JakLingko: The Implementation of Integrated Transportation Approach in Jakarta Smart City

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Abstract. Jakarta is one of the big cities which has already implemented the concept of a smart city. To be a smart city, Jakarta has to improve its efficiency, maintain its progressive in technology, and deliver environmentally friendly service, without compromising the social aspects. Transportation has become the major problem to solve especially due to high traffic congestion in Jakarta which hinder Jakarta's purpose to create a smart city while delivering sustainable development for smart mobility for the city. The purpose of this paper is to review the implementation of technology platforms to address the transportation problems in Jakarta and to provide reference and recommendation to improve service delivery. The findings show that the three indicators of improving the quality of public transportation in Jakarta, including integration, reach, and the number of users of public transportation still need improvements to make the JakLingko app user friendly, and trusted by the people to be used. Recommendations are given to provide more promotion to the online application and to improve the smoothness operation of the application platform.

Keywords: JakLingko · Smart city · Smart mobility · Technology platform

1 Introduction

Jakarta, as one of the world's most populated cities and the city with the greatest per capita GDP per 2021 in Indonesia which reached Rp274, 7 million stated by Central Agency of Statistics Indonesia, has several issues and is in the process of establishing a smart city. Jakarta, which was pushed to become a metropolis, was in urgent need of an efficient and appropriate solution for welfare. Especially since the city is also supported by hinterlands, making it busier. Rapid urbanization expands a more dynamic or rapidly changing urban structure, resulting in a variety of challenges such as economic collapse, social concerns, and the climatic catastrophe. From the initial beginning to the present day, urban areas have grown and expanded because of a variety of internal and external variables, one of which is transportation modes. To be a smart city, Jakarta must be efficient, progressive in technology, environmentally friendly, and inclusive in social aspects. Smart city applications aim at developing answers to ecological, social, economic, and managerial concerns [1].

Al Although certain issues have been fixed and current obstacles have been addressed, Jakarta still needs improvement and there is always a potential for additional growth. Jakarta and traffic have been a continuing issue owing to the city's high mobilization and active operations as the center of government and trade. Central Agency of Statistics Indonesia reveals Jakarta alone has a total of 10,61 million population per 2021. The number of vehicles owned reaches 21 million with 20% made up of cars and 79% of motorcycles. In 2017, the congestion rate was 61% which leads Jakarta to be the 4th most congested city in the world based on the TomTom Traffic Index. An improvement occurred in 2020, where the percentage of Jakarta's congestion dropped to the level of 36%. Then in 2021 the percentage decreased to 34%. It didn't get any better looking at how IQAir declared Jakarta has officially become the city with the worst air quality and urban pollution in the world and the air pollution index is at number 163 as it is in the unhealthy category.

The reduction in congestion coincides with the introduction of MRT Jakarta in 2019 and the ban on Covid-19 mobilization. PT Mass Rapid Transport Jakarta states that MRT Jakarta's major objective is to promote economic growth by increasing mobility, reducing congestion, and developing urban transit networks. For the first phase, 13 stations were linked throughout Jakarta along a 16-kilometer stretch from Lebak Bulus to Bundaran HI. According to PT MRT Jakarta, the average daily MRT passenger in 2021 reached 19,200 passengers. Another supporting public transportation, Transjakarta recorded a total of 505,434 customers per day as of December 1, 2021. Transjakarta is Jakarta's first Bus Rapid Transit (BRT) transit system, which has been in operation since 2004. However, once the Covid-19 limitation is eased in the Jakarta region and mobilization returns to normal, the possibility of increased traffic congestion exists.

Transport activities support the increasing demands for mobility for passengers and goods, especially in urban areas. But transport activities have resulted in the rate of motorization and congestion growing. As a result, the transportation sector is becoming increasingly linked to environmental issues. The most important impacts of transport on the environment relate to climate change, air quality, noise, water quality, soil quality, biodiversity and land grabbing. Smart city is an idea promoting a multidisciplinary approach by taking into account ICT and sustainability in cities which provide innovative goods and services. The primary purpose of a smart city is to supply the city with advanced technology and intelligence to achieve more efficient infrastructure and services. A responsible and global society in which technology and innovation enhance people's daily lives is the result of a sustainable city [2]. In an effort to maximize smart city service, The Jakarta Government is establishing Jak Lingko, an integrated system of all modes of public transportation in Jakarta, to support accessible and sustainable public transportation including the payment system through integrated technological advancements in 2022. Public transportation systems range from Transjakarta, MiniTrans, MikroTrans, MRT, LRT, KRL, MRT KAI Bandara to highways.

1.1 Smart City

Smart City is the concepts adopted by big cities in the purpose to improve the quality of life for societies living in urban areas while creating sustainable development by utilizing the aspects of human and social capital and information and communication technology

(ICT) in the city service delivery [3]. The Organization for Economic Co-operation and Development/OECD defines smart cities as the initiatives to maximize the application of digital technology in improving the welfare of the society while creating sustainable, environmentally friendly, and inclusive city services by encouraging collaboration and cooperation among stakeholders [4]. Smart city is also aligned with the concept of smart mobility which relates to the 17 sustainable development goals set by the United Nations. Smart mobility is related to the mobility climate in the city and applied in the city planning for goods and people transportation which will experience a drastic change in the future [5]. Smart mobility was also defined as a modern transportation model that utilizes the implementation of ICT in the application to reduce the traffic congestion in urban cities [6]. One of the most difficult aspects to address is the transportation arrangement especially in big cities where traffic congestion happens in the daily life of the city and involves complex problems such as economy, environmental aspect, ICT, and human capital [7].

In planning a smart city, the condition of its infrastructure also needs to be considered before continuing to progress. The infrastructure condition may cause problems that hinder the city to be smart and become the prioritization to be addressed which could consume the city current resources. The planning of a smart city must be well conducted since there are many problems to be solved and it is impossible to reach all of the aspects of a smart city in one step [8].

1.2 Integrated Transportation Platform

In order to be established as a smart city, there are certain prerequisite conditions available before the process can be continued which are physical and network infrastructure. The infrastructure is needed to support the improvement of performance within and between the sectors in the city. The availability of modern and digital technology has functioned as the media to connect the public and government, especially the wide use of smartphones, the increasing development of digital application and internet of things (IoT) created the supportive climate to the smart city progress [9]. Various platforms such as social media, portal and website and Smartphone applications such as mobile apps are examples of digital technology that can be utilized to solve the city problem [10].

The development of applications or the use of AI that has been applied to the Jakarta transportation sector is currently still limited to schedule information, passenger density and electronic payments. So there are still opportunities for further development in the application of AI in the form of data integration and customer information as well as feature development in applications. In terms of data integration, government policies are needed to expedite the integration process of each related party. Therefore, the application of AI is expected to help overcome the problems of traffic management, public transportation and the movement of people in cities. Things that must be considered in the application of AI are about the integration of all modes of transportation and the convenience for application users in obtaining public transportation information through one door [11]. With the help of ICT information technology in the transportation sector, transportation users can obtain the necessary information about the condition of road density and the location to be addressed using public transportation that suits the needs of its users [12].

Syalianda and Kusumawati argue that the implementation of digital application and platforms in the transportation sector must consider the maximum utilization of the technology, regular socialization and monitoring to the growth of application users, and to maintain the transparent, accountable and responsive service delivery from the government in order to get maximum support from the community [13]. The phenomena of Mobility as a service (MaaS) has become the paradigm in the smart city to solve transportation problems. These concepts have already been adopted by many smart cities such as Vienna (Austria), Hannover (Germany), Gothenburg (Sweden), Helsinki (Finland), Turku (Finland), and Montpeller (France) [14]. The purpose of MaaS is to reduce the number of private cars in the street while improving the attractiveness of using public Transport, to integrate public transport platforms, routes, parking and payment systems across all transport modes and to overcome the traffic congestion problems [15]. However, there are some challenges in MaaS implementation which derive from Data and information sharing, legal, adoption challenges, scalability and trust [5]. Previous researchers usually focus on the use of technology to solve the transportation problem and to create an application which integrates transportation mode, however the review about application platforms in Jakarta such as JakLingko is still limited. Therefore this paper objective is to provide literature and reference for the application of JakLingko in Jakarta smart city transportation system.

2 Materials and Method

This study uses a qualitative descriptive study method derived from secondary data sources such as sixteen previous literature and official documents related to the implementation of a smart city policy application in Jakarta called JakLingko on its official platform on the internet. All references relevant to the topic were collected from various sources such as mass media, official documents, news, previous research, and journals. Data is collected, classified, and analyzed to get an idea of how the JakLingko Application works as a smart technology effort in Jakarta Smart City.

3 Results and Discussion

3.1 Jaklingko's Program

JakLingko is a new payment integration company set up by all Public Transport Operators to design, coordinate and implement the Ticketing and Fare Integration including the study on the new fare policy. Currently, transportation integration includes Transjakarta, MRT, LRT, and KAI Commuter. JakLingko's ownership structure is divided into four companies, namely, PT Transjakarta at 20%, PT Jakarta Propertindo at 20%, PT MRT Jakarta at 20%, and PT Moda Integrasi Transportasi Jabodetabek at 40% [16].

Phase 1 (Central Clearing House System and Mobile App)
This phase begins in August 2021. Jaklingko is launching a card and an application for limited trials to the public. Each transportation operator is connected in one unified ticket payment management platform. Mobile App to plan, book and pay for public transport services [16].

Phase 2 (Mobility as a Service)

This phase begins in March 2022. Mobility as a service is a type of service through a shared digital channel that allows users to plan, order and pay for various types of mobility services in a comprehensive manner. The services available are BPJS health payments, electricity, credit, Pgn Gas, internet, multi payments, PDAM, game vouchers, and access to the Grand Launching Jakarta International Stadium [16].

Account Based Ticketing

This phase begins in September 2022. Account Based Ticketing (ABT) allows the implementation of flexible fare models (daily, weekly, and monthly) and variations of special ticket products according to user profiles (students, aged, to disabilities) [16].

3.2 Jaklingko Transportationand Payment Integration

In an effort to realize strategically integrated transportation services, PT JakLingko Indonesia cooperates with PT Jatelindo Perkasa Abadi, PT Aino Indonesia, Thales, and Lyko [8]. JakLingko has integrated several public transportations in Jakarta such as Transjakarta, MRT, LRT, and KAI Commuter. Meanwhile, Mikrotrans and Raillink are currently in the development stage. In the first phase, JakLingko is also connected with the first mile and last mile transportation partners for online motorcycle taxis Grab (bike and car). JakLingko presents an integrated payment card and application. In one transaction, it can be used to pay for the entire trip. Currently, Jaklingko's payment options can use QRIS and Fello. Meanwhile, other e-wallets are still in the process of discussing cooperation. The government created a program for updating micro public transportation services by entering it into the JakLingko system. The Jakarta government buys the services of micro transportation providers such as angkot. In this way, the number of public transport passengers in Jakarta increased dramatically to one million per day.

3.3 Journey Planning

Journey Planning is a system presented by JakLingko to facilitate users in terms of time efficiency and travel effectiveness. Journey Planning recommends several modes of transportation from the starting point of departure to the final destination. When viewed in more detail, this feature shows the price until the estimate reaches the destination. By joining Grab as a partner in JakLingko, the range of the Journey Planning system will be more detailed from the user's initial position to the final destination.

4 Conclusion and Recommendation

This paper aims to identify the use of a smart city-based transportation application in Jakarta called JakLingko. The Jakarta government claims that public transportation in Jakarta has experienced a significant improvement. There are three indicators of improving the quality of public transportation in Jakarta, including integration, reach, and the number of users of public transportation. The number of downloads of the JakLingko application on the play store is still around one hundred thousand. This

number is very far from the number of people in DKI Jakarta. The Central Agency of Statistics Indonesia reports that Jakarta's population is 10.61 million in 2021. It can be seen that the JakLingko program in the form of an application has not been able to reach more targets. Therefore, the government should further promote this system to the public in order to reach more targets. When viewed from the rating on the play store, JakLingko is classified as an application with a very low rating of 2.0. Many users commented on network problems that often-had errors, misleading routes, and the existing system was not maximized. Therefore, basic problems such as an error in the network system must immediately become an evaluation for the government. Users hope that this application program can help them when traveling using public transportation and provide an easy way to operate it.

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