study aims to fill the gap by examining the impact of smart city application on public trust towards the government.

METHODS: A primary data collection was conducted in 2021 to profile the citizens’ behaviour in terms of smart city application. This study had surveyed four big cities in Indonesia that had built smart city applications well: Jakarta, Bandung, Semarang, and Surabaya. The primary data were analyzed through ordinary least squares regression.

FINDINGS: This study finds that the fundamental factors of smart city applications that are statistically significant were on quality, satisfaction, and reliability. These factors had positive and significant impacts on the level of trust in the local government. Based on the regression model, the increase of application quality score by 1 affects the score of trust in the local government, which will rise by 0.440 (Jakarta), 0.269 (Bandung), and 0.245 (Semarang), and 0.212 (Surabaya). The increase in application satisfaction score by 1 affects the score of trust in local government, which will rise by 0.193 (Jakarta), 0.431 (Bandung), 0.07 (Semarang), and 0.186 (Surabaya). Also, an increase in application reliability score by 1 affects a rise in trust in local government by 0.187 (Jakarta), 0.204 (Bandung), 0.137 (Semarang), and 0.192 (Surabaya).

CONCLUSION: Smart city applications can shape public trust by increasing the application’s quality, satisfaction, reliability and community empowerment. However, it should be noted that the number of community which uses smart city application is still low. Therefore, It is necessary to encourage a culture of using those applications to help build citizens’ trust in the government and improve urban quality.

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INTRODUCTION

Urbanization is accelerating and it is putting more pressure on the environment and society. Developments that are not well planned also adds to this burden. Such Problems arise due to population growth, economic changes, pandemics, corruption, and many other factors. Ineffective and inefficient government solutions exacerbate public dissatisfaction and distrust of government. It threatens the government, obstructs government operations, and even threatens the rule of law. According to data on public trust in Indonesia, public trust in the government has declined. One of the reasons for the drop in confidence is the government's performance in dealing with the pandemic. The decline in public trust in the government during the COVID-19 pandemic is discussed by [Rachmawati et al. \(2021\)](#). Reduced trust is associated with a lack of preparedness and ineffective management, resulting in an increase of economic losses and community suffering. The corruption level, which contributes to the trust decline, is also further caused by the economic crisis ([Schumacher, 2013](#)). The erosion of trust poses a risk to government operations and even disrupts the regional economy. A lack of trust can harm the rule of law. In response to this, the government has begun to turn to technology that can solve urban problems. Nowadays, technology has become an integral part of human life that cannot be separated from it. Technology is integrated into transportation, traffic monitoring applications, education, and various other areas. Technology is constantly evolving. As society enters the fourth industrial revolution, technological advancements focus on digital technology. People are unavoidably entering an era where all activities are being conducted digitally. The Internet of Things (IoT) or artificial intelligence (AI) are some of the terms used to describe this era ([Kaginalkar et al., 2021](#); [Zhang et al., 2017](#)). Automation occurs due to digital transformation in industrial application systems or government activities. Because of this, various applications aimed to aid urban development have been launched in conjunction with smartphones. Collaborating with the community is one of strategies that can help raise participation awareness. Today, Smartphones are not considered as a luxury item. It is affordable to almost everyone, making it easier for people to adopt and use the available applications. Smartphone support makes it easier to use such

applications from the government to the community because it can reach almost everyone. Several regions have attempted the transition to a smart city, but the road to such transition is not easy. Nevertheless, the public is interested in the smart city application since it provides several benefits, including convenience and sustainability. The community is aware of the importance of participating in the upkeep of public spaces ([Jeannot, 2018](#)). Some applications provide waste sorting, public transportation complaint hub, and more. Smart cities have been widely adopted in Indonesian cities such as Jakarta, Surabaya, Bandung, Semarang, and others. In the case of Jakarta, the city have created a smart city application named *Jakarta Kini* (JAKI). Other cities such as Bandung has a smart city application named *Bandung Sadayana Smart City*, Semarang has a smart city application named *Semarang Smart Transportation City*, and Surabaya has a smart city application named *Wadah Usulan dan Keluhan* (E-Wadul). The government uses smart cities to ensure security, comfort, and public order. Many studies have been conducted on the community's adoption of smart city applications ([Bélanger and Carter, 2008](#); [Zhang et al., 2018](#)). [Sanawiri and Agusti \(2019\)](#) had tried to compare and contrast smart city applications in terms of value proposition and smart city framework. However, previous researches on smart cities to solve public trust issue shows that cyber security and data transparency have been an obstacle in increasing public trust on smart cities ([Braun et al., 2018](#); [Ma, 2021](#)). According to previous research, there are a few links between smart city applications and government trust. In addition, there are other factors outside of cyber security and data transparency issues that impact public trust on smart cities. This study attempts to fill this gap by examining the impact of smart city applications on public trust in government, which is examined by comparing several regions. However, whether smart city applications reflect a more intense correlation between government and society and whether this correlation has implications for citizens' trust in government remains to be seen. This study investigated the correlation between application quality, user satisfaction, reliability, and government trust. With the variety of smart city applications offered by local governments base on public trust and community empowerment. This study took samples in four different cities in Indonesia to compare

application usage in these cities using comparative analysis.

Smart city application adoption and social capital

A smart city is a concept that is quite popular in various parts of the world. It is common to incorporate science, technology, and the Internet of Things (Zhang *et al.*, 2017) into human activities. This platform connects online database services that can be used with available application. Technology is merely a government-provided means of interaction (Razak *et al.*, 2021). The government is the authority that regulates the governance, but community initiatives are central to the governance of a smart city (Paskaleva *et al.*, 2017). According to Jeannot (2018), e-government focuses more on administrative aspects, work services, and information on rule enforcement. A smart city, on the other hand, is primarily for administrators. One aspect of a smart city is e-government. The concept of a smart city is based on Information and Communication Technologies (ICT), which can be used to entice the public to participate in smart city services or applications. Smart city goals have shifted away from infrastructure development to service providers (Kim, 2022). Smart city applications that offer digitization services and develop applications with technology support provide opportunities for increasing the communication between the government and the community (Sanawiri and Agusti, 2019). Smart city applications offer better environmental quality to improve people's welfare sustainably (Goldfinch *et al.*, 2009). Digital platforms have facilitated transparency and community participatory mechanisms (Criado and Gil-Garcia, 2019). However, how is willing is the society in adopting the application? Application adoption is based on the level of confidence in the government (Alzahrani *et al.*, 2017). Lack of trust is a barrier to adopting smart city applications (Beldad *et al.*, 2012). Smart city applications vary widely in several regions, depending on the needs and goals of the local government. The government, in this case, cooperates with the private sector to form a platform to attract public participation. Public and private collaboration can demonstrate flexibility in responding to urban needs (Kim, 2022). Zheng and Schachter (2017) discuss the willingness of people to participate in applications. The benefits that

users' get is the most significant driving variable. The main difficulty in adopting applications is not a technical problem but rather a social one (Jeannot, 2018). The term "trust" refers to how people feel about the government's performance. Trust is the primary concern in democratic government and public administration (Tolbert and Mossberger, 2006). Technology, government agencies, citizen aspects, and risk factors impact trust (Alzahrani *et al.*, 2017). The public's perception of the government's capacity and integration in the delivery of public services shape trust. Process-based trust and institution-based trust are two types of trust. Repeated interactions between the government and the community build process-based trust (Alamsyah *et al.*, 2016). The interaction is shaped by the government's previous experience and reputation in processing program performance (Beldad *et al.*, 2012) that the community has felt. Lack of trust in government can reduce government legitimacy (Tolbert and Mossberger, 2006). The level of public trust can be seen in their willingness to participate in politics (Goldfinch *et al.*, 2009). Trust is one of the individual social capital variables that have important impact on how citizen to cooperate with government through e-participation (Choi and Song, 2020). This study on investigating public trust also have implication on social capital because Srirama *et al.* (2020) explains that on social capital there are 2 dimensions which trust is a part of, consisting of relational dimension and structural dimension. Trust is part of relational dimension on social capital theory. Socio Citizenry theory describes government-citizen interactions through social media (Aladwani and Dwivedi, 2018). There are three primary constructs in Socio Citizenry: the anticipation of quality, the configuration of trust, and agreed adaptation. Smart city applications have been shown in previous studies to increase citizen interaction and form new public perceptions or values (Lim *et al.*, 2021). The current study study aims to increase public trust in the government, resulting in better regional development. The problem of public distrust is not a minor one, and a solution must be found as soon as possible. This study was carried out in four big cities in Java Island, Jakarta, Bandung, Semarang, and Surabaya of Indonesia was conducted face-to-face with strict health protocols in 2021.

MATERIALS AND METHODS

Data, assumptions and limitations

The data used in this study were a primary data sample obtained from a google form online survey. The survey data used in this study were obtained from 4 different metropolitan cities in Java Island (Indonesia): Jakarta, Bandung, Semarang, and Surabaya. From the primary data collection, the survey gathered 816 respondents, consisting of 209 respondents from Jakarta, 210 respondents from Bandung, 198 respondents from Semarang, and 199 respondents from Surabaya. The survey itself consisted 8 sections, where each section contained up to 7 questions. The sections asked on the survey were as follows:

- Part 1: Respondents' obedience to local guidance and instructions
- Part 2: Respondents' opinions, tips, and recommendations on a local smart city application
- Part 3: Self-confidence in problem-solving ability
- Part 4: Trust aspects of local government
- Part 5: The existence of helpful neighbourhoods, friends and relatives
- Part 6: Smart city application quality of service
- Part 7: Respondents' impressions, perceptions, and engagement with local smart city application
- Part 8: Respondents' satisfaction on local smart city application.

Multiple sections, as mentioned above, were used to profile respondents' behaviour, perception, engagement, and satisfaction on the smart city application in their respective cities. In this study, the results of all questions were not included. Only relevant questions (variables) used in the regression model would be shown in summary statistics. The sampling method used in this survey was random purposive sampling. Random individuals were taken from intended cities with well-managed smart city applications that can be installed in common smartphones in most used operating systems (Android and iOS). Individuals recorded in this survey were independent of each other and came from different households. Only citizens who had smart city application installed on their smartphones were recorded in this survey. Smart city applications that the respondents had scored were different based on the city they lived in: the applications issued by the city government of Jakarta, Bandung, Semarang, and Surabaya.

Regression model

This study employed an ordinary least squares (OLS) regression model to estimate the impact of the variable of interests and control variables to score trust in local governments. The score of trust in local government was measured from respondents' answer on how well they could trust the local government in managing the city and solving citizens' daily issues, ranging from 1 to 6. Hence, citizens' trust in their respective local governments varied from 1 to 6. In this study, the factors (primarily related to smart city applications) which affected the trust score was analyzed. The variables of interest were the smart city application quality, citizens' (respondents) satisfaction on the smart city application, and the smart city application reliability score. The control variables used in this study were respondents' age, years of schooling (proxy of education level), and gender. In this study, both the dependent variable (score of trust in local government) and the variable of interests (score of smart city application quality, citizens' satisfaction on the smart city application, and the score of smart city application reliability) had the same magnitudes, where respondents rated those aspects from 1 to 6. Hence, this study focused on respondents' level of trust in their respective local governments, with their general perceptions of smart city application as the main factor affecting their trust in local government. The assumption that was used on the regression model is the linearity. The regression model is shown in Eq. 1.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon \quad (1)$$

Where;

Y = Score of trust to local government

β_0 = Intercept

β_1 to β_6 = Coefficient parameter of independent variables

X_1 = Score of smart city application quality

X_2 = Score of smart city's satisfaction from citizens

X_3 = Score of smart city application reliability

X_4 = Age (in years)

X_5 = Years of schooling (in years)

X_6 = Dummy variable of gender

ε = Error terms

This study analyzed how the variable of interest affected the dependent variable comparatively in

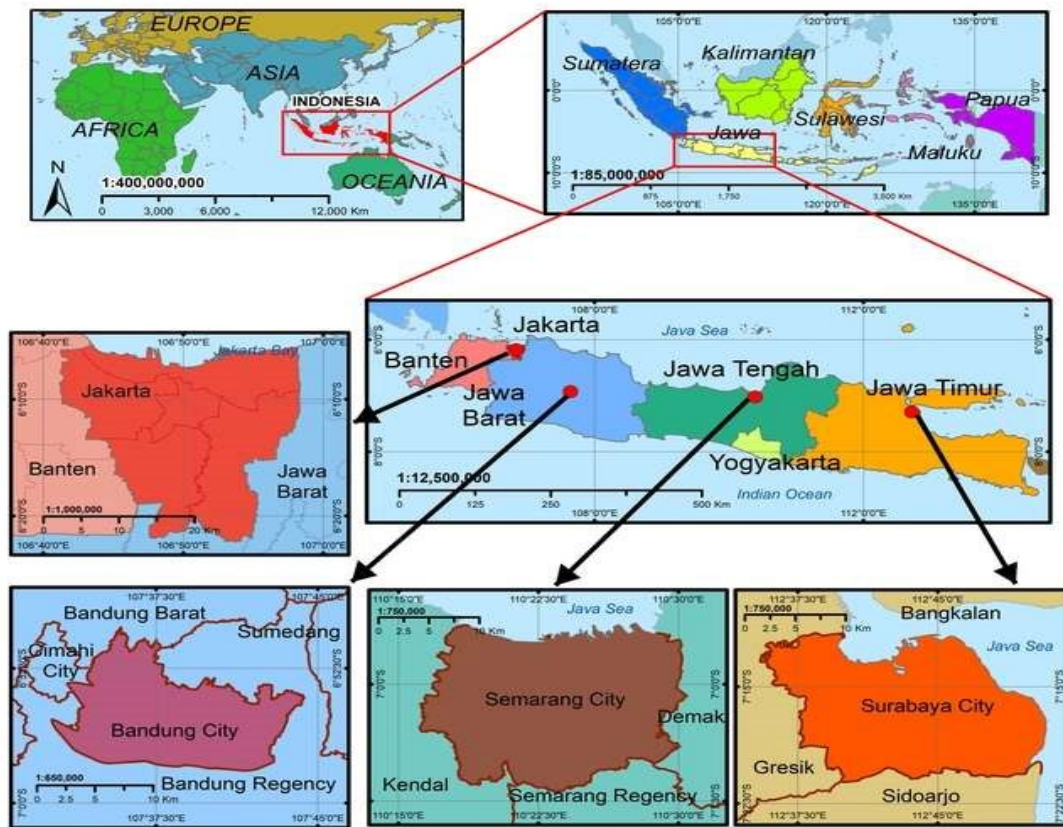


Fig 1: Geographical Location of the study area in the four different metropolitan cities in Java Island, Indonesia; 1- Jakarta, 2- Bandung, 3- Semarang, 4- Surabaya in Indonesia

each observed city. Hence, the same regression had been run separately on respondents from each city to achieve a comparative analysis. The result was grouped based on cities. In the following paragraphs and analysis, the word ‘app’ refers to a smart city application operated by the local government in observed cities. This study examined how citizens’ trust in local government was formed in the context of the smart city and digital well-being that the local government had created.

RESULTS AND DISCUSSION

Summary statistics

Before this study goes to the regression analysis, the summary statistics are presented to show the sample profile of this study. The summary statistics data is shown in Table 1.

The purpose of Table 1 as descriptive statistic is

to summarize the characteristics of data based on the variable that were used in this study. As seen in the table above, citizen samples from Semarang have the most average trust score for the local government (5) compared to other cities. This high level of trust in Semarang citizens was also followed by the smart city application quality score (4.92) and the highest application satisfaction level (4.88) compared to the others. However, those high trust and quality was not followed by the application reliability since Semarang has the lowest average score of application reliability (4.31). On the demographical factor, the average age of respondents in Jakarta is the youngest (26.09) compared to the other cities. In addition, in Jakarta, the respondents have the highest average years of schooling (13.72) compared to other cities. Overall, the number of male respondents is more than the number of female respondents, except in Surabaya city.

Table 1: Summary statistics

Variables	Jakarta	Bandung	Semarang	Surabaya	Total
The score of the local government trust					
Mean	4.95	4.89	5.00	4.97	4.95
S.D.	1.19	1.13	0.51	0.73	0.94
Frequency	209	210	198	199	816
The score of smart city application quality					
Mean	4.83	4.82	4.92	4.65	4.81
S.D.	1.15	1.17	0.59	0.81	0.97
Frequency	209	210	198	199	816
The score of smart city application satisfaction					
Mean	4.83	4.85	4.88	4.82	4.85
S.D.	1.09	1.07	0.66	0.77	0.92
Frequency	209	210	198	199	816
The score of smart city application reliability					
Mean	4.67	4.84	4.31	4.80	4.66
S.D.	1.15	1.06	0.83	0.79	0.99
Frequency	209	210	198	199	816
Age					
Mean	26.09	29.95	30.74	31.46	29.52
S.D.	6.82	10.72	9.03	8.96	9.21
Frequency	209	210	198	199	816
Years of schooling					
Mean	13.72	12.60	12.48	13.62	13.11
S.D.	2.47	2.03	2.44	2.26	2.37
Frequency	209	210	198	199	816
Sex/gender					
Female	71	83	75	103	332
Male	138	127	123	96	484
Total	209	210	198	199	816

Regression Results

In this study, the regression was run separately on respondents from 4 sampled cities (Table 2). This comparative analysis analyzed how the variable of interests and control variable affected the dependent variable in each case of the city as well as the characteristics which indicates how it might differ from each other.

According to the regression result in Table 2, it is shown that application quality has a significant impact on the score of trust in the local government. As the results showed, the coefficient parameter of the application quality is statistically significant at a 99% confidence level, with different magnitudes in each city. Table 2 is used to indicate the main findings from each variables and each cases that are statistically significant. Comparatively, Jakarta has the highest coefficient parameter, meaning that citizens in Jakarta will trust the local government more as the quality of smart city application rises. Statistically,

when the application quality score rises by 1, the score of trust in the local government will rise by 0.440 (Jakarta), 0.269 (Bandung), 0.245 (Semarang), and 0.212 (Surabaya). To deepen the understanding of how smart city application quality affects the trust score of local government, this study also conducted a graphical simulation based on the regression model above. In Fig. 2, it is shown that citizens of Jakarta and Bandung create a higher slope of the curve (steeper), meaning that an increase in application quality by one will result in a higher increase of trust compared with two other cities (Semarang and Surabaya). The slope of the curve of citizens in Semarang and Surabaya is relatively more declivous than in Jakarta and Bandung, meaning that the increase of application quality by one will result in a lower increase of trust in local government.

The quality of government social media affects public trust, which in turn will affect the level of adaptation of social media (Aladwani and Dwivedi,

Table 2: Regression results

Variables	Jakarta	Bandung	Semarang	Surabaya	Total
The score of the local government trust					
Mean	4.95	4.89	5.00	4.97	4.95
S.D.	1.19	1.13	0.51	0.73	0.94
Frequency	209	210	198	199	816
The score of smart city application quality					
Mean	4.83	4.82	4.92	4.65	4.81
S.D.	1.15	1.17	0.59	0.81	0.97
Frequency	209	210	198	199	816
The score of smart city application satisfaction					
Mean	4.83	4.85	4.88	4.82	4.85
S.D.	1.09	1.07	0.66	0.77	0.92
Frequency	209	210	198	199	816
The score of smart city application reliability					
Mean	4.67	4.84	4.31	4.80	4.66
S.D.	1.15	1.06	0.83	0.79	0.99
Frequency	209	210	198	199	816
Age					
Mean	26.09	29.95	30.74	31.46	29.52
S.D.	6.82	10.72	9.03	8.96	9.21
Frequency	209	210	198	199	816
Years of schooling					
Mean	13.72	12.60	12.48	13.62	13.11
S.D.	2.47	2.03	2.44	2.26	2.37
Frequency	209	210	198	199	816
Sex/gender					
Female	71	83	75	103	332
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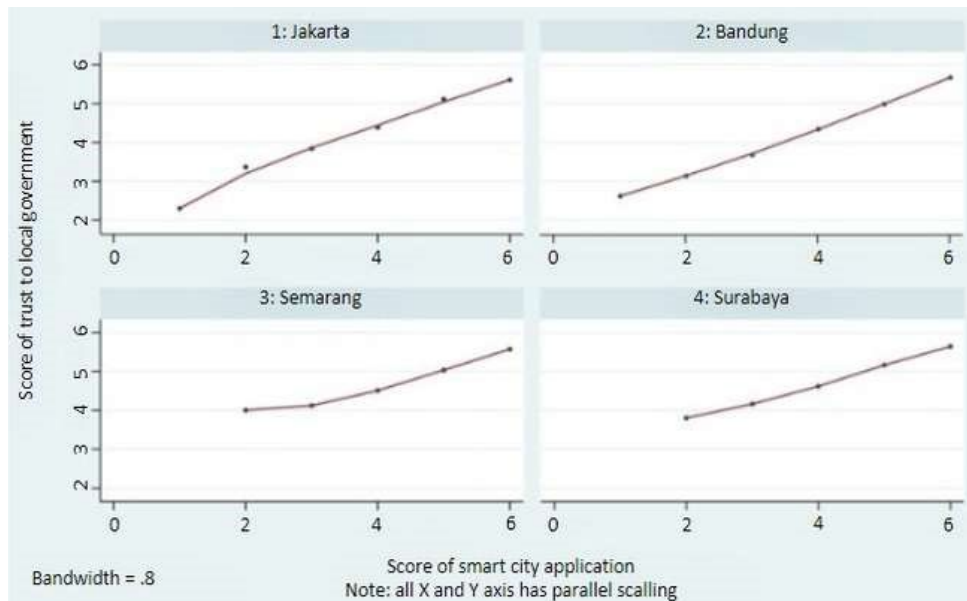


Fig. 2: Impact of application quality on citizens' trust in local government

2018). Smart management and services are linked to application quality (Razak *et al.*, 2021). Application management and solving urban problems are examples of the government's smart management. Local governments have improved service quality by providing efficiency, transparency, and excellence through smart city applications (Pimenta *et al.*, 2018). The government provides good application services to increase community participation while achieving government goals for improving urban sustainability (Allen *et al.*, 2020). Previous research on public trust also shows the result that quality is a significant factor toward public trust (Nulhusna *et al.*, 2017; Brous *et al.*, 2020). However, Nulhusna *et al.* (2017) shows the research that service quality have no significant relationship towards trust, but rather, the informational quality is have significant relationship to trust. Therefore, to improve the public trust, government should improve the information quality.

To improve people's satisfaction, the government continues to improve the applications' quality. The government has tried to improve the application's features and capabilities. Improvements to the application's quality are still being made to meet the goals that must be achieved by building application resiliency in the face of unforeseen events. Cosgrave

et al. (2014) emphasize the importance of increasing resilience for application sustainability. Growing the number of innovations available can help ensure long-term viability. The second variable of interest is application satisfaction. According to the regression result, application satisfaction plays an essential role in determining trust towards local government. However, this is not the case in every cities, but rather, only some of the cities is statistically significant. In all cities, application satisfaction positively impacts the citizens' trust, meaning that an increase in application satisfaction will also increase citizens' trust in local government. The coefficient parameter of application satisfaction in Jakarta is significant at a 95% confidence level, while in Bandung and Surabaya is significant at a 99% confidence level. Only coefficient parameters in the case of Semarang are not statistically significant. Statistically, when the application satisfaction score rises by 1, the score of trust in the local government will rise by 0.193 (Jakarta), 0.431 (Bandung), 0.07 (Semarang), and 0.186 (Surabaya). A simulation also has been conducted to see how application satisfaction affects the score of trust based on the regression model. That simulation is shown in Fig. 3. Graphically, most cities have a bending curve, meaning that trust in local government will not increase until application

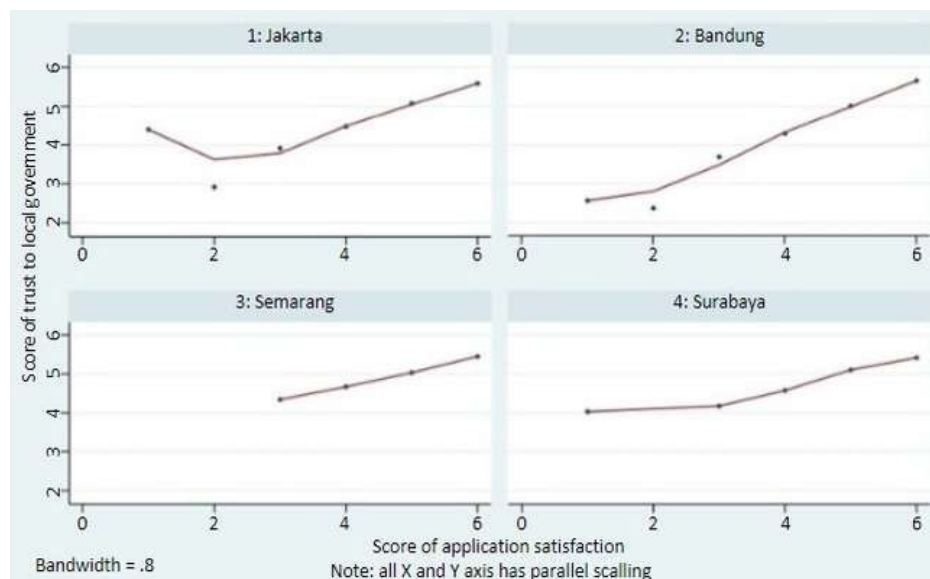


Fig. 3: Impact of application satisfaction on citizens' trust in local government

satisfaction rates reach a certain level. For example, in the case of Jakarta, the trust will rise after the satisfaction level reaches two and above, while other cities have a relatively lower threshold. In the case of Semarang, it does not have a bending curve, meaning that citizens' trust in the government will likely rise linearly as the application satisfaction increases. Satisfaction is essential in determining whether or not an application is successful. User satisfaction is a criterion for evaluating the level of service provided (Zheng and Schachter, 2017). Operational effectiveness is the most substantial variable that has a direct impact on the level of user satisfaction, according to Santa et al. (2019). Meanwhile, system and service quality perceptions have a more negligible direct impact than information quality. According to Zhu and Alamsyah (2022), community satisfaction is linked to community empowerment. The community believes that the government has increased community satisfaction by making government efforts transparent. Transparency and satisfaction on the government's performance can also help build public trust (Soonhee and Jooho, 2012). People who have used the application have a higher sense of security in Jakarta, according to Allen et al. (2020). The government will follow the reporting perception immediately to provide a

sense of safety and security. The level of community satisfaction in Jakarta has risen due to problems being solved through community reporting. Pérez-Morote et al. (2020) discuss the e-participation index (EPI), which affects the satisfaction of smart city services. The more participants use the application, the more satisfied the users are. The satisfaction felt by users can encourage others to feel the same way, and even individuals can attract non-users of the application to become application users. Nulhusna et al. (2017) stated that satisfaction can be as an intermediary between service quality and trust. However, research by Welch et al. (2005) shows the result that trust depends heavily on satisfaction because satisfaction is positively related to the trust towards the government. The next variable of interest is the application reliability. According to the regression result, application reliability has a significant and positive impact on the level of trust in the local government. Therefore, the smart city application reliability in solving citizens' daily problems plays an essential role in forming trust in the local government. The coefficient parameter of application reliability is statistically significant, wherein the case of Jakarta, it is significant at 95% confidence level, whereas in Bandung, Semarang, and Surabaya, these are significant at 99% confidence

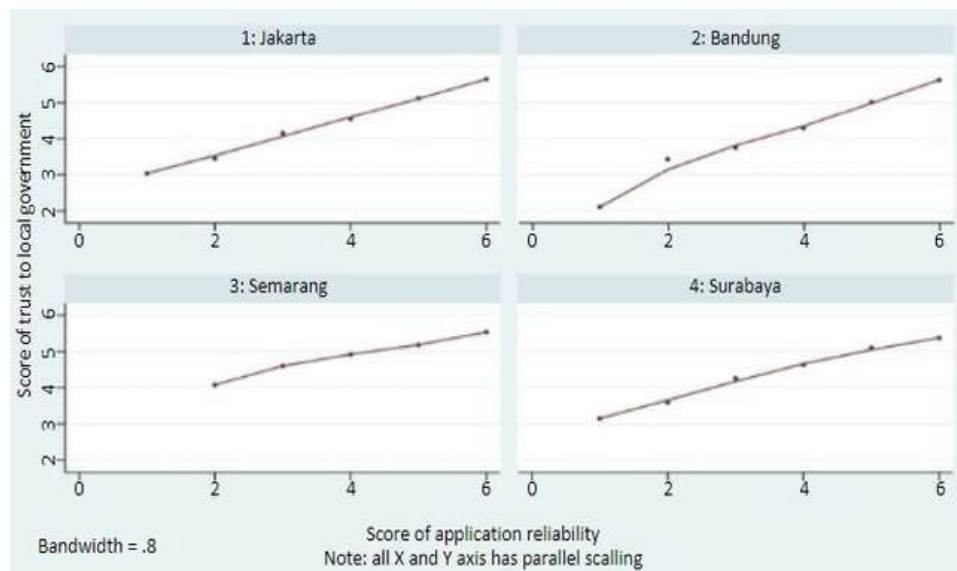


Fig. 4: Impact of application reliability on citizens' trust in local government

level. Statistically, an increase in application reliability by one will be followed by an increase in trust in local government by 0.187 (Jakarta), 0.204 (Bandung), 0.137 (Semarang), and 0.192 (Surabaya). According to the regression result, Bandung has the highest coefficient parameter of application reliability, indicating that the local government has made a notable performance and reliability on their smart city applications, when relatively compared to other observed cities. On the other hand, Semarang has the lowest coefficient parameter compared to the other cities, which indicates that the smart city application of Semarang was not as reliable in comparison to the application of other cities. To deepen the understanding of how application reliability affects the level of trust in local government, the simulation was conducted based on the regression model. In this case, the simulation result is stated on Fig. 4.

According to the result in Fig. 4, all curves form a positive correlation to the trust level, meaning that the application reliability will increase citizens' trust in the local government. In addition, the result shows convergence with the regression table, where the curve slope in the case of Bandung is slightly steeper than the other cities. The steeper curve indicates that an increase in trust level caused by the rise of application reliability in Bandung is higher than the other cities. It serves as a good evidence for the local government of Bandung in managing the smart city ecosystems. The results of this study are supported by Rachmawati et al. (2021), stating that reliability is associated with application optimization. Smart city applications are increasingly offering more exclusive features, covering sectors such as transportation and other problems. Application reliability has solved more complex problems through community participation (Allen et al., 2020). The settlement of damage to urban facilities is reported to be more than routine work such as waste management. Kim (2022) emphasizes the importance of service operation and maintenance over application development. Maintenance is an important step to ensure service continuity. Innovations are offered to the community to attract and increase the application's intensity. Innovation and application development have implications for changing people's behaviour patterns (Cosgrave et al., 2014). The integration of transportation has improved community interaction, transportation efficiency, and urban environment

quality. The application becomes a forum for the community to channel their aspirations, with the application assisting the government in achieving urban performance goals. Because of these forums, when the government takes direct action to increase trust, the effectiveness can be felt right away. Among applications, reliability has been linked through application development. The *Jakarta Kini* (JAKI) application in Jakarta caters to a wide range of requirements and includes numerous features. The application is also improving as a result of such changes. Improved features and innovations can attract more users. The data obtained are then integrated into the application. The public-facing application services have been regarded as high-quality, as evidenced by user satisfaction. The government has been successful in keeping its promises to the public. The initial promises of application adoption were participation freedom, economic benefit, system integration, and environmental benefit. Data maintenance is one factor that affects an application's reliability. The importance of data privatization has made the government secure online data for application users. Data privatization is indispensable for increasing application security (Moustaka et al., 2019). Application data processing should be used so that data is not wasted and is not scattered (Afriani et al., 2021). The application should be optimized for service with no or minimal errors due to the data privatization feature. The fear of leaking personal information in applications discourages adopters (Beldad et al., 2012). Personal data is very vulnerable to misuse. It is crucial to ensure the privacy of application users' data. Several studies discussing cyber security (Zhang et al., 2018). Cosgrave et al. (2014) revealed that the use of public data without privatization develops a sense of public distrust towards the government, thereby triggering the destruction of public and government relations in the long term. Therefore, it is essential to carry out data maintenance to increase the level of trust in the community. Reliability is obtained from the increase in application performance to see how big the system failure rate is. Mayangsari and Novani (2015) said that the application had provided environmental and social improvements, thus it must be optimized and innovated according to development needs. The more the reliability of the application increases, the more it will meet the community's expectations with the decreasing number of urban problems and

increasing public and government communication. The government has optimized public services and provided feedback on public reporting. The high level of application reliability is associated with a match between reporting/application use and government response efforts. This study on application reliability with public trust is also in line with the result by [Hu et al. \(2019\)](#), who argued that the security and reliability have a relation to public acceptance and technology which implicates that if the reliability of such platforms is high, then the public will have more trust. The government, which seems to reach out to the poor with its policies, has a higher level of trust.

The next control variable that will be analyzed is education. In this study, the impact of education level is approximated by the years of schooling. The years of schooling varies from 6 (elementary school), 9 (junior high school), 12 (senior high school), 16 (Undergraduate), and up to 20 (Postgraduates). According to the regression result, years of schooling slightly and negatively impact the level of trust in the local government. However, only the case of Bandung was statistically significant at a 99% confidence level. Statistically, an increase of years of schooling by one year will likely increase the level of trust in local government by 0.005 (Jakarta) and decrease by -0.072 (Bandung), -0.009 (Semarang), and -0.02 (Surabaya). The only statistically significant case is Bandung.

This study also conducted a simulation based on the regression model to see how years of schooling affect the trust of local government scores. The result of the simulation is shown in [Fig. 5](#). Based on the regression result, in the case of Jakarta and Semarang, years of schooling negatively impact the level of trust, meaning that more educated residents will tend to trust the local government less. Meanwhile, in Bandung, it has a slightly quadratic effect, meaning that the trust in local government will tend to be lower until a certain level of education. In the case of Surabaya, the trust score will tend to rise as the years of schooling rise. Higher levels of education provide opportunities for individuals to obtain information about government performance. News issues give interest for the public to find out what the government has been doing. Individuals with higher education tend to have higher demands on the government, such as providing a better quality governance, or being more transparent and accountable. [Grimmelikhuijsen et al. \(2013\)](#) stated that high demand for orders is related to a high level of satisfaction on government performance. The expectations of individuals with higher education are higher than those with low education. [Botero and Justice \(2013\)](#) reported that highly educated individuals were likelier to sue or frequently complain to the government. The complaint is seen as a way to improve the government's performance

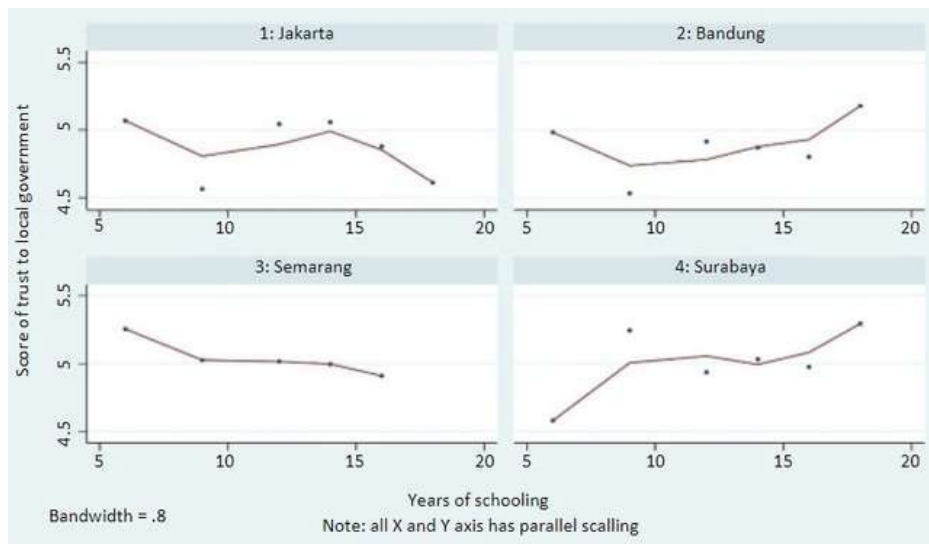


Fig. 5: Impact of years of schooling trust on local government

and encourage the government to improve better governance. The higher a person's knowledge is inversely proportional to the level of trust in the government. Areas with low institutional quality and high levels of non-transparency impact the erosion of government and community relations related to improving the education of their people (Charron and Rothstein, 2016).

The government must continue to improve its performance to reduce distrust among the academic community. A more competent the government, the more they will be more trusted, and vice versa. The government will be viewed as less trustworthy if it is less competent in following community wishes. On the other hand, trust is a strong bond between the community and the government that allows them to work together to build urban areas. The last control variable is the dummy variable of sex/gender. Based on the regression table, the dummy variable of sex (where 1 = male and 0 = female) does not significantly impact the local government's trust score. Statistically, male citizens tend to have more trust scores of -0.01 (Jakarta), 0.088 (Bandung), -0.009 (Semarang), and -0.028 (Surabaya), but the coefficient parameters are not significant. Hence, the correlation between gender and the trust score for local government is inconclusive, both on the regression level and the simulation (Fig. 6). However, previous research stated that gender have correlation to the public trust on

the government (Kim et al., 2017). The results are convergent with the simulation results that have been conducted based on the regression model. The visual result of the simulation is stated in Fig. 5. On the constant, the case of Semarang has the highest initial point of trust (2.84) compared to the other city cases, such as Jakarta (0.78), Bandung (1.48), and Surabaya (2.55). Most constants are significant at a 99% confidence level, except constant in the case of Jakarta. The regression models on each city also have various R-squares. In the case of Jakarta, the variance of the variable dependent can be explained by the variance of the independent variable of 44.6% (Jakarta), 64.9% (Bandung), and 19.9% (Semarang), and 23.1% (Surabaya). Trust and application are a reinforcing cycle (Alzahrani et al., 2017). Trust is the beginning of the willingness to adopt applications by the community, which can affect the return to the level of trust. Public trust is formed through the creation of public value. One strategy for creating public value is through smart city applications (Criado and Gil-Garcia, 2019; Savoldelli et al., 2014). In their study, Criado and Gil-Garcia (2019) explained that public value creation using smart technology. Public value creation is based on data collected by smart city application users. Public value creation has challenges in fulfilling the efficiency of accountability, equity, and response (Cosgrave et al., 2014). An increase in these variables will lead to a boost in confidence.



Fig. 6: Gender on citizens' trust in local government is inconclusive compared to the regression result

The government has successfully communicated the goals of application adoption through smart city applications, resulting in a close correlation. The government has succeeded in achieving its goal of community-based performance improvement. Given the importance of applications in fostering public trust, the previous studies stress the importance of maximizing community application use. However, the issue is that the community's technology literacy rate is still low. The frequency in which users use applications is also low (Afriani *et al.*, 2021). Therefore, it is necessary to encourage building a culture of using applications and reporting to improve urban quality. Another problem is expressed by (Allen *et al.*, 2020). Smart city applications have improved the urban environment, but the scope of improvement is primarily for middle and upper socioeconomic areas, where marginalized areas lack adequate reporting and improvement. Martinez and Masron (2020) revealed that the common use of the internet (digitation) is an obstacle to building trust, which is then associated with the use of smart city applications. There are also still some criticisms of the lack of support for community social inclusion (Paskaleva *et al.*, 2017). Development can be achieved by implementing the effectiveness of sustainable-based governance. Empowerment fosters intelligent communities that foster innovation and collaboration while fostering positive government-community relations (Appio *et al.*, 2019).

CONCLUSION

After conducting a survey in Jakarta, Bandung, Semarang, and Surabaya, as well as exploring the factors that affect the trust score towards the local government, this study concludes that smart city applications can help build the trust of the community in the government. However, several factors can affect the application's achievement in building citizens' trust, namely: the application's quality, satisfaction, and reliability. These three factors that can affect the public trust, based on the regression analysis, are the application's quality, satisfaction, and reliability, which are found to be statistically significant. The quality of the smart city application has a positive and significant impact on the local government's trust score. The coefficient parameter in each case of the cities is different, while Jakarta has the highest coefficient parameter.

It indicates that the quality of smart city application will increase citizens' trust in their local government. In addition, the smart city application satisfaction significantly and positively impacts the trust score in Jakarta, Bandung, and Surabaya. In other words, the level of user-friendly application could directly impact citizens' trust. Other than that, smart city application reliability also has a positive and significant impact on trust in all cities. This indicates that the more reliable the application, the more it will raise the citizens' trust. However, the coefficient parameter is different for each city. Therefore, one of the government's efforts which should be focused, in terms of smart city development, is to build smart city applications that provides a good quality design, having a reliable content, and gives satisfactory results to the user. This study in investigating the public trust implicates to the empowerment of community. The government can build trust and empower the community through using the result of this study. Based on this study model, the user application's age, years of schooling, and gender did not significantly impact the building process of citizens' trust. In addition, years of education also do not significantly impact the trust level, with the exception in Bandung's case. Those differences in results in Bandung still need to be analyzed further to explore what factors make school years significantly impact a smart city application to build citizens' trust. However, even though the smart city application can build citizens' trust in the government, the community that uses this application is still low. It implies even though previous study shows that the smart city applications can increase interaction, it also becomes an urgency to see other factors on community participation in smart city applications. Furthermore, the differences of coefficient parameters can be a potential future research on investigating other factors that impacted smart city implementation. Therefore, it is necessary to encourage a culture of using those applications to help build citizens' trust in the government and improve urban quality. This study suggested further research on how to increase the use of smart city applications and what aspects impact the usage. In addition, this study also suggests combining this study's results with the result from other cities to represent all types of cities. This is because this study only focuses on the big cities as a sample study.

AUTHOR CONTRIBUTIONS

H. Herdiansyah as a single author, is responsible for the field research process and writing the manuscript.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy have been completely observed by the authors.

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ABBREVIATIONS

∞	Level of significance
ϵ	Error terms
β_0	Intercept
$\beta_{-i} (1,2,3 \dots k)$	Coefficient parameter of independent variables
AI	Artificial intelligence
App.	Application
EPI	E-participation index
Eq.	Equation
Est	Estimation model
E-Wadul	<i>Wadah Usulan dan Keluhan</i> (Container for Proposals and Postponing)
Fig.	Figure
Freq.	Frequency
ICT	Information and communication technologies
iOS	iPhone Operating System
IoT	Internet of Things
JAKI	<i>Jakarta Kini</i> (Jakarta Now)
Localgovt	Local government
OLS	Ordinary least squares
R-squared	Coefficient of determination
Satisf	Satisfaction
S.D.	Standard deviation
TAM	Technology acceptance model
X_i	Explanatory variables
X_1	Score of smart city application quality
X_2	Score of smart city's satisfaction from citizens
X_3	Score of smart city application reliability
X_4	Age (in years)
X_5	Years of schooling (in years)
X_6	Dummy variable of gender
\bar{Y}	Score of trust to local government
Y_{sch}	Years of schooling

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