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Jababeka Smart Township Super-App Case-Study: Hackathon as a mechanism for Open Innovation

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ABSTRACT

This case-study articulates the findings and implications of Hackathon which was held as a part of digital literacy training program for the implementation of a Smart City digital platform called "Jababeka Smart Township Super-App". Firstly, the case-study explores the outputs of the Hackathon and its role as an open innovation mechanism. Secondly, it aims to explore the impact of hackathon on raising the awareness as well as the participants' willingness to be involved and accept the Smart City implementation. Narrative analysis is employed for the first research objective and descriptive analysis employed for the second research objective where 8 participants are interviewed to provide their accounts on Hackathon and analyzed based on a technology acceptance model (TAM) framework, identifying the Perceived usefulness (PU) and perceived ease of use (PEOU) as the indicators of positive attitude and acceptance towards Smart City implementation. The results indicate that the Super-App as an integrated digital platform can be effectively implemented based on the Open Innovation approach resulting in 30+ community-developed applications, especially as it encourages the community to be the key players in the creation of multi-sided digital platform startups. Finally, Hackathon is found to be a useful mechanism in raising the level of understanding on the concept of Smart City and increase the stakeholders' acceptance for Smart City implementation.

Keywords: Jababeka Smart Township, Open Innovation, Hackathon, Digital literacy training, technology acceptance model (TAM)

ABSTRAK

Studi kasus ini mengartikulasikan temuan dan implikasi dari Hackathon yang diadakan sebagai bagian dari program pelatihan literasi digital untuk implementasi platform digital Smart City yang disebut "Jababeka Smart Township Super-App". Pertama, studi kasus mengeksplorasi keluaran Hackathon dan perannya sebagai mekanisme inovasi terbuka. Kedua, bertujuan untuk mengeksplorasi dampak hackathon dalam meningkatkan kesadaran serta kesediaan para peserta untuk terlibat dan menerima implementasi Smart City. Analisis naratif digunakan untuk tujuan penelitian pertama dan analisis deskriptif digunakan untuk tujuan penelitian kedua di mana 8 peserta diwawancarai untuk memberikan akun mereka di Hackathon dan dianalisis berdasarkan kerangka model penerimaan teknologi (TAM), mengidentifikasi Perceived usefulness (PU) dan persepsi kemudahan penggunaan (PEOU) sebagai indikator sikap dan penerimaan positif terhadap implementasi Smart City. Hasilnya menunjukkan bahwa Super-App sebagai platform digital terintegrasi dapat diimplementasikan secara efektif berdasarkan pendekatan Open Innovation yang menghasilkan 30+ aplikasi yang dikembangkan komunitas, terutama karena mendorong komunitas untuk menjadi pemain kunci dalam pembuatan multi-sisi. startup platform digital. Akhirnya, Hackathon ditemukan sebagai mekanisme yang berguna dalam meningkatkan tingkat pemahaman tentang konsep Smart City, dan meningkatkan penerimaan pemangku kepentingan untuk implementasi Smart City.

Kata kunci: Jababeka Smart Township, Inovasi Terbuka, Hackathon, Pelatihan literasi digital, model penerimaan tekonologi (TAM)

1. Introduction

The concept of Smart City has been around as early as the 1990s' but its implementation has gained momentum in recent years with the explosive population growth and the resulting complexity of urban management (Supangkat et al., 2018). Apart from the management perspective, increasing demand for higher standards of

living such as eco-friendly environment, sustainable business practices and responsible consumption has contributed to this trend gaining popularity.

Throughout Indonesia, there are over 75 cities actively in the process of transitioning to a Smart City in accordance with the Indonesia 100 Smart Cities Movement, an initiative from the Ministry of Communication and Information Technology of the Republic of Indonesia in 2017 and 2018. This initiative is in line with the proactive efforts by the Government to promote Industry 4.0 as measures to address the challenges of technological advancements as well as exploring the opportunities. Policy-wise, development of supporting infrastructure, digital technology development, integrated service policy, accelerated adoption capability technology through national digital literacy programs, digital transition in the commercial sector and public services have been highly encouraged by the Government of Indonesia. This provides the basis for this case study on the implementation of this Smart City in Jababeka area based on open innovation.

Several definitions have emerged for a Smart City with much of the emphasis on the functions; what a smart city can or should be able to do. They are well developed in the means of mobility, technological infrastructure, human resources, economic success, sustainable environment, and enhanced quality of life (Giffinger et al., 2007). Another key point in understanding this concept is the assumption that Smart Cities are the major players of the future in their perceived role in facilitating the social, economic, and environmental conditions (Mori, 2012). The "interconnection" features of Smart Cities are delivered on digital platforms to enable communication between various municipal services and thus integrating the people, social capital and information and communication technology into a Smart Ecosystem (Harrison et al., 2010; Nam, 2011; Deby, 2019).

As an industrial, residential, and commercial development founded in 1989 by PT. Jababeka, the Jababeka Town covers 5,600 hectares and has a population of 1 million people. Jababeka town, as a self-contained city built on the smart city model, has its own infrastructure, including clean water treatment, wastewater treatment, power plants, dry ports, and seaports to support the export and import activities of its huge variety of industrial tenants from over 30 countries. As the manager of industrial, commercial, and residential areas in Bekasi Regency, as well as several special economic zones such as Tanjung Lesung and Morotai, a collaboration with PT. Jababeka can maximize the far-reaching impact of the Smart Ecosystem to the Jababeka community.

As a community service program to promote implementation of Smart Ecosystem in the Jababeka area, the "Jababeka Smart Township Super-App" initiative builds on five pillars of development: smart citizen, smart business and innovation, smart environment, smart mobility, and smart security. While being much more than just providing services or offering an effective platform for supply and demand to cross-over, the implementation of Smart Ecosystems opens up opportunities for people to participate in integrated service development itself. Smart Ecosystem is an environment that enables all aspects of the community to participate in developing a smart environment based on digital technology. Super-App is a form of Smart Ecosystem on a digital platform which is open to various innovative applications by the developers (in this case, the citizens of Jababeka) and synthesizes them to form an integrated service network.

According to Nam & Pardo (2011), there are three fundamental components of Smart City: technology, human and institutional. Only when these three components align and blend together, the Smart City is born. In the case of Jababeka Smart Township Super-App, the delivery of digital literacy training - in the form of Hackathon - to the community is to enhance the human factors, through socialization of benefits of mobile technologies, education of developing applications for Super-App and injecting the culture of Open Innovation. The development of Super-App lays the groundwork for the human and institutional factors to synergize and maximize the impact based on the technology factors.

With the concept of smart cities becoming a major trend in both developed and developing countries (Setijadi et al., 2021), several complications arise in the implementation process in Indonesia, such as irregularity of implementation, inappropriate framework, limited models, lack of awareness and more (Achmad et al., 2018; Anthopoulos et al., 1997; Kemenkominfo, 2016; Meniningsih et al., 2013). Setijadi et al (2021) points out that there is no standardized procedure to assess the readiness to implement Smart City concept due to its technological aspect and many stakeholders failing to understand its mechanism and implications. Therefore, it is in high demand to test various mechanisms to raise the stakeholders' digital literacy levels through efficient awareness and capacity building programs such as Hackathon. This study holds a Hackathon as a digital literacy training program to raise awareness of Smart City concept among the stakeholders and adopts the technology acceptance model (TAM) to assess whether the training has been significant through interviews with the participants.

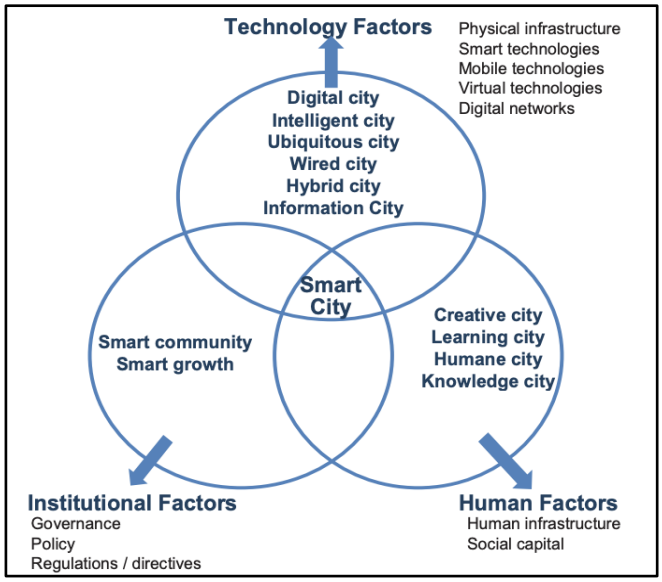

Figure 1. Fundamental components of smart city
(Source: Nam & Pardo, 2011)

2. Methods

2.1 Conceptual Framework of Jababeka Smart Ecosystem (Smart City)

The conceptual framework of the Smart Ecosystem in the Jababeka area (Figure 2) has three key aspects: 1) the enabling digital infrastructure such as Cloud Computing, Mobile Apps, Internet-of-Things and Artificial Intelligence; 2) the Super-App as the digital platform as a bridge between the back end and user interface and; 3) the players on the digital platform such as collaborators (PT. Jababeka) and the developers (Jababeka community).

Figure 2. Conceptual Framework of Smart Ecosystem in Jababeka Area

2.1.1 Players in the Jababeka Smart Ecosystem

Within the Jababeka Smart Ecosystem, every citizen has the opportunity to play a dual role: to be a producer of services as well as consumers. This interchangeable role benefits the community as they are presented with a variety of options to choose from and contribute equally to making their town a more inclusive and sustainable development platform. When encountered with a problem, there is higher potential to offer solutions based on Open Innovation. The dissemination of these solutions also becomes faster as these apps will be integrated into the existing ecosystem of consumers - the Jababeka community.

Stakeholders in this case include the Jababeka community as whole and for accurate assessment, the Hackathon was open to participation by all stakeholders within the Jababeka community. These stakeholders' understanding

and acceptance towards Smart City matters because the multi-sided features of the Super App can only flourish upon their active participation and open innovation.

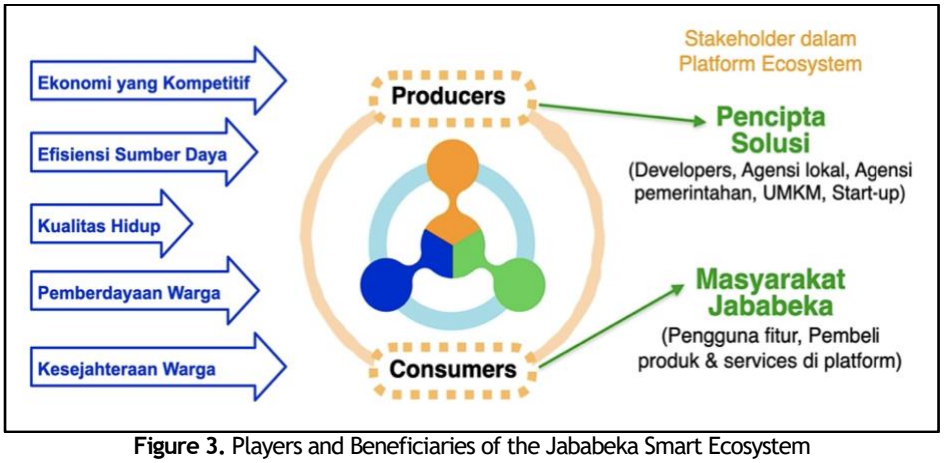

Figure 3. Players and Beneficiaries of the Jababeka Smart Ecosystem

2.1.2 Delivery of Digital Literacy Programs: Hackathon

Hackathon, in the traditional sense, refers to a social coding event where computer programmers and others in a team develop a new software program. In the scope of this program, the Hackathon is a competition-style event where the participants come together to develop applications for their existing businesses to integrate into the Jababeka Smart Township Super-App. The range of participants is not limited to only computer programmers and developers but also extended to all those who are interested in the digital transition for their business.

Multi-sided digital platform startups in the technical sense, is defined as any sort of platform that adds value to numerous parties by enabling the exchange of goods or services. The driving factor behind the success of such a platform is the number of users, which is often referred to as the network effect. The more the number of existing users, the more that are willing to join. For this, a deeper organizational collaboration is required and the ease of access through mobile apps makes this feasible (Nielsen, 2018). Open Innovation is the culture of this Super-App which enables it.

The Hackathon was held for 3 days to include a wider public from the Jababeka community. Approximately 100 participants (over 20 teams) have joined the event. Some of the teams already had a startup business less than a year old and many of the businesses had an online channel (mostly Instagram). Some teams wanted to start a new business at the time of the event. The Hackathon started off with the delivery of digital literacy knowledge by the event facilitators on the concept of the Smart Ecosystem, the scope and framework of the Jababeka Smart Township Super-App and training on how to develop an application. By the end of the Hackathon, more than 20 Applications were developed and successfully integrated into the Super-App digital platform.

2.2 Research Method

The study adopts narrative and descriptive qualitative method to analyze the findings. According to Creswell (2014), qualitative research is data-driven; its objective is not to test theory. Interviewing approach, which enable researchers to become active participants in the development and comprehension of what is being examined, is one way to acquire data for qualitative research. According to Holstein and Gubrium (1997), the finest study outcomes come from effective cooperation between researchers and informants who are interviewed (Ritchie, Jane and Lewis, 2003). For this case study, the author interviewed the participants of the Hackathon tournament. Primary data collected through the interview during the Hackathon was analyzed to assess the effectiveness and impact of the program. For the purposes of this study the researcher interviewed 8 participants (all from different teams). For validity and reliability of the findings, triangulation was implemented where three researchers separately analyzed the interview scripts and came to the same findings.

2.3 Research Question and Analytical Framework

Firstly, the case-study explores the outputs of the Hackathon and its role as an open innovation mechanism. Secondly, it aims to explore the impact of hackathon on raising the awareness as well as the participants' willingness to be involved and accept the Smart City implementation. Narrative analysis is employed for the first research objective whereas 8 participants are interviewed to provide their accounts on Hackathon and analyzed based on a technology acceptance model (TAM) framework, identifying the Perceived Usefulness (PU) and

Perceived Ease of Use (PEOU) as the indicators of positive attitude and acceptance towards Smart City implementation.

The analysis and interpretation of the primary data is based on the framework of the TAM which was originally conceptualized by David (1989). as the author asks the open-ended, indirective questions to assess the participants' willingness to engage in the program based on two indicators: PU and PEOU. The prior is used to measure at what level the users will come to conform to using the technology for its perceived benefits and the latter refers to how the technology can benefit the users in comparison to their previous approach on performing the same task. The interview results will be analyzed and interpreted in this framework and asks the following research question:

RQ 1: What are the outputs of the Jababeka Smart Township Super-App and its impact?
RQ 2: How did the delivery of the digital literacy event (hackathon) influence the participants on their willingness to be involved and accept Smart City implementation?
A: Have the PU of participants increased after the event?
B: Have the PEOU of participants increased after the event?

3. Result and Discussion

3.1 Jababeka Smart Township Super-App Outputs

Previously, (app) developers developed apps only by code. However, software nowadays makes building an app prototype or the app itself straightforward, thanks to technical improvements. Due to the ease of access and convenient user interface, creating an app prototype or the real app is no longer limited to the professional programmers but also open to the wider public. The suggested app prototype is intended to supplement the current Jababeka Smart Township Super-App without altering its primary function.

Figma is a User Interface (UI) design tool and a web-based graphics editor, and this promotes an inclusive digital platform which enables everyone who is interested in developing applications to participate. Everything from wireframing websites to building mobile app interfaces, prototyping applications, and designs, and producing social media content can be executed with it. Figma is a graphics editor unlike any other. The fact that it operates fully inside a browser is its key differentiation. What this implies is that users can access their projects and start developing from any device, without the need to buy multiple licenses or install professional software. It is thus inexpensive, easier, and more integrative to develop an online application.

Jababeka Smart Township Super-App, a social media application that may be utilized by the Jababeka residents and tenants to help improve services, to take part in and take care of the environment and the ultimate goal is to turn the city into a Smart City. Reports will be forwarded and followed up on by relevant parties, and they may be tracked online using the Jsmart program. It is also known that this application's coverage is quite large for Jababeka. It has 9 area coverages, which are Jababeka Industrial Area Phase 1 until Phase 7, plus Jababeka Innovation Center (JIC) and Jababeka Residential Area. Figure 4. shows a map of the area that is covered by the Super-App.

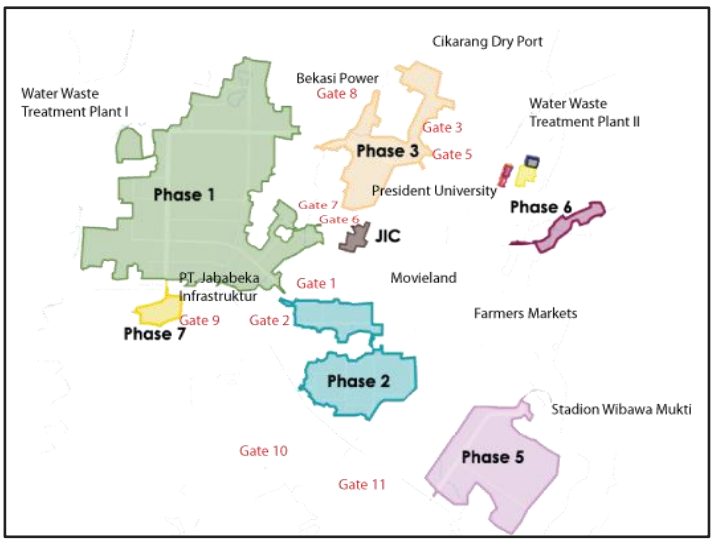

Figure 4. Super-App area Coverage

In the current smartphone era, Jababeka Smart Township Super-App aims to provide services that are easily accessible through citizens' mobile phones. With application break-through this one-stop service, Jababeka Smart-Township Super-App integrates many online services provided by Jababeka (a service developed by area), community (apps developed by the community), and industry and startups (privately developed services). Application categories that are developed and modified by the community vary in its range.

Currently, over 20 categories of apps have been identified and developed for integration including data center applications and information, household waste bank applications, emergency response applications, as well as various creative business applications such as food & beverage applications, digital education applications, mobile applications fashion, as well as local blending applications for tourism.

3.2 Hackathon Outputs and Implications of Open Innovation

The Hackathon participants have developed over 20 apps to be integrated into the Super-App digital platform. The apps cover various areas of service for both commercial and public purposes such as reporting, accommodation, events, telemedicine, tourist destinations, apps to allocate and book public transportation and facilities, recycle-reuse-resell eco-friendly apps and more. In addition to the solid results in the form of community-developed apps, the participants gained extensive knowledge and experience on app development throughout the event period.

Jababeka Smart Township Super-App community service program is in essence a Smart Ecosystem which enables development of multi-sided digital platform startups and accelerates the growth of micro, small and medium enterprises (MSEMEs) by integrating the providers into the Smart Ecosystem. Such digital mechanism realizes the conceptual down streaming for the development of integrated Town through the Smart Ecosystem design based on the foundations of industry 4.0 and participative concept of Open Innovations.

It aims to increase active participation and involvement of the town's co-creators, such as various city stakeholders and residents to build a smarter and more sustainable Jababeka Township, resulting in a more collaborative place for citizens, academics, communities, social organizations, start-ups, media, business, industry and government. Highly talented community member is expected to be a catalyst to create a smart township 4.0 ecosystem in Indonesia Jababeka area. This is in line with the fundamental components of the Smart City framework (Nam & Pardo, 2011) where all three components including human factors (infrastructure and social capital) are prerequisite to the creation of the Smart Ecosystem.

The expected impact of the PKM Jababeka Smart Township Super-App initiation covers:

- Smart Citizen -> Encouraging community engagement
- Smart Business & Innovation -> Smart research and data, Sharing and inclusive economy,
- Start-up incubation, MSME acceleration
- Smart Environment -> Encouraging sustainable lifestyle, Resource development and sustainable management of energy
- Smart Mobility
- Smart Security -> Cyber security, public surveillance

3.3 Hackhathon as a Digital Literacy Mechanism for Smart City Implementation

The general impression from the participants was that their perspective on digital integration has completely changed after the event. Their initial opinion was that app development required professional programmers and that it would be a very difficult process for those who have no prior experience in hands-on computer programming. The participants' PU and PEOU had increased upon their success of developing Apps for the Super-App. Although they had already created online presence for their businesses through social media accounts (i.e., Instagram), building an app for the business was perceived as a lengthy process that requires a significant number of resources.

As a result, their perception on accepting the Jababeka Smart Township Super-App as a go-to digital platform for developing apps has greatly improved compared to prior to the event. The respondents voiced out their increased understanding on the concept of Smart City in general and upon direct participation through Hackathon, reported to have a better grasp of the concept as well as their intention to participate more actively because they now deemed it more approachable and accessible with their skill levels. The Hackathon's targeted objective to increase participants' PU and PEOU, in turn contributed to raising their technology readiness and acceptance towards the Super App for Smart City implementation in accordance with the Technology Acceptance Model (TAM). From the consumer behavior perspective, the user experience of building apps has positively contributed to their perception and in turn the behavior of using the Super-App.

The findings show that digital literacy training through a competitive yet informative event such as Hackathon can enrich the participant experience; both knowledge transfer and hands-on training have increased the PU and PEOU of the participants which ultimately results in a positive consumer behavior of the product (Super-App) as well as the intention to keep using it.

4. Conclusion and Recommendations

The Jababeka Smart Township Super-App encourages harmonious collaboration between residents and Jababeka as the estate manager. This allows an area to continue to grow while at the same time fostering a sense of belonging to citizens. Realizing that estate managers cannot work alone without local stakeholders and residents, Jababeka Smart Township aims to be a hub to ensure that city creators and governments can work together. With the help and support of citizens, communities, media, academics, industry, and other governments, Jababeka can overcome many challenges and provide better services to citizens. For a successful implementation of Smart City projects in Indonesia, the first step is to educate the stakeholders through efficient mechanisms such as hackathon, to raise their awareness and capacity to be involved and accept its implementation. As the findings indicate, Open Innovation is critical in such multi-sided platforms and stakeholder participation is key. The author proposes that more contemporary and creative forms of events (such as Hackathon) be held in the dissemination of digital literacy training. As concluded from the findings, the methods of delivery can target identified determinants of TAM to achieve more effective outcomes from each event.

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Appendix 1. Hackathon Poster

Appendix 2. Apps developed during the Hackathon (Top 10)

#	Apps	Description
1	J-ECO	Facilitate eco-friendly culture by recycling waste
2	Events	Go-to app for info. on events in Jababeka area
3	Public Facilities	Pinpoint the various facilities in Jababeka area
4	Public Transportation	Search, track shuttle locations and book online
5	Housing - Lokost	Search boarding houses, hotels, pay online
6	Telemedicine - JaMed	Search hospitals, pharmacies, doctors, book online
7	Feedback and Report	Report anything related to Jababeka, replies, blog
8	Education - Fundy	Access books, courses, keep a reading portfolio
9	Panic Button - J-Panic	Emergency call, auto detect location, online S.O.S
10	Crowdfunding - Donasi	Get info on disasters in the area, donate to help

Appendix 3. Photo Documentation of Apps (Screenshot on Mobile)

Screenshot of Jababeka Smart Township Super-App	 
Screenshot of Apps developed through the Hackathon	

Screenshot of Apps developed through the Hackathon