Gamification: Stimulating User Smart City Application

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ABSTRACT

The urban problems have led to an increase in the population in urban areas considering the needs of many government employees to provide service to all citizens. However, in actual conditions, government employees are limited, therefore, need community empowerment involved to support government management of the city. The solution for community empowerment is using communication technology as a public space for the citizens to communicate with the government. Citizen participation used smart city application ass public space to inform the sentiment public to the government. Citizens have adapted from traditional public play to public technological space. Gamification on smart city application devices motivates citizens, which has a growing influence on reporting and complaint activity. Technology set up gamification to create active citizens by reporting complaints of city infrastructure. Results identified gamification encourage a lot of citizen participation in reporting sentiment and complaint inside smart city applications.

INTRODUCTION

Gamification is defined as using game-like designs in contexts other than games (Robson, K. & Plangger, K. & Kietzman, J. H. & Mccarthy, L. & Pitt, L., 2015). However, this is a new term that denotes a social phenomenon of a generation in a digitally literate population. At the same time, digital literacy relates not only to skills in the use of information and communication technology devices but also to the process of reading, understanding, creating, and writing for new information (Hariyanti, Salim, Nabilah, 2020). *Gamification* has been defined as using game mechanics, aesthetics, and *game-based* thinking to engage people, motivate action, encourage learning, and solve problems. In the case of hiring new employees, research shows an increase in employee engagement and the learning process, which impacts high productivity (Kapp, 2013). The gamification used in smart cities adapts to citizen needs and personal experiences resulting in retention and engagement (Kazhamiakian et al., 2021).

A smart city is defined to be innovative technology and an intelligent government. Citizen empowerment is the key to success in managing the city by the government. To stimulate citizens, therefore, gamification needs to direct individual behavior. The integration of game elements is seen as one of the strategies to encourage e-participation by making platform updates that increase engagement more attractive to use and make people interested in public participation (Thiel, S-K, 2016a. Coronado, J.E. and Vasquez, A., 2014). The public who is moved to participate in an application that has game integration in it is what is called gamified participation (Thiel, S. K., 2016b).

An innovative city application, framework gamification is used to create games aimed toward services. Traditional aspects of gamification include rules, points, and competition to motivate individual behavior. (Buckley, Noonan, Geary, Mackessy, & Nagle, 2018).

Gamification is motivation messages that affect behavioral citizens in innovative city applications. Gamification is used in proses making decisions, codesign services dan new products to motivate citizens to participate actively (Opromolla et al., 2015). Gamification used in the smart city, therefore, has an interest: [1] Policy and object smart city, [2] integration in service, [3] the number of parties involved in the game, [4] a fun playing on multiple levels and specific time scale.

Gamification aims to develop services process within experience in playing games to forward citizen created value for involved in digital community empowerment. The goal of gamification is an experience using the smart application city. The story, clear goals, and progress, usually used are the point, challenge, badge, and reward.

The six design patterns in creating games (Ingrosso, 2014): [1] User act dan System recorded from a user action. All user activity is recorded automatically in data. [2]The user reported all activities. User display environment and report automatically recorded in application data. [3] The user completes the mission. The system provides a purpose that must be achieved and action that must-do for achievement. [4] The user shares content with another user. [5] Users share location information from specific places. [6] User simulation in-game gives users capabilities to increase skill in certain situations in the environment.

Citizen activity in the smart city context focuses how the extent of the behavior they want to achieve in a game. The townspeople can play four leading roles (Opromola et al., 2015): [1] Learner, citizen learning to increase the quality of life, lifestyle, and behavior. [2] Examinee, monitoring behavior according to the desired behavior. [3] Teacher, evaluation, and monitoring by citizens, [4] Sensor, citizens collecting data and information on society. Public administration has specifically been analyzed in the urban context.

Gamification effects stimulate citizen participation to develop the city. Gamification uses motivation messages to cultivate citizens' behavior that gives the experience of norm and value (Muktiyo & Razak, 2019). Citizens' concern for the city is motivated by means and virtuous behavior. Residents who manage municipal waste in cities are driven by a moral obligation to conserve the environment. The role of gamification on citizen involvement behavior is essential for behavior and attitude awareness. Gamification has a role in changing behavior by utilizing aspects of communication technology. Gamification content in intelligent city applications affects citizen participation in complaining about public service (Gonz et al., 2018). Gamification is used on the technology of application of intelligent city trigger social change. However, the determination of technology builds an ecology of networks among people on the micro-level of analysis that triggers social change (Misa, 1994). The network between actors, both citizens, and the government have engaged each other to improve the city. There are relations between citizens and government to manage the city with a smart city platform (Lin,2018). Using smart city applications, both government and citizens interact to accomplish common goals for municipal administration.

It is essential to have up-to-date and accurate information on the city's state to fulfill the shared objective of municipal management. Consequently, citizens are participating in the current flow of information transmission, observing the impact of gamification on citizens' willingness to provide complaint information to the government. It is different in other cities in Java, such as The Regional Government of Kuningan Regency, which uses radio to provide one-way communication to the public (Sari & Nugrahani, 2019). By using radio, Government has an asymmetric relationship with the public. It is in contrast with innovative city applications that have an asymmetrical relationship with the public. Publics are being agile to communicate with the government. Symmetrical communications improve ties with the public when sharing goals (Grunig & Grunig, 2008). The people must provide feedback on the message to achieve balanced communication. It was critical to receive input for the government to use big data as a decision-making resource (Puri et al., 2018).

The government obtains big data through the construction of smart city application infrastructure. Application smart city, namely Qlue, has been developed by the capital city in Indonesia. The application builds many menus to provide public space for official complaints and sentiment from the public. The government views the general people as a crucial source of information. As a result, citizen sources that actively offer information acquire the government's trust in terms of message quality. Therefore, this study examines the effect of gamification on citizen behavior by providing information about the urban problem, especially on the destruction of public facilities and the weakness of public services. The study intends to look at the number of complaints made by residents, the location of complaints, and the effectiveness of complaint resolution. Researchers compared gamification in smart city applications to encourage citizen participation under the governorships of Basuki Cahya Purnama and Anis Baswedanin the DKI Jakarta province.

METHOD

This research used the quantitative method. The type of method used in the study is data science. In using data science, it is used in the form of big data. The government gathers and collects big data to redefine a purpose (Salganik, 2018). Data science can describe human behavior in the digital world. Researchers crawl data from the Qlue smart city application data center, then classify and categorize data to present it in graph form.

A. Concept Definition

Gamification improves services by including experiences of playing games to encourage users to form a value. The decision to report complaints is the desire to report that arises because of gamification.

B. Data Analysis

This study used machine learning to analyze big data. Machine algorithms are used to analyze citizen behavior. Algorithm machine learning predicted the behavior of citizens based on recorded data in real-time. The algorithm in machine learning derives intelligence from data in real-time that assist in data-driven decisions. Algorithm machine learning deduces the omitted data, thereby reducing the overhead of long-term expert explanations, so technically a part of statistics (Cady, 2017; Madhukar & Pooja, 2019). This research analyzed two periods of leadership in Capital City Jakarta, namely Basuki Cahya Purnama (Ahok) and Anies Baswedan (Anies). Data from the Qlue smart city application is crawled. The data was displayed using tableau as part of the research methods.

RESULTS AND DISCUSSION

Jakarta, being Indonesia's capital, has a diverse population, which catalyzes dynamic social interaction. The citizen is a social change agent whose efforts are aided by the environment. The technology environment influences behavior change. On a smart city application, citizens as members of communities that exchange complaints about public facilities. A citizen is a social actor who provides information to the government in the form of public opinion. In the digital public arena, actors and technology influence public behavior.

Gamification is employed in the technological system to motivate actors who use technology. Citizens' conduct is proposed by a system structure composed of ecological digital society, adaptive structuration. It is in line with the duality of design, which argues that the characteristics of social systems, social practices, and social system reproduction are all connected to structure, system, and structuration (Giddens, 1988). The digital public space is organized to facilitate the behavior of the agent and power. They were using internal actors to become harmonious partners with external partners that give incentives, according to the rural evaluation in China on rural development (Wang et al., 2017).

The findings of this study indicate that there is a difference in the number of citizen complaints reports between the two leadership periods in the capital city Jakarta, namely Basuki Cahya Purnama (Ahok) and Anies Baswedan (Anies).

Perbandingan Jumlah Keluhan Masyarakat

AHOK
501.234
(19 November 2014 – Mei 2017)

ANIES
331.681
(Oktober 2017 – Maret 2019)

*data dihimpun dari aplikasi Qlue

Image 1. Comparison of the Number of Public Complaints Collected from the Qlue Application

Gamification stimulates citizens of Jakarta in five cities and one regency to communicate with the government to information needs and complaints about urban and district environmental management. In the Ahok era, west Jakarta had the highest complaint about city problems. Meanwhile, during Anies's period, South Jakarta received the most increased reports of issues. Five cities in Jakarta, various city problems occurred due to reports of the problem.
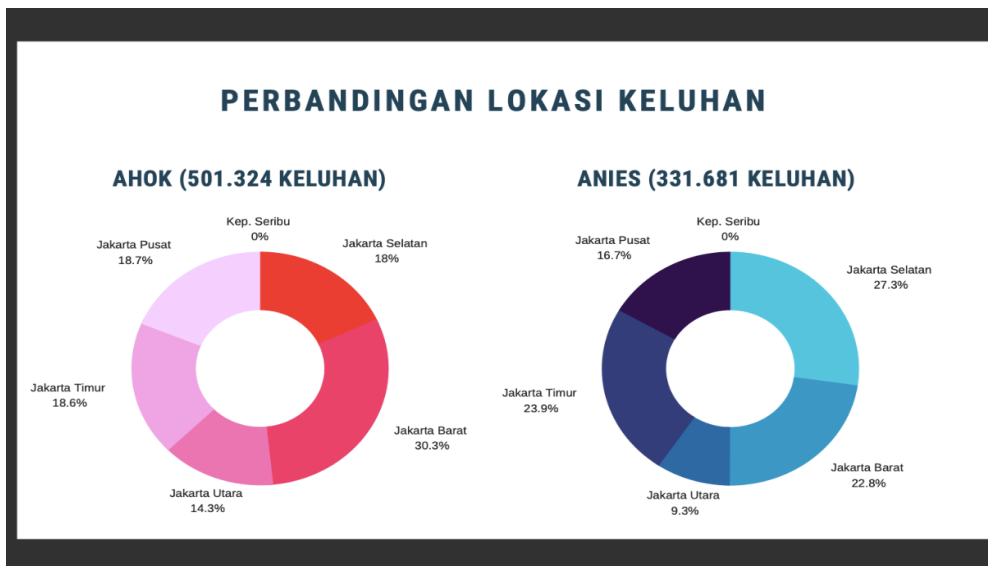
Image 2. Comparison of Community Complaint Locations Compiled from the Qlue Application

When residents express their dissatisfaction with public services and infrastructure, their tones are heard by the authorities. Citizens are the actors who engage in providing real-time information to town hall authorities. The actor's tone is recorded and displayed in the authority office at big data smart city applications. The visualized of big data in smart city applications determines the authorities' attitudes and policies in Central Province DKI Jakarta. The interaction between citizen and the government are facilitated by things, namely digital ecology and social agencies. The attitudes and the behavior of the government are recorded in big data then visualized in the dashboard of the governor and government service center. The recorded data is the basis for evaluating government performance. Government work performance is the behavior of resolving complaints from citizens. As shown in the excellence theory, citizens use symmetrical communication to interact with the government to accomplish common goals (Grunig & Grunig, 2008).
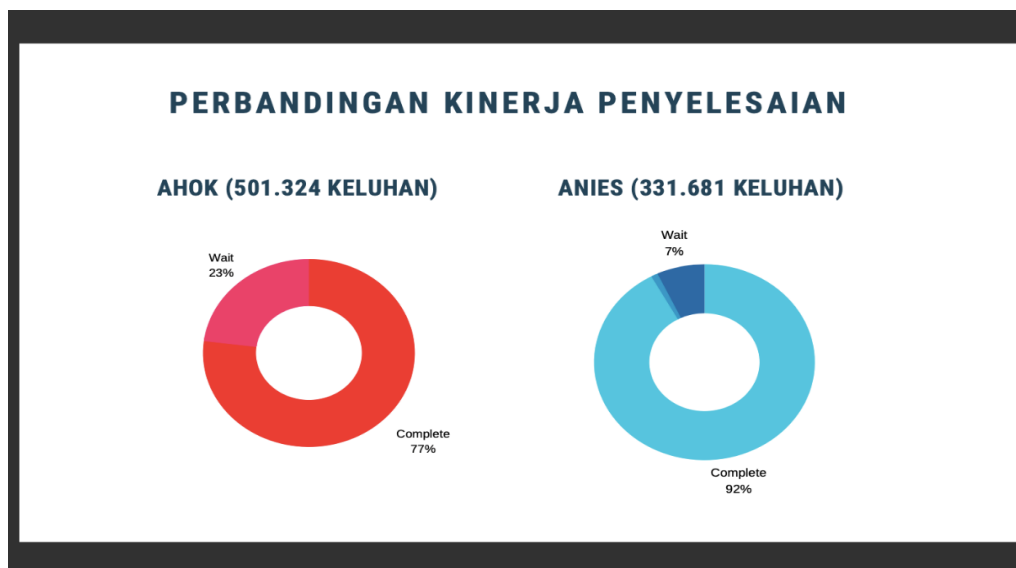
Image 3. Comparison of Community Complaint Resolution Performance Compiled from the Qlue Application

There are differences between Ahok and Anies in smart city management. It is recorded in big data that in the Ahok era, 77% of the problems were resolved in the Anies era, 92% of residents' complaints were resolved. In the Ahok, 23% of residents reported were still waiting, while in the Anies era, 7% of residents' complaints were still waiting to be resolved. Digital behavior recorded in big data shows that citizens are agencies that actively report during the Ahok and Anies era. However, in the Ahok era, gamification led to an increase in the number of reports. In the Ahok era, 77% of the problems were resolved. In contrast to the Anies era where 92% of residents' complaints were resolved. In the Ahok era, 23% of residents' reports were still waiting, while in the Anies era, 7 % of resident complaints were still waiting to be resolved.

Based on big data analysis, the recorded behavior of citizens as an agency consistently reported actively both in the Ahok and Anies eras. However, researchers can see that during the Ahok era, gamification impacted increasing the number of reports. In contrast, in the Anies era, gamification led to a decline in reporting. Nevertheless, it is unique in the agency of the government, wherein in the Ahok era, there were 23% reporting waiting to be completed. In the Anies era, there were 7% remaining to be completed.

There were 386,019 completed reports in the Ahok era, whereas the reports were 305,146 completed during the Anis era. In the same period, in the Ahok era, reports were higher regarding the number of settlements compared to the Anies era. Ahok's period was 1.26 times higher in completing reports than Anis's era. Gamification provides reward badges to citizens agencies and government officials. The badge is given in the of a superuser predicate which is trusted in providing reports. If there is a superuser report, it will be prioritized considering the reputation of previous reports was very credible. Residents who frequently report will get a unique avatar account. In the Ahok era, the participation of residents was 1.5 times higher than in the period of Anis.

The gamification used by the government has an impact on increasing citizen action to report to the government. There are several reports on Ahok's leadership. Residents report very intensively, but many complaints reports are still on the waiting list for work to be resolved. The agencies from the government apparatus have not maximized their behavior to be active in resolving complaints in line with Opomolla et al. (2015), which states that gamification can motivate citizens to participate in smart city applications.

It means that the role of communication technology has provided a communication channel. The communication channel accommodates a network of social actors that merge into an agency—argued that the citizen is part of networks such as actors, machines, institutions, and social relations (Misa, 1994). Networks are provided channels that consider people to send a message. Communication channels in which there is a context of communication between citizen agencies and government agencies achieve different effects in two different periods of leadership. It appears that there are factors needed to be analyzed, namely factors of leadership style and organizational culture. There are gaps in the use of communication technology in communication practices between government and citizens. The findings of this study are in line with the study of smart cities in china which emphasizes smart management and service (Lin, 2018). In contrast to implementing smart cities, the City of New York in the United States of America supports citizen opinion about the source of government policy in certain areas (Puri et al., 2018).

In the Anies era, there was a lethargy for citizens agencies to communicate intensely with government agencies. It seems that there are other factors causing lethargy. It is necessary to explore the communication style of leaders and organizational culture. However, there are indications of a very high increase in report completion with a shallow waiting list for reports. There is stimulation for government agencies to resolve complaints. The author is not too sure about the cause of technological determinism, but there are other factors. According to the authors, two aspects need to be followed up: leadership style, communication style, and organizational culture.

CONCLUSION

Problem-solving is the indicator of performance. The higher the level of problem-solving, the higher the government's work performance. Government as agencies that are active and support performance indicators. The performance indicator is the number of complaints that have been completed. If any complaints have been solved, that effect waiting list complains it is getting lower. Government employees in the Ahok era had interactive involvement. On the other hand, in the Anies era, government employees had high involvement behavior. Based on the analysis of the behavior of government employees, there are other factors besides communication technology that cause active involvement in responding to citizen complaints.

The author found gamification in the Ahok era was higher than in the Anies era. Gamification does have a role in stimulating smart city users, but it is not the only factor. It concludes after the existence of comparative studies in two different periods of leadership. The ecology of technology and gamification are alike determining social change. However, other communication practices with technology and gamification resulted in other stimuli between citizens and government agencies.

Further research is needed to examine aspects of leadership culture and government organizational culture in communicating with citizens. However, communication technology is a determinant of social change in communication but not the primary factor. It is necessary to pay attention to other factors. It is better if implementing policies and decision-making considers cultural aspects.

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