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A Study on Digital Democracy Practice: Opportunities and Challenges of e-Health Implementation in Indonesia

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Abstract

As a developing country, Indonesia faces a crucial issue concerning the provision of health services to the public. The 1998 political reform led to demands for more aspiring and accommodating bureaucratic services being afforded to the public. The political reform brought about bureaucratic reform bearing good governance, wherein one of its forms is the provision of health services through the innovation of an information technology (IT) based service named e-Health. Keeping in mind Indonesia's characteristics as a developing country, the implementation of IT-based services evokes numerous debates. This study aims to analyze the implementation of e-Health along with the opportunities it has, and the challenges it faces. By using a study case approach on the Surabaya Municipality Health Authority as the initiator and implementer of e-Health, as well as observations and user surveys, the results show that in spite of having been prepared properly with supporting policies, infrastructure, budgeting, dissemination, and operational system, there were still many prevalent obstacles encountered, particularly concerning digital divide, technical difficulties, psychological barriers, and cultural issues. Nevertheless, there are numerous opportunities available for refining e-Health implementation, provided there is a political will from the government to improve and enhance the ICT infrastructure, widespread use of mobile devices, involvement of public participation, and equal distribution of service points easily accessible to the public. Strong government commitment also serves as a guarantee for e-Health service program sustainability in Surabaya Municipality.

Keywords:
bureaucratic reform; innovation; information technology; e-Health

Introduction

This paper explores the opportunities and challenges of e-Health implementation, as a digital democracy practice in Surabaya, Indonesia. The world is undergoing major changes as a result of the "wave of democracy," as propounded by Samuel Huntington. These waves manifest in almost all aspects of human life ranging from social, economic, culture, politics, and environment. Digital democracy simply means the political activities using digital channels, especially web 2.0 as a form of political participation or raising public support that has created a digital tool, which can be used as a facilitator of democracy. Digital platforms increase the opportunities

for the public to participate in public policy, and management process as well as spawn many innovations at the government levels. A global public management revolution has been reshaping the relationship between citizens and the state since the 1980s. This revolution is concerned with how the governments should be more responsive to the governed. The governments have sought out new strategies and tactics to not only rebuild the responsive linkages between themselves and their citizens, but also to encourage the citizen involvement in public administration (Kettl, 2005). The Information and Communication Technology (ICT) is one possible solution for resolving the disconnection that exists between the legislatures and the citizens in a representative democracy (Kang & Dugdale, 2010).

According to the country group classification created by Healy (2008), which was based on the population's average annual income, Indonesia was included in the category of transitional countries with a medium income level along with Brazil, India, China, and Vietnam. The other two remaining groups are rich countries with an average annual income per person above USD 10,000 and the least developed countries with an average annual income per person of less than USD 1,000. The three country groups encounter similar issues in the field of health with varying types and at different levels. Regardless of the country's grouping, all governments have an interest in the health of their people. This relates to health dimension being one of the human development index components introduced by the United Nations Development Programme (UNDP) in 1990, which was published periodically in their annual publication, the Human Development Report (HDR). Here, the crux of the issue lies in the fact that differing levels of economy significantly influence how the governments respond to matters of health, particularly relating to the use of ICT for the provision of health services (Healy, 2008).

A nation's economic capacity greatly influences government policies in addressing health issues in their country. Countries with high income per capita generally have high health index. In 2015, the World Health Organization (WHO) published a list of countries based on the citizens' level of health. In general, the top 20 were dominated by European countries with Iceland being the healthiest country in the world, although Singapore, an Asian country, was a runner-up coming in second place. Meanwhile, countries in the African region dominated the top 20 lowest health ranking spots.

Indonesia as a developing country was ranked 91 in the WHO list of 188 countries in terms of its population's health level. Even so, the government of Indonesia continuously strives to improve its population's state of health. Since the 1998 political reform, when the Indonesian system shifted to a democratic system of government, the government has been putting all its efforts into fulfilling the people's demand for good governance oriented toward serving the public interest. The urgency of implementing bureaucratic reform, as all parties have demanded, is a distinctive government agenda. The expected end result of the bureaucratic reform is good governance that administratively carries out management, services, development, empowerment, and protection of citizens, by using government principles that are open, transparent, accountable, based on the rule of law, and involving public participation.

In addition to bureaucratic reform, the political reform undertaken led to a shift of the government system from a centralized, to a decentralized one. With the amendment of Law No. 22/1999 on Regional Government, to Law No. 32/2004 and Law No. 23/2014, regional governments were afforded the rights, authority, and responsibility to undertake regional autonomy; that is, to manage and govern their respective region. It is through

such regional autonomy mechanisms that regional heads are given direct responsibility for governing the people of their region. Aside from providing a breath of fresh air to the localities in autonomously governing and developing their own area, the regional autonomy has also become an arena for the inter-regional competition, concerning innovations related to the implementation of government programs. Subsequently, the inter-regional competition is not only able to boost regional prestige, but it also serves as a means for the regional heads to establish their political image as a leader.

Surabaya Municipality has for two periods (2010 – 2015 and 2016 – 2021) been under the leadership of Tri Rismaharini, the first woman mayor post-reform, who has held two consecutive terms with numerous accomplishments. This can easily be proven with the many national and international awards she has received. One of her spectacular accomplishments pertaining to the bureaucratic reform concerns ICT-based public services, through the development of e-Government. Surabaya Municipality's E-Government or Digital Government Service (DGS) is a representation of the grand design in the development of Surabaya Cyber City, which seeks to establish Surabaya as a Smart City. Surabaya administration's E-Government programs were categorized into 10 internet-based digital service categories, namely: 1) Regional Finance Management System, consisting of: E-Musrenbang, E-Budgeting, E-Project, E-Procurement, E-Delivery, E-Controlling, E-Performance, E-SIMBADA, E-Payment, E-Tax, E-Audit, Fasum-Fasos; 2) E-SDM (Human Resource related) covering: Test of CPNS (Civil Servant Candidate), Periodic Salary, Promotion, Transfer, and Pension; 3) E-MONITORING covering: CCTV, Control of Advertisement (Billboards), tax and retribution, raid operations (*Operasi Yustisi*), Garbage Monitoring, and Burial Monitoring; 4) E-EDUCATION covering: New Student Intake, Online Tryout, Online Report Cards, Online Employment of Principal, Radio Visual; 5) E-OFFICE consisting of E-Surat (e-letter) and E-Jadwal (e-schedule); 6) E-PERMIT comprising of SSW (Surabaya Single Window) Online dan E-Lampid; 7) E-HEALTH; 8) SIMPROLANAS or *Sistem Informasi Program Layanan Masyarakat* (Public Service Program Information System); 9) SISTEM SIAGA BENCANA-112 (disaster preparedness system); 10) MEDIA CENTER consisting of E-Sapawarga, surabaya.go.id, Twitter, Facebook, YouTube, Email, and Call Center/SMS (all accessible via www.surabaya.go.id).

Out of the ten internet-based digital service categories, e-Health was among one of the most fascinating digital services to study. The e-Health application in Surabaya was the first internet-based service in Indonesia, which, since its initiation in 2014, has gained significant attention, and became a prominent source of comparative study by other regional administrations in Indonesia. Surabaya Municipality e-Health also received many awards wherein one of them is the Top 25 national level public service innovation award afforded by the Ministry of State Apparatus Empowerment and the Bureaucratic Reform in 2015 (https://www.viva.co.id/berita/nasional/620180-top-25-terpilih-dalam-kompetisi-sinovik). What is surprising is despite the Indonesia's social context as a developing country, it is adopting the technological innovation, specifically in the field of Information Communication Technology (ICT) for the health sector. With an annual per capita income average of USD 3,974 per person in 2016 (https://tradingeconomics.com/indonesia/gdp-per-capita), and given the numerous social issues being confronted, as well as the issue of technological infrastructure availability, it is thus interesting to observe how the implementation of e-Health is being undertaken by the Surabaya Municipal Health

Authority. A number of research studies on e-Health show that there are many obstacles in the implementation and sustainability of e-Health programs in developing countries (Berg, 2001; Molefi, 2010; Dyk, 2014; WHO & ITU, 2012; Fanta, 2015). For that reason, this article seeks to answer questions about how e-Health innovation has been implemented in Surabaya Municipality and the opportunities, as well as challenges faced in the implementation of e-Health innovation.

Methods

This study applied qualitative method and procedures in its methodology. The implementation of the method was adopted by the administration system and political context of Indonesia. The components of activity for the study were desk review and fieldwork. Desk review activities included identifying the legal, administrative, and policy documentation, to assess the present situation with regard to the government's efforts in accepting the practice of digital democracy. The main government documents that were analyzed include government strategic documents, such as the National Medium Term Development Plan (RPJMN), the Local Medium Term Development Plan (RPJMND), and the Standard Operational Procedure of digital-based services (e-Health). Field work activities occurred from May to June 2017, and included focus group discussions and in-depth interviews with staff, from the key institutions responsible for implementing e-Health, Health agency and customers. The data collection was conducted through a series of FGDs and interviews that included FGDs between agencies responsible for the implementation of e-Health. The First FGD was conducted with the institution responsible with e-Health, such as Health Institution (Dinas Kesehatan), Communication and Technology institution (Dinas Kominfo) and Local Planning Agency (Bappeko). The Second FGD was conducted with the e-Health implementers local community health service (Puskesmas) heads, healthcare cadres and IT staff in several Puskesmas. The Third FGD was conducted with the user of e-Health in the area of urban and rural health centres. Following the FGD, a series of in-depth interviews were also conducted on providers, such as Head of Puskesmas, health cadres, and IT Officers, as well as interviews with e-Health users Tanah Kali Kedinding area, Penanggal, Gayungan, Sambikerep, Lontar and Kedung Anyar, Pasar Kembang. The aim of conducting the serial FGDs was basically to gather information from e-Health's provider and user perspectives about the implementation of e-Health, that was offered by the Surabaya local government. In these FGDs, participants were asked questions in an interactive setting, and were encouraged to discuss thoughts freely with other participants, about the benefit and obstacle of implementing e-Health in Puskesmas. This open and free discussions then generated ideas, and provided a wealth of information for the Surabaya local government. The in-depth interview at the other side, that was also conducted in this research involved intensive individual interviews with users and providers, to explore their perspectives on the e-Health program. By conducting both FGDs and in-depth interview, researchers aimed to use more data, one method to on the same topic. This is a way of assuring the validity of this research, and also to capture the different dimensions of the e-Health implementation

Result and Discussion

E-Health Innovation

Public services reflect the state of the nation. The need for innovation in the public service sector cannot be underestimated. Always seeking to improve the performance and productivity, while innovation is a key driver of the public service sector. It is important to note that the logic of the public service performance is changing profoundly, due to

innovations. Governments around the world advance innovation as a significant means to improve the public services (Walker, 2006, p. 311). The concept of innovation has been linked primarily to the private businesses, with a historic focus on product innovation. Yet, innovation can be found in the public sector as well. It involves the introduction of new ideas that enhance achievement of organizational purposes, thereby ensuring growth in the organization (Maduabum, 2014, p. 13). Innovation is defined as something new or identified as new by a particular group of community. Rogers define innovation as "… an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers 2003, p. 11). A similar definition was also presented by Mohan J. Dutta who asserted innovation to be "…an idea, practice or object that is new to the adopter group" (Dutta 2011, p. 99). Newman (2001, p. 61) defines innovation as, "discontinuous or step change, as something which was completely new to a particular local authority (though which may have previously been applied elsewhere), and a change that had already been implemented, rather than just an aspiration or planned initiative." This definition emphasizes that new innovations must be implemented—how the new idea must be acted upon through sporadic, incremental changes. According to Slaughter (1998, p. 35), innovation is the actual use of a nontrivial change and improvement in a process product or system that is novel to the institution developing it. In the public sector context, "innovation" encompasses a range of meanings, including modernization, improvement and reform. Nevertheless, countries have varying levels of sophistication in terms of their innovation; starting at quite simple, yet effective, bureaucratic changes to organizational best practice, through to intricate modifications and legislative reforms, that frequently involve dramatic alterations to standard daily practices and the use of cutting-edge technical solutions (Cunningham & Karakasidou, 2009, p. 8).

In the context of this study, innovation is identified as the e-Health innovation undertaken by the Surabaya Municipal Health Authority. E-Health is a new practice within the health service reform in Indonesia, and can be categorized as a service innovation. According to den Hertog, van der Aa, and de Jong (2010), service innovation is a new service experience or service solution that consists of one or several of the following dimensions: new service concept, new customer interaction, new value system/ business partners, new revenue model, new organizational and/or technological service delivery system. E-Health in Indonesia was initiated and introduced for the very first time by the Surabaya Municipal government, with the Regional Health Authority responsible for its implementation. The definition of e-Health may be interpreted in many differing ways, resulting in experts unable to reach a consensus regarding an exact definition of e-Health (Svensson, 2002). There exists more than one definition of e-Health, and various terms have been used to describe this service (Fisk, 2011). In an attempt to resolve this conceptual problem, Zilgavis partitioned e-Health into sub-components based on health issues, these included: health service access, patient autonomy, inter-disciplinary information exchange and work flows, scientific research, clinical decision making patient safety, and administration (Zilgavis, 2015).

E-Health is an internet-based health service. Hence, it is more appropriate to observe the definition of e-Health from the ICT perspective. Kirch defines e-Health as "the use of the internet or other electronic media by patients, health workers, and the public, to disseminate or provide access to health and lifestyle information or services" (Kirch 2008, p. 322). The Commission of the European Communities defines e-Health as using ICT in health services, products, and in the procedures

that lead to overall organizational change with the purpose of improving citizen health. Furthermore, the Commission sees e-Health as heaving a key role in the competence and throughput in healthcare delivery, the interface between health-service providers and patients, the way data is transmitted between institutions, and the level of communication between patients and/or health professionals (Commission of the European Communities, 2012).

Based on the above definitions, it may be summarized that e-Health is an ICT-based health service that functions as a communication bridge between members of the population, professionals in the health sector, health insurance and financial institutions, policy makers, and other stakeholders as well. Its main goal is to enhance the quality of health services provided to the public (Setianto, 2016). Thus, e-Health focuses on the provision of health services to the public, thereby putting citizens at the core of service, as well as striving to facilitate in generating, providing, evaluating, and communicating information for the citizens' interest.

As a form of ICT application, e-Health implementation covers all of the functions that influence the health sector. E-Health not only refers to tools with internet-based application, but it includes all networks of health information, electronic health records, telemedicine services, portable and wearable personal communication systems, health portal, and many more technology and information-based tools assisting in prevention, diagnosis, treatment, health monitoring, and lifestyle management (Kirch 2008, p. 322).

An innovation is inseparable from the process of diffusion and adoption. The success of innovation is significantly determined by its success in diffusion and adoption level. Diffusion is defined as "…the process by which an innovation is communicated through certain channels over time among the members of the social system (Greenhalgh, 2005, p. 29, Rogers, 2003, p. 5). As for adoption, it is defined as "… the decision to make full use of the innovation as the best course of action available" (Rogers, 2003, p. 177, Greenhalgh, 2005, p. 28).

Theories on innovation and its implementation, relating to success, opportunities, and challenges, have been much discussed by experts. However, e-Health relates to the adoption of a complex technological innovation that not only involves technological infrastructure, but also numerous aspects on the side of the adopters and their political, economic, social, cultural, and legal environment. There are several theories illustrating technological adoption such as the innovation diffusion theories (Rogers, 1962/2003), Technology Acceptance Models (TAM) (Davis et al., 1989), the Task Technology Fit Model (TTF) (Goodhue & Thompson, 1995), the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), Theories of Reasoned Action (TRA) and Planned Behavior (TPB) (Icek Ajzen, 1985). These theories emphasize on system quality, and information in the success of information systems (Seddon, 1997; Rissanen, 2014). All of the above theories remain lacking in providing a holistic outlook concerning the acceptance of the ICT along with the complexities of the confronted issues (Röcker, 2010).

As an innovation dependent on ICT, one of the problems encountered in the implementation of e-Health was the issue of technology. E-Health implementation is highly reliant on technology in terms of networks, high-speed transmission, access facilities and associated costs, as well as local network infrastructures (Healy, 2008). All of the above require substantial funding, making provision of technology very dependent on the administrator's economic capacity. The subsequent issue relates to the enhancement of human resource capacity at the individual and systemic level (Zilgavis, 2015). Economic, operational, and legal issues are also

regarded as challenges in the development and implementation of e-Health (Hill, Langvardt & Massey, 2007). Another challenge is involving users representing the majority. Differing health systems possess different metrics, different styles of leadership, different cultures, different financial conditions, and different environments, which ultimately means that the same implementation strategy concept may not be compatible in any given place (Berg, 2001). Based on several research results, the challenges in the implementation of e-Health may be summarized as follows: Patients' and healthcare workers' resistance to change, lack of ownership, lack of ICT skills or inadequate human capacity, cultural differences and language barriers, lack of enabling policy environments, weak leadership and coordination, weak ICT infrastructure and services, inadequate financial resources, weak monitoring and evaluation systems, legal issues (Fanta, 2015, p. 1049), lack of understanding about the healthcare system, poor user involvement, limited collaboration, lack of creation of a joint vision, technological challenges, poor project management (Ericsson, 2014, p. 12).

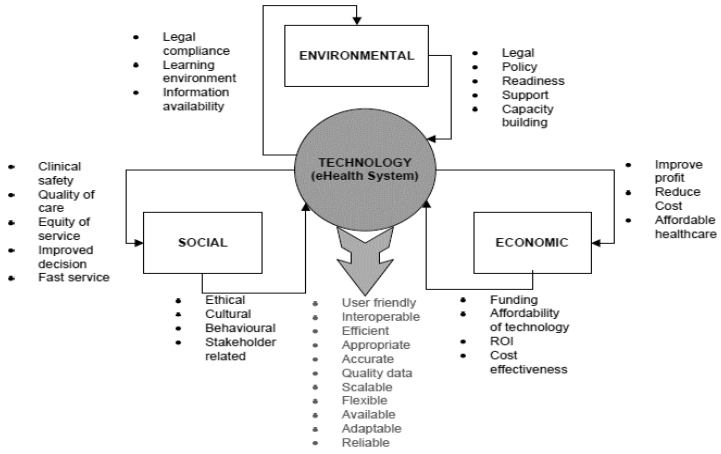
Given the complexity of challenges in the implementation of e-Health as an innovation in the health service provision, the best model able to accommodate such complexity was the model developed by Fanta et al. (2015). This model compiles the system model developed by Blanchard (2008, p. 6) together with social factors (Bilbao-Osorio et al., 2014; Khoja et al., 2007; Khoja, et al., 2013; Leon et al., 2012; WHO, 2011), environmental factors (Bilbao-Osorio et al., 2014; Khoja et al., 2007; Khoja et al., 2013; Leon et al., 2012; WHO, 2011), and economic factors (Bilbao-Osorio et al., 2014; Leon et al., 2012). The model is visualized as follows (Diagram 1).

In e-Health implementation, issues relating to the attitude of users, benefits gained, managerial support, subjective norms, ease of use, and novelty of the innovation should also be points to consider as they will influence the decision of whether or not to use e-Health (Yang & Wang, 2012). Additionally, issues pertaining to e-Health innovation are related to "relative advantage, compatibility, complexity, trialability, and observability" (Rogers, 2003, p. 15-16).

Implementation of E-Health Innovation

The Surabaya Municipality E-Health program began with a concern regarding the

Diagram 1.
Context Diagram for e-Health System



Source: Fanta et al., 2015, p. 1057

provision of health services, particularly those pertaining to patients queuing for their service number. The queuing may even have to be repeated when a patient is referred to seek treatment at other health facilities. This reality compelled the Surabaya Mayor to instruct the Head of the Surabaya Municipal Health Authority to find a solution to the problem. The Regional Health Authority conveyed the concept of utilizing internet-based electronic service to address the issue, by using a service known as e-Health. It was then included in the health service provision development agenda as one of the components of e-Government that was further developed to support the actualization of the Surabaya Smart City program.

Since becoming Mayor of Surabaya in 2010, Tri Rismaharini was committed to establishing good governance through the development of e-Government. Despite being initiated in 2010, the legal aspect of the Surabaya e-Government was only issued in 2013 in the form of Surabaya Mayoral Regulation No. 5 Year 2013 on Guide for Using Technology and Communications in the Implementation of Regional Administration. E-Health, as a form of e-Government innovation, was based on this mayoral regulation for its legal standing. Based on this legal standing, the Surabaya Municipal Health Authority began developing the e-Health prototype. The funding for the e-Health project was stipulated to be the responsibility of the municipal government as e-Health was one of the top down projects from the executive branch of government. Therefore, e-Health was able to secure full political, legal, and financial supports. The e-Health project was entirely funded by the Surabaya Municipal Government Regional Budget (APBD) through the Surabaya Municipal Health Authority. Using funds from the APBD, the Surabaya Municipal Health Authority began developing the e-Health prototype, establishing infrastructure, creating an online application database, setting up networks, and conducting operations and implementation. According to the interview from the Health Department in Surabaya, e-Health was officially used throughout Surabaya Municipality along with the official announcement of Surabaya Single Window (SSW), e-Lampid, and the development of Broadband Learning Centre (BLC) by the Mayor of Surabaya.

Despite being the initiator, implementer, and operator of e-Health, the Surabaya Municipal Health Authority does not work on its own. Article 4, verse 2 of the Surabaya Mayoral Regulation No. 5 Year 2013 stipulates that the Surabaya Municipal Health Authority coordinates with the Municipal Information and Communication Authority. In Article 4, it states: "Within the development framework, the management and/or monitoring and evaluation of information and communication technology must be in coordination with the Information and Communication Authority." The Municipal Information and Communication Authority (*Diskominfo*) is a Regional Organization (OPD – *Organisasi Perangkat Daerah*) responsible for ICT and telecommunication infrastructures along with their management in the Surabaya Municipality. Diskominfo is also responsible for software and network, serves as a provider for applications and server, as well as the government website manager. The Surabaya Municipal government's website, www.surabaya.go.id, is the main website containing all information relating to the Surabaya Municipal administration. This site accommodates all web contents of Surabaya Municipal government's OPDs, although each OPD also maintains their own autonomous website.

The process of initiation, application development, and operation of e-Health was entirely managed by the Surabaya Municipal Health Authority; however, ICT infrastructure, particularly concerning technical specification and program creation or application, was conducted through

coordination with Diskominfo. As for the procurement of infrastructure, it was the authority of the Surabaya Municipal government procurement section. Diskominfo, in this matter, holds an integration function in the management of government websites as well as recommendation and supervision of program, and technical specifications required by OPDs. This integration function can be observed not only in the fact that all OPD websites are contained within the government's main site, managed by Diskominfo, but also that all applications available in the e-Kiosk go through Diskominfo and are directly connected to the relevant organizations. All information and data from the OPD websites and e-Kiosk are sent to the Diskominfo server, except for e-Health data. The medical record data of e-Health is submitted solely to the Surabaya Municipal Health Authority in order to secure patient confidentiality.

In order to provide services to all applications spread out throughout every OPD, Diskominfo has 1,520 terabytes of data storage and utilizes a cloud computing system. The data storage security system is connected to 40 servers and will continue to increase along with the addition of applications available on the e-Kiosks. In addition to its security system, each application also has its own backup. Bearing such infrastructural support capacity and given a significantly large data storage space, data disturbance of each application is expected to be minimized. All of the operational applications are web-based, and if one of the applications were to experience an error, it would create trouble for all the applications on the e-Kiosk. Since all applications were connected to the computer at the Diskominfo program section, any trouble occurring in the software will automatically be detected.

Concerning the e-Health implementation, it was presented in the tangible form of e-Kiosk. The e-Kiosk was designed to look similar to an ATM (Automatic Teller Machine)—it is orange in color and features a touchscreen monitor, keyboard, scanner printer, and RFID (Radio Frequency Identification) machine. E-Kiosk, or Public Service Kiosk, was designed for not only facilitating e-Health, but for all public services initiated by the Surabaya Municipal Government as well. Eventually, all public services will be available on and employed via a single media, the e-Kiosk. During its official release in 2014, e-Kiosk had three public service applications available, namely e-Health (health service application), e-Lampid (civil registry application), and Surabaya Single Windows (permit application). Currently, two more applications have been made available namely *e-pendidikan* (education related) and *e-kecamatan* (district related). In 2014, the Surabaya Municipal Health Authority had 203 e-Kiosks spread out in 10 community health centers (Puskesmas), 154 sub-district offices, 31 district offices, 2 regional hospitals, and 6 service SKPD (Regional Working Unit) offices. Currently, the number of e-Kiosks available has reached 253 units and they are placed in all 62 Puskesmas throughout Surabaya. The Surabaya Municipal Government plans to have 3,000 additional e-Kiosk units placed in every RW (community association) to enable citizens with easy access to public services.

E-Health is not only accessible via e-Kiosk, as it is also accessible via mobile devices and smart phones by using the Google Playstore application, and via personal computer or laptop as well, using the availability of the internet connection. E-Health can be accessed through the following link: www.ehealth.surabaya.go.id/daftar. As for e-Kiosk, e-Health is easily accessible by pressing a finger to the touchscreen monitor. Patients can directly register when their civil registry data has already been recorded in the RFID. If it had not been recorded, the patient must go to the Puskesmas to save their data by submitting their e-KTP (electronic ID) to the officer in charge for processing. Once the data has been

recorded, the patient data will appear, and the patient may directly head to the policlinic as directed by the officer. For subsequent visits, patients whose data have been recorded only need to scan the e-KTP to the RFID scanner on the e-Kiosk, the system will then conduct a search automatically.

For patients who happen to forget to bring their e-KTP, as long as their data is recorded in the RFID, they would only be required to state their name, date of birth, and address to the officer in charge. The officer will conduct a search, based on the given identity, the system will run and provide the patients' data, so they can subsequently be directed to the relevant policlinic. If there are insufficient data, the patient can also fill in the missing information to be in accordance to the civil registry. The e-Health system was purposely integrated with the civil registry system available at the Surabaya Municipal Civil Registry Authority through the use of RFID. The system was also connected to hospitals and Puskesmas in order to provide patients with ease of service. Via this connected system, Puskesmas can instantly provide online referrals for patients requiring hospital treatment. The patient would no longer need to queue for receiving hospital services. Registration service through the e-Kiosk is ready 24-hours a day for in-house Puskesmas categories, and is available for service from morning to 10 p.m. for regular Puskesmas, District Offices, and Sub-district Offices.

The operation of e-Health application has been made by the Surabaya Municipal Health Authority, in such a way that is user-friendly. However, in order to support users apprehensive of utilizing it, the Municipal Health Authority has an officer in place to assist them. There are officers present to assist users at the e-Kiosk locations. For instance, at Puskesmas, there is a Linmas (civilian guard) officer present to assist patients in registering for health services via e-Health.

Concerning the internal aspect of the service, e-Health implementation must go hand in hand with the capacity of Puskesmas and the hospital employees in operating the e-Health system. Failure in implementation is often caused by internal factors wherein employees are incapable of adapting to the new technology. Thus, e-Health implementation entails conducting internal capacity building of operating staff in e-Health comprehension and mastery. For this very reason, IT staff were posted in all hospitals and Puskesmas. The main task of the IT staff, concerning e-Health implementation, is managing the main database, and providing assistance to the policlinic officers in operating the policlinic database, as well as addressing any network errors while e-Health is processing. Information pertaining to the e-Health implementation was also conveyed to employees during brief information sessions held routinely every week. Subsequently, the IT staff along with the Puskesmas officers provide on-site learning to users/patients in utilizing e-Kiosk for online registration.

In addition to Puskesmas officers providing on-site learning for patients and residents in using e-Kiosk in order to receive online health services via e-Health, the e-Health diffusion process to the community has been conducted quite comprehensively through various communication channels, such as electronic, print media, government bureaucracy, community figures, and through direct education provided to the community. During the launch of e-Health, it was covered by various media through news coverage in the newspapers, radio, and television. The Surabaya Municipal Health Authority and Surabaya Municipal Government Public Relations also collaborated with the local media in disseminating information about the e-Health. Information concerning the e-Health was also dispersed via brochures, placed in offices of public services, such as sub-district offices, district offices, Puskesmas, and others.

Billboards and banners were also placed strategically throughout the city, residential areas, hospitals, and Puskesmas.

The Surabaya Municipal Health Authority in collaboration with other government units at the district and sub-district levels directly undertook the dissemination of e-Health to the public. Officers at the districts and sub-districts were actively involved in the diffusion of information pertaining to e-Health, by following the explanation delivered by the Surabaya Municipal Health Authority officers. Heads of the Community Association (RW), heads of the Neighborhood Association (RT), Driving Team of PKK (Empowerment and Family Welfare), community figures, and religious figures also conducted diffusion of e-Health. Surabaya Municipal Health Authority specifically provides an officer trained in responding to public interest and inquiries relating to e-Health.

Challenges, Opportunities and Sustainability

Despite the Surabaya Municipal Health Authority's efforts in preparing for the implementation of e-Health as much as possible, there were some obstacles and challenges confronted in its execution. The first obstacle and challenge encountered was an internal factor. The internal environment was initially resistant to the e-Health innovation, in terms of accepting the new innovation and implementing it. The e-Health innovation altered the prevailing practice. The change obligated internal staff to conduct learning and appropriation. This was regarded as difficult, troublesome, discomforting, and unpleasant. Such was also the case with the public, who are health service users, as an external entity. The change in pattern of service from manual to digital based on the internet was considered troublesome, as they would have to do something they had never learned about or done. Additionally, there were also some cultural reasons for resistance. The online service has put an end to queuing, and made the service more disciplined and prompt. This has resulted in people losing the time and space to gather and congregate with other patients for longer periods of time. Patients, especially the elderly, use this waiting period at Puskesmas as a medium for social interactions, meaning at Puskesmas they were able to meet new people and share stories to pass the time. Whereas, if they quickly finished with their appointment, there will be no one to spend their time or share stories with.

Aside from the reasons above, the resistance to e-Health was caused more by the prevalence of digital divide, covering gaps in capacity, knowledge, and skills of accessing digital devices. At Puskesmas, in the city center, the digital divide was relatively unobserved and e-Health implementation went reasonably well. E-Health was accepted and operated by the internal staff assisting the public in using the e-Health or by the public directly using the e-Health. The character of inner-city residents who are generally educated and technologically savvy provides an enabling environment for the smooth implementation of e-Health at Puskesmas in central Surabaya. In Puskesmas located in marginal areas or on the outskirts of the city, the conditions are different.

Visitation to a sample of Puskesmas located along the city's outskirts showed quite a boisterous atmosphere. There were three concentrations of patients observed at the Puskesmas, two concentrations in the building were like crowds of patients to be exact. The first crowd was at the front of the manual service counter, the second at the front of the e-Kiosk next to the manual service counter, and the third crowd was found outside next to the main entrance of the Puskesmas. The crowd at the front of the manual service counter was filled with patients intending to submit their proof of registration, so officers could retrieve the patients' medical records to be subsequently delivered to the intended policlinic. As for

the two remaining crowds at the front of the e-Kiosk and beside the main entrance, they were patients intending to register online. They did not register for themselves, as they did not know how. The Puskesmas officers had to assist them in registering. The use of e-Kiosk was assisted by a Linmas officer, while next to the main entrance, a Puskesmas IT officer was assisting residents to input their registration via laptop. The Puskesmas officer took the initiative of directly registering the patient for their following visit to ease the ensuing registration process.

Based on the patients' interview results, they generally did not know that e-Health provides them the ability to register online. Many of them did not own a cellular device with sufficient capacity for accessing the internet, as the devices they have were simply for calling and sending text messages. There were one or two educated patients, who were not local residents, and were just coincidentally accompanying their family to the Puskesmas. Even the educated patients did not have any information about e-Health; although, in the registration process, they tried to directly register through the e-Kiosk without assistance from the Puskesmas officer. Other educated patients were observed to have attempted registering via their mobile phones. Generally, patients who did not own supporting devices or had limited knowledge or experience using technology stated that the new health service system conducted via e-Health was more troublesome. The manual system was seen to be easier for them, as they only need to queue for their registration number, and then wait for their turn to be called out by the officer.

In spite of the registration function provided through e-Kiosk, some patients only came to take their registration number and then left the Puskesmas with the excuse of having to wait for a long period because they may have to tend to other matters. Upon their return, their number had been called, which was a problem for other patients who were waiting at the Puskesmas to obtain health services. In most cases, people who registered online were often observed to arrive later, which disrupts the order of service provision to other patients.

The challenges found in the e-Health implementation were not merely related to issues of resistance, attitude, mentality, and culture along with the digital divide among the community, as there were also technical problems encountered. The e-Health operation often had issues with the server being down, disconnected internet network, and limitations of internet network capacity. Indonesia's internet network connectivity is still unstable, so there was at least one mass internet connectivity disturbance all over Surabaya that caused disturbance to all online based services. Poor internet network, and weak signal often made it difficult to access e-Health sometimes. The e-Kiosks provided were often inoperable, given the lack of computer capacity, and the sensor, monitor, and printer often did not run properly.

Amid the various shortcomings leading to obstacles and challenges in its implementation, e-Health of Surabaya Municipality is constantly being improved in terms of infrastructure, technical implementation, and variety of services. Hence, the Surabaya Municipality e-Health program has broad potential to be developed as an internet-based health services provision program. The Surabaya Municipal Government was at least open to any suggestions, complaints, and input relating to e-Health implementation. The municipal government holds internal evaluation by conducting routine coordinative meetings. They also formed a complaints team at the Media Center and Surabaya Municipal Health Authority in relation to the e-Health program, wherein problems were directly addressed and followed up.

The coverage of health services provided through the e-Health at Puskesmas was also

broadened. Previously, e-Health services at Puskesmas only provided individual service, whereas currently an expansion is developing that will provide community services. These community services include monitoring of toddler's nutrition intake, and monitoring of elderly individuals, this leads to e-Health not only being curative, but also preventive and rehabilitative as well.

Concerning the infrastructural and technical aspects of e-Health, the Surabaya Municipal Government continuously strives to improve them. For network difficulties, the municipal government already has its own VPN and FO networks, although it is still of insufficient capacity. In order to increase network capacity, the Surabaya Municipal Government through Diskominfo collaborates with PT Telkom to work with a bandwidth speed of 200 Mbps by using FO, so it can operate faster without relying on Wi-Fi signal. Within a broader context of supporting the Surabaya Cyber City plan, the municipal government plans to have 1 million Wi-Fi locations, 2 million Speedy (Broadband/FO internet connection) users, and 800,000 hotspots in Surabaya. The Surabaya Municipal Government also plans to replace all computers, printers, scanners, and monitors of all e-Kiosks along with more sufficient sensors successively to support the performance of health services through e-Health starting in the 2018 fiscal year.

Upon the observation of the commitment, the Surabaya Municipality holds in actualizing Surabaya Cyber City by developing its e-Government through programs such as e-Health, it may be confidently said that the e-Health program's continuity and sustainability will be maintained. In addition to the indications mentioned in the above opportunity developments, e-Health is a government program with its funding entirely provided by the government through the Regional Budget. Hence, pessimistic views of experts concerning the success of e-Health implementation and continuity that may have been observed in developing countries are unsubstantiated in the case of Surabaya. E-Health implementation in Surabaya is not an assistance project, as those in other developing countries wherein the termination of funding assistance means the stop of e-Health project implementation.

Conclusion

Based on the explanations above, it may be summarized that the e-Health innovation implementation in Surabaya Municipality was a necessity for providing efficient health services, which bears the implications on the aspects of economic efficiency, because an orderly, prompt, and assured line of queue results in patients no longer needing to come repeatedly to the hospitals or Puskesmas for one-time treatment and care. E-Health is supported by user-friendly access and is accessible through e-Kiosks provided in various relevant locations or through other means such as personal communication devices. E-Health's ease of use was also demonstrated by the three differing languages function that are representative of the residents living in Surabaya; namely, Indonesian, Javanese, and Madurese.

Nevertheless, the implementation of e-Health innovation still encounters obstacles and challenges, particularly resistance from health workers/officers and users. This is largely due to the issues of psychology, attitude, mentality, and culture based on the prevailing technological gap or digital divide and habitual practice. Another notable challenge lies in the provision of more sufficient technical and infrastructural support in e-Health implementation, because given the currently existing facilities and equipment, the program still lacks the capacity to function optimally.

Despite the variety of obstacles and challenges the Surabaya Municipal Government has encountered, e-Health implementation still

shows opportunities for growth and continuity. This was based on indications of openness and commitment shown by the Surabaya Municipal Government and Surabaya Municipal Health Authority in accepting new ideas, complaints, and grievances, creating policies for assisting in the provision of services to residents or users who have limited knowledge and skills relating to access of technology, as well as in conducting information dissemination, training, and improving e-Health supporting facilities such as network infrastructure, and technical or technological capacity. E-Health is a policy and program created by the government. As a result of this direct government support, including political, legal, and financial aspects, the continuity and sustainability of the e-Health program in the city of Surabaya is assured.

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