Can the Implementation of Smart City Promote Inclusive Development of a Local Economy?

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ABSTRACT
Smart city initiatives which have been implemented worldwide are seen as an excellent revolution within sustainable development in urban areas. The smart city concept offers governance framework aiming to efficiently manage the resources by considering environmentally friendly approaches and humanist principles. The ultimate goal of this study is to investigate the implementation of a smart city on inclusive development in Malang City, East Java, Indonesia. By employing a qualitative methodology, specifically using case study approach, this research examined if smart city concept is successfully implemented in Malang City according to six different aspects; smart government, smart environment, smart living, smart economy, smart mobility, and smart people. Results showed that Malang City has started to become a smart city by acquiring four out of six aspects mentioned above: smart government, smart economy, smart environment and smart living. This transformation indicates that smart city employment can increase inclusive development in Malang, although other evaluation parameters, namely smart people and smart mobility, require an improvement. Therefore, a synergy between stakeholders in a policy formulation and a program implementation is required; thus, the implementation of a smart city can benefit the public as a whole and drive active community participation on local, sustainable development.

Keywords: Smart City, Inclusive Development, Local Economy, Malang City.

1. INTRODUCTION

Rapid population growth and technological advances have led to various constraints in economic, social and cultural life. Technological improvements followed by ICT developments have prompted the public to efficiently carry out various activities. Population mobility in the global era is multilateral with various cultures and civilizations it produces. Advances in information technology have also massively promoted democratization in government practices and public decision making. The urbanization patterns emerging worldwide pointed out different scenarios on different continents, requiring different approaches, policies and strategies [1]. Currently, the ICT democratization process taking place around the world leads to discussions on sustainability, resource conservation, resilient smart

cities, and smart economics development suitable for different cities, countries, and continents.

The process of digitalization thrives in various activities within sustainable development. This process is also supported by the existence of a policy roadmap formulated by each country to improve society's welfare. This policy implementation exists as budget allocations, physical infrastructures, human resources readiness, and strong institutional capacities. Besides, local wisdom is also strengthened so that there is harmony in social life and the use of IT in meeting the community's needs.

It is expected that the dynamics occurring in local development can promote more inclusive development. Inclusive development has three dimensions of development, namely: social, ecological and political [2]. Such three dimensions of

inclusive development are implemented in the sustainable development goals (there are 17 targets in the SDGs). Therefore, these three dimensions are closely related to ongoing development processes around the world. Meanwhile, in its report, the National Development Planning Agency (Bappenas) of the Republic of Indonesia in 2019 mentioned three pillars of inclusive economic development, namely: economic growth and development, income distribution and poverty reduction, and expansion of access and opportunities[1]. Through more inclusive local development, it is easier to achieve social cohesion in human interaction between nations. In this situation, development can be expected to achieve social welfare prosperity for the entire community.

Malang is one of the cities in East Java, Indonesia. In 2020, the city population has reached 874,890 people, while the density level hit 7,949 and the growth rate topped to 0.48. Malang is also known as the city of education. The distance between Malang and Surabaya, a capital city of East Java, is about 90 km or approximately an hour via road transports. Malang City is also close to Batu City and Malang Regency that are famous for their tourism destinations. The sizeable economic potential in Malang City leads to its economic growth (Gross Regional Domestic Product) by an average of 5.73 per cent in 2019.

To embrace the development of global economy and IT advancement, Malang has initiated its Smart City system. This initiation is supported by the fact that this city has several supporting factors: its population, education center, higher local revenue, and economic development. Among Malang's initiatives on the smart city development is the policy on Regional Spatial Planning (RTRW) year 2010-2030 regarding the vision and mission of Malang City, the Long-Term Development Plan (2005-2020), as well as the Roadmap for Malang as Smart City[2]. Based on the description above, this study investigates the implementation of the smart city in Malang and its impact on inclusive development for the local economy in the region.

2. THEORETICAL FRAMEWORK

According to the Organization of Economic Co-operation and Development (OECD), Smart City's concept originally came from an initiative to use digital and ICT-based innovations to increase the service efficiency and generate new economic opportunities in urban areas[3]. In this case, the concept remains elusive and is still a matter of debate. Furthermore, a smart city's definition varies with countries and OECD institutions and depends on the geopolitical context and the specific problems the concept faces. However, in most cases, the concept of a smart city is inseparable from initiatives employing digital innovation to make urban service provision more efficient, thereby increasing society's competitiveness as a whole. Meanwhile, Winkowska et al. [3] stated that a smart city is a new concept. The dynamics of technological innovation development provide a room and opportunity to build a smart city in a particular region. However, in various existing literature, studies solely focus on the technical aspects leading to various problems and limitations in implementing a smart city concept.

Zanella et al. [4] suggested that although there is no formal and widely accepted definition for the smart city concept, the idea is to better use of public resources while at the same time reducing operational costs of public administration. Smart City paradigm focuses on the three pillars of metabolism, culture and governance, and offers ICT utilization as an answer to existing problems rather than causing additional challenges [5]. Meanwhile, according to Guo et al. [6], a smart city is urban development based on integrating various information and ICT solutions to manage city resources. This definition emphasizes the role of technology. Conceptually, there are six elements in the concept of smart city, namely: smart living, smart government, smart people, smart environment, smart economy, and smart mobility [4],[7].

Inclusive development remains a challenge for many developing countries in the 21st century. Todaro mentioned several characteristics of countries with lower inclusivity, including low income, low human capital, and high economic vulnerability [8]. The concept of a smart city might support inclusive development within a country. Among the goals of a smart city, namely improving the quality of life, promoting economic growth, and increasing resource management through government participation in infrastructure development and human and social capital investments [9]. The outline description of the smart city system is shown in Figure 1 below.

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Supporting factors consisting of smart infrastructure, human resources, and social capital are interrelated [10]. Several researchers emphasized the importance of technology in a smart infrastructure implementation [11],[12]. However, technology cannot function without human involvement [13]. Therefore, the return rate on investment in technology and infrastructure will depend on human and social capital [14]. Endogenous personal investments will boost a person's capacity to learn and innovate. Meanwhile, social capital acts as bonding, bridging, and linking within stimuli leading to the successful policy implementation [15]. Humans and social capital have been identified as key elements of a smart city as the implementation of such concept starts with human resources and requires sustainable collective participation from citizens, communities, universities, industry, and government [16-18]. Therefore, from the explanation above, it can be concluded that the application of smart city involves several factors namely education, learning, knowledge, and innovation.
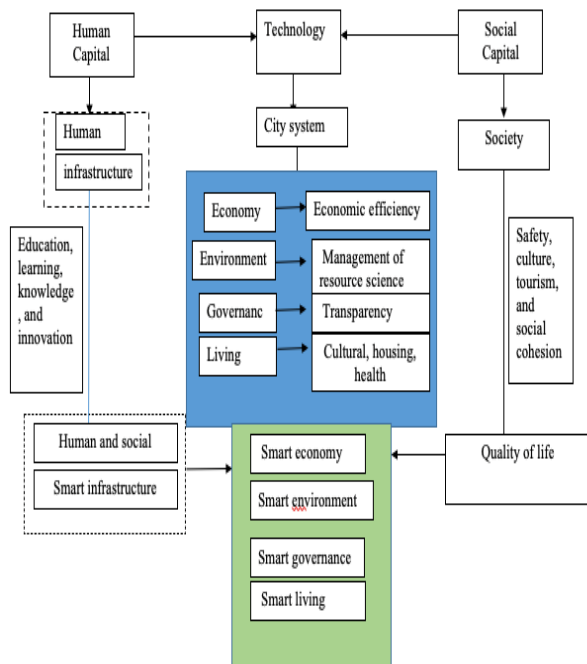

Figure 1 Theoretical framework of a smart city system

Source: Author modification from Yao et al., 2020 [19]

In figure 1, the blue block relates to economy, environment, governance and livelihoods. The application of technology in various domains can improve urban development, including economic, environmental, and government issues via data collection, transfer and analysis [20],[21]. There are four indicators described as follows; the improvement of economic development through productivity and efficiency, the environmental quality enhancement through natural resource management, the quality improvement of governance via transparency, and the quality improvement of life through culture, housing and tourism [22],[23].

The blue block in figure 1 refers to a green block (below it) consisting of several aspects: smart economy, smart environment, smart governance, and smart living. The ultimate goal of smart city implementation is to improve citizens' quality of life through increased system efficiency in urban areas [24],[25]. Moreover, smart cities might drive towards a more open society and improve public security, culture, housing, tourism and social cohesion [26].

3. RESEARCH METHOD

This qualitative research used a case study approach. Creswell stated that this approach explored issues through one or more cases in a limited system (i.e., background, context) [27]. Meanwhile, Stake defined a case study approach as a choice regarding what is being studied, instead of a methodology [28]. The data collection was done through document analysis, observation and in-depth interviews [27]. The research was carried out in Malang city, particularly via the government of Malang City. Furthermore, the research participants comprised of traders, government staffs, and the user of smart city facilities. Data analysis was performed using descriptive methods. Moreover, we used a triangulation technique to make the data and information obtained valid and reliable.

4. RESULT AND DISCUSSION

The employment of smart city concept in Malang has been by far targeting four aspects. The first aspect is the smart government focusing on digitizing government processes through e-government approach. The second aspect refers to the smart economy. In this case, Malang City utilizes telecommunication information technology (ICT) to promote regional economic growth. The third aspect is the smart environment. This aspect aims at improving environmental quality. The fourth aspect is the smart living which promotes a sustainable and friendly living ecosystem.

4.1. The implementation of Smart Government

Several smart city programs in Malang were done in collaboration with Bappeda, Kominfo and BPS. For instance, Malang City's government, via the Communication and Informatics Office inaugurated the Ngalam Command Center (NCC). NCC is an information centre aimed to monitor Regional Apparatus Organizations (OPD) activities in Malang City. Furthermore, the government also created an integrated website for all service departments to facilitate information exchange. In the NCC, information related to public services such as ambulance, traffic activities and others can be monitored from a control room. Besides, CCTV's presence in several areas of the city (which is also connected to NCC) might increase public security. In total, there are around 140 CCTVs installed in the area. Among such CCTV's main functions are to monitor traffic jam and the congestion in public spaces such as tourist areas or parks. The existence of NCC indeed supports Malang as a smart city. In this case, the NCC is a home for data, information and applications updated regularly by the government official. The NCC might also help people who increasingly demand immediate services from the government. In the end, NCC helps the government receive complaints from the citizens and can provide faster solutions to various problems faced by the community.

Table 1. The implementation of E-government towards Malang Smart City

No	Agency	E-government
1	Department of population and civil registration	JITSI teleconference application, PaHe (Paket Hemat), Only Office, WhatsAct, Dear Diary
2	Department of revenue	SIMPATDA (Sistem informasi pendapatan Daerah), on line tax payment via ATM
3	Public health office	SIKNAS online, P-Care BPJS Kesehatan (National Health Insurance)
4	The department of Family Planning	E-PDRT, an online complaint regarding domestic violence
5	Regional civil service agency	SIMPEG (civil service information), digital presence attendance (Si Preti), Management information system ASN (SIMAS)
6	Malang Police Station	Panic Button
7	Department of transportation	ATCS (Area Traffic Control System) & RTTIC (Road Transaport and Traffic information center)
8	Department of Communication and Information	NCC (Ngalam Comond Center), Sambat Rene Ker online
9	Department of Education	Education management and information system (SIMDIK)

Source: Subekti and Bustomy, 2018 [29]

Several implementations of smart city concept in Malang can be explained as below.

4.1.1. Patroltaru

Patroltaru is a spatial patrol application ensuring the land use process in Malang City according to its local spatial planning. This app allows direct community monitoring to any existing land use process in the city. Patroltaru was launched to promote public information disclosure and strengthen the role of community in regional development. The spirit of transparency is reflected in this application as the public can easily access the data related to spatial planning. Furthermore, the public can also follow the land use concept carried out by the local government. By doing this, any misconduct in space utilization can be minimized or to some extent, can be prevented.

4.1.2. e-Suradi (Digital letter)

The use of digital mail in administrative processes is among the pillars of a smart city, namely smart governance. In this case, Malang City has e-Suradi, a

digital letter used as official governmental correspondence. This application aims to speed up the administration process between sections so that the correspondence becomes fast and efficient. Besides, the existence of e-Suradi will create good governance towards Go Green as the use of paper is significantly reduced. Furthermore, it is cost-effective as it does not require a courier to deliver the letter to the recipients.

4.1.3. Smart Health Care

Smart Health Care is a digital-based service queue system integrated with the Mobile JKN application. Through this application, the citizen can register for medical services available in the city via online. The users will know their queue number in advance able to predict the time to visit the FKTP (first-level medical facilities). During the registration, participants can also write down complaints (illness, health condition etc.), so that the doctors or other medical staffs can immediately get information regarding the patient's condition. A total of 72 FKTPs in Malang City have implemented Smart Health Care. This number includes 16 health centres, 21 general practitioners, 31 primary clinics, three military clinics and 1 POLRI clinic. Besides, digital service is also implemented in Advanced Referral Health Facilities (FKRTL) such as major hospitals and clinics. Currently, 95% of FKRTLs collaborated with BPJS Kesehatan (National Health Insurance) in Malang City use a digital-based system. They provide information regarding the availability of beds and offer fast administration process through a fingerprint system.

4.1.4. Complaint Apps (Rene Ker)

The government, through the Department of Communication and Information Technology launched an online complaint service called "Sambat Rene Ker". This platform is based on android operating system and is available on Google Play. Sambat Rene Ker" is integrated with LAPOR (a public complaint service), an application owned by the Ministry of Administrative and Bureaucratic Reform. The Sambat Rene Ker allows the citizen to make complaints regarding the quality of public services in Malang. This will make it easier for the Malang City government in providing services to the community.

According to government staff, the implementation of a smart city in Malang was carried out through several steps:

1. building a policy roadmap
2. creating a smart city portal
3. implementing programs
4. involving related stakeholders
5. conducting monetary evaluation
6. improving programs and expanding the smart city program

The programs are designed to increase community participation in development. The implementation of the smart city program is integrated with the budget allocation information provided by the government. Existing program plans are communicated to the public through public consultation forums organized by related government agencies.

4.2. The implementation of Smart Economy

In this aspect, Malang City has initiated a regional economic management using digital technology. Among the examples such digitalization are the development of online local tax payments and smart markets.

4.2.1. On Line tax collection (E-tax system)

In general, the *E-tax* system applies to all types of local taxes in Malang City. This e-tax payment system has involved Bank Jatim as a service partner. The database is automatically connected to the Regional Tax Service Agency (BPPD) in Malang. Through this system, taxpayers no longer need to bring local tax returns to the BPPD office since the step can be done online. Even though the system is online, supervision is carried out manually, especially if there is suspicious data. Currently, 176 taxpayers across Malang City have implemented an online system, including hotels, restaurants, and dormitory managers.

4.2.2. Smart Market "Joyo Agung"

With an area of 4,000 m2, Joyo Agung Market is located in Merjosari Village, Lowokwaru District, Malang City. It is a public market applying digital technology through the implementation of cashless shopping. In this market, merchants and buyers can make fast transactions simply by using a mobile application. The sellers have a barcode that can be scanned using the buyer's cell-phone, making it easier to choose groceries and payment. Updates in good prices are also accessible via the application. Buyers are facilitated in choosing products according to their category. There are vegetable blocks, processed foods, fish and meats. The managers provide a strong Wi-Fi connection to improve the performance of traders. The Wi-Fi connection is the main tool for managing

applications used to sell their goods. One hundred fifty-six sellers already occupy this market. Most traders from residents involving local youth organizations. In the future, other facilities will be added, namely the construction of a polyclinic, pharmacy and service between goods to make shopping easier.

4.2.3. Smart Market "Oro-oro Dowo"

Another smart market in Malang City is called Oro-Oro Dowo Market. This market was in the past built by the Dutch government. In 2015, the Malang City Government made some renovations to this market. In 2019, Oro-Oro Dowo implemented digitization through online system sales. Figure 2 explains the smart market (SM) concept implemented in Oro-Oro Dowo. The concept involves three parties, namely the government, banks, and market traders. The government acts as a facilitator in providing online-based application programs and providing assistance to market traders in technological literacy. Bank manages financial transactions run in the application. Meanwhile, traders including micro, small and medium enterprises (MSMEs) use this application to increase sales.
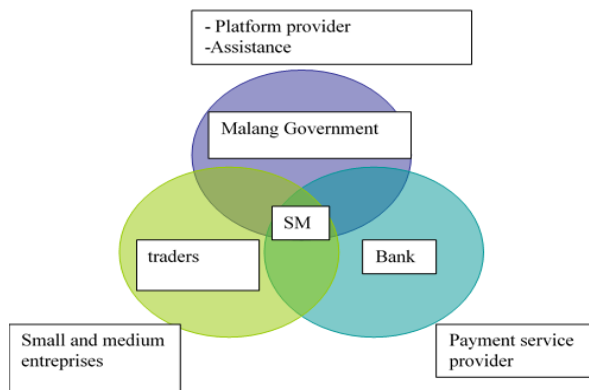

Figure 2 Parties involved in the smart market "Oro-oro Dowo", Malang City.

The online transaction system certainly provides convenience to buyers. However, the most important thing is the safety and simplicity of the transaction itself. Figure 3 depicts the stages on how to order via online at the Oro-Oro Dowo Market
1. Buyers access the pasar.id website via a smartphone or laptop. The buyers then search for the designated market and selects goods according to category

2. The merchant approves the application and prepares the goods requested by the buyer
3. Buyers make payments online via BRI and send proof of payment
4. The order will be delivered by courier to the buyer addresses.

Figure 3 Online ordering system in Oro-oro Dowo market, Malang City.

Based on the interview with a seller in the Oro-Oro Dowo Market, we concluded that the implementation of the smart city concept exists through the digital transaction. Besides, the interview results show that the smart city program can help people meet their daily needs easily and efficiently.

4.3. The implementation of Smart Environment

Kampung Glintung, one of the villages in Malang City, is an interesting location to study regarding its efforts to arrange the village landscape and greening in Malang City. As a proof, in the Guangzhou Award for Urban Innovation, Glintung Go Green (3G) village is nominated as the top 15 out of 301 cities having an innovation to preserve the environment[4].

In the past, Kampung Glintung was a slum area covering 5.5 per cent of Malang City or around 608 hectares (Malang Kota.go.id). Its location along the river making the flooding can occur 3-4 times a year during the rainy season. Then, there are massively changed since 2012. Kampung Glintung is now a beautiful, comfortable and peaceful village. The community and government initiate and demonstrate an environmentally friendly approach to tackling climate change through collective action. Community leaders created an environmental conservation movement transforming Glintung from a climate-prone area to be a climate-resilient area through a participatory approach.

Together with related-stakeholders, Kampung Glintung has implemented a smart environment called

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Water Saving Movement (GEMAR). This community initiative consists of several activities such as planting trees, building a water reservoir, creating vertical gardens, farming organic products, recycling waste, and integrating local culture and wisdom. The implementation of a smart environment program through community participation successfully promotes inclusive development in Malang City. As a result, this project has inspired many parties in big cities in Indonesia to re-green densely populated areas. The Kampung Glintung initiative has become a pilot project and eco-tourism destination for domestic and foreign tourists to see the practice of implementing the environment in inclusive development.

Based on the interview with local tourists visited Glintung, they said that they were satisfied with the Eco green-based tourism facilities provided in the village. In addition to this, all related-information about Glintung village can also be easily accessed through online media, making it more accessible for everyone regardless their position.

4.4. The implementation of Smart Living

Smart living is a way to create a decent living ecosystem for the community. Smart living means people can experience a healthy and safe quality while supporting Economic development at a regional level [10]. Kampung Jodipan is an example of smart living implementation in Malang City.

Kampung Jodipan was one of the twenty-nine slum areas in Malang with improper waste management and high crime rates. Currently, Kampung Jodipan has transformed into a smart living area after a collaborative action consisting of universities, businesses, and society encourages people to love nature and create a clean, healthy, safe environment living.

Figure 4 A colorful Jodipan village, Malang City.

Initially, there were no plans to make Kampung Jodipan as a tourist destination. The Strategy of painting murals in this village is only a way to change people's behaviour to love the environment because of its beauty and cleanliness. However, unexpectedly

many visitors are attracted to come and take pictures in Kampung Jodipan. Following this, all involved-stakeholders decided to make more structured strategies to promote Kampung Jodipan as tourist destination using social media, such as Instagram, Facebook, Etc. Then, Kampung Jodipan became popular after lots of photos are spread through social media. As a response, people who were living in Kampung Jodipan started to create a business and get positive socio-economic impact from the tourists.

Currently, Kampung Jodipan has become the transformation symbol of a slum area into smart living in Malang City. This village has even transformed into a well-known tourist destination in Malang City. The transformation encourages an increase in job opportunities with a bigger multiplier effect. For instance, unemployed residents can work and get income to fulfil their daily needs. Some of the job opportunities spur in this village includes ticket sales, food and crafts sales at tourist sites, tour guides, lodging. To maintain the main attraction in Kampung Jodipan, the whole community must keep clean the area and the environment.

Results from interview, observation and related document analysis showed the presence of community participation during the implementation of the smart city in Malang. It is for instance, during program delivery, implementation and monitoring. Among the benefits of community, information is available in real-time, economic transactions run easily and efficiently, and well-established communication between residents and the city government. Another program to promote inclusive development in Malang City is smart mobility and smart people program. This is in line with the concept of inclusive development that requires a harmonious social, ecological and interpersonal dimension in community development. All smart city program implemented needs to support local wisdom. Local wisdom is a social capital that can be maintained to achieve sustainable development. Moreover, it is also possible to integrate the local wisdom with modern values on implementing inclusive development program. The modern values in this context are universality, transparency, accountability, and competitiveness.

5. CONCLUSION

To conclude, Malang has transformed itself to become a smart city. This transformation was supported by four out of the six pillars of smart city: smart economy, smart environment, smart governance

and smart living. In general, smart city program received positive responses from the community (traders, consumers, local tourists, and local governments). Besides, the smart city program can also support economic activities and enhance the government's administrative services. Moreover, the implementation of smart transactions and eco-tourism has created a harmonization on socio-economic activities among society. Furthermore, this study also gives information regarding the government's effort in implementing smart city program. In addition to this, various development policies and budget allocations for implementing the smart city program always involve stakeholders (for example, the community, city government, academics, and the business world). This collaborative action can be a social capital facilitating the realization of a smart city program that can eventually improve people's lives' prosperity and welfare. An important result in this research is that the smart city program can encourage inclusive development in Malang City. In the end, the social, ecological and political dimensions in the smart city program can indeed speed up the development process of Malang City.

A city development is increasingly dynamic, thereby requiring complex and varied services for the community living within it. To implement the smart city program, the government needs to promote the synergy between all stakeholders in policy formulation, evaluation and program implementation. This effort is important so that the application of a smart city can encourage active community participation in sustainable local development. Besides, it also requires other aspects of a smart city program, namely smart mobility and smart people. Furthermore, the government also needs to socialize the smart city program to the community, so they can participate in improving the program quality.

AUTHORS' CONTRIBUTIONS

IM wrote the introduction and research method sections of the manuscript, AFS prepared the abstract and wrote a part of result and discussion, especially for the implementation of smart environment and smart living, BH wrote the theoretical framework and provided figure 1, 2 and 3 as well as prepared the smart economy discussion, SRS wrote the smart government discussion, and MSR conducted review and proofread. All authors reviewed the final manuscript.

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