

Smart City and Diffusion of Innovations Process: Communicating “Solo Destination” as IoT Implementation of Smart City in Surakarta

Monika Sri Yuliarti
Universitas Sebelas Maret (UNS),
Ir. Sutami 36A, Surakarta, Indonesia-57126
monika.yuliarti@staff.uns.ac.id

Sri Hastjarjo
Universitas Sebelas Maret (UNS),
Ir. Sutami 36A, Surakarta, Indonesia-57126
sri.hastjarjo@gmail.com

Likha Sari Anggreni
Universitas Sebelas Maret (UNS),
Ir. Sutami 36A, Surakarta, Indonesia-57126
likha.sari@yahoo.com

Abstract— Nowadays, there is a rapid development in the trend of a smart city concept. Since the end of 1990’s, many cities have initiated smart city concept. In Indonesia, some cities have been declared as the smart cities. One of them is Surakarta, which also known as Solo, in Central Java province. Meanwhile, smart city is known as the manifestation of Internet of Things (IoT). A smart city needs some online applications to support it. Surakarta has Solo Destination application as one of the online applications that support smart city concept. It consists of novelty, innovation, and new technology, specifically internet connection. Moreover, the diffusion of innovations always comes with the new technology. Well socializing to the people as the target of the new technology development is needed to be done to support the diffusion of innovations process. This paper will analyze the communication strategy as a part of the diffusion innovations process of Solo Destination application, involving the Transportation, Communication, and Informatics Agency of Surakarta city as the main informant. In-depth interview and literature review will be used as the gathering data technique. The findings of the research will be expected as the input for an important initial stage for diffusion innovation process that needs to be done in a new invention.

Keywords— *communication strategy, diffusion of innovations, IoT, smart city, Solo Destination, Surakarta.*

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Biographical notes:

Monika Sri Yuliarti, was born in Batang, Central Java, Indonesia. She was graduated from Master Program of Communication in Universitas Sebelas Maret. Since 2013, she has been being a teaching staff in Communication Science Department, Universitas Sebelas Maret, Surakarta. She has published some modules and article, in new media studies, such as Modules of Social Media Literacy (2016),

The Role of Educators & Students in Building INTEGRITY E-Book (2013), article entitled *Jurnalisme Online: Mampukah Berantas Korupsi?* in *Komunikasi & Permasalahan Korupsi di Indonesia* (2012). Some articles that has published in proceeding and has be presented in national and international conference are *Smart City and Diffusion of Innovations Process: Communicating “Solo Destination” as IoT Implementation of Smart City in Surakarta* (Bandung Indonesia, 2016), *Smart City And Media: When Kompas Online Talks About Smart Cities in Indonesia* (Kunming China, 2016), and *Media Sosial: Mengglobalnya Informasi versus Menurunnya Afeksi* (Depok, Indonesia 2015).

Sri Hastjarjo is a doctor in Communication Science Department of Universitas Sebelas Maret, Surakarta, Indonesia. He obtained his doctoral degree from The University of Newcastle, Australia, majoring in Journalism. Mostly, his researches are about journalism, some are them have the connectivity with the new media. He is currently a head of the department. The latest paper of him, entitled *Local Journalism in the New Media Landscape: Opportunities and Challenges* has made him one of the keynote speaker in an international conference held in Surakarta.

Likha Sari Anggreni was born in Magelang, 26 Februari 1986. She obtained her master degree in Media and Communication, Universiti Kebangsaan Malaysia. She is currently a lecturer in Communication Science Department of Universitas Sebelas Maret, Surakarta. Her publications are: *Modules of Social Media Literacy* (2016), *Social Media Literacy towards Students as an Early Solution to Prevent Global Terrorism* (proceeding, 2016), and *Smart City and Diffusion of Innovations Process: Communicating “Solo Destination” as IoT Implementation of Smart City in Surakarta* (proceeding, 2016). She taught Communication Technology and Advertising project in the department.

I. INTRODUCTION

In this dynamic world, a transformation is a common. There are many innovations appear as the change of the generation. The development of technology comes with the

new concept, namely “internet of things” (IoT), which was already initiated in 1990’s (McCourt, et.al., 2014; Rose et.al., 2015). The emerging if IoT already spread all over the world, including in Indonesia, even there is no empirical exact data about it. At least in 2014, two UC Berkeley friends from Indonesia, Martin Kurnadi and Ikin Wirawan, built an IoT company in Indonesia, namely PT. IoT Company Indonesia, which is claimed as the pioneer for facilitating others in innovating IoT, with a specific name, Geeknesia (about IoT Indonesia, n.d.; Kurnadi, 2015).

Moreover, in the next year, 2015, there were some big events held in Bandung and Jakarta relate to the Internet of Things, they were Asia Africa Smart City Summit in Bandung, on April 2015, Indocomtech 2015 in Jakarta on October 2015, and Tech in Asia in Jakarta on November 2015 (Dipa, 2015; Wisesa, 2015; Wijaya, 2015). All of them shows that IoT became important and start to rise in Indonesia even they had different concept and scope. Asia Africa Smart City Summit, for example, is a forum which is attended by 25 mayors, seven of them are from Indonesia. The event was attended by 446 participants from 39 countries and 69 cities in the Asia-Africa region. The mayors from the Asia-Africa region agreed to establish the Asia Africa Smart City Alliance as part of an agreement after discussing the topic and attending a panel session at the Asia-Africa Smart City Summit (Dipa, 2015). While Indocomtech is a business expo event that involved southeast countries, with the transaction target at about 650 billion rupiahs (Wisesa, 2015). Eventually, Tech in Asia is an event that involves a dissemination of innovation which has the largest scope among others (Wijaya, 2015).

IoT and smart city are the entities that hard to be separated. The part of being “smart” in a smart city is utilizing information and communications technology (ICT) and the Internet to address urban challenges (Mitchell, et.al., 2013). Many cities all over the world have been declared as smart cities, such as Padova in Italy (Zanella, et.al, 2014), Amsterdam in Netherland, Chicago and New York in United States of America, Busan in Korea, an Nice in France (Mitchell, et.al., 2013). The application of internet technology in every smart city all over the world are different each other, based on the infrastructure, the resource, and the need.

In Indonesia, there are some cities that already been declared as smart city, event they have a minimum involvement of internet technology in connecting the people and the program. Bandung is one of the cities in Indonesia that already settle in the application of IoT for the smart city programs. Jakarta, Bogor, Makasar, Aceh, Balikpapan, Depok are the other cities that have become a partner for a platform that is built by researchers and professionals focusing in smart city field for developing the smart city in Indonesia namely SmartCityID which based in Bandung (About SmartCityID). Unfortunately, there is no official valid data provided by government about the database relates to the smart city in Indonesia.

In some media, Solo was mentioned often relates to the smart city. In official website of kota Solo, The Head of Transportation, Communication and Information Agency of

kota Solo mentioned that in August 2015 the city is declared as a smart city along with other 15 cities in Indonesia (Solo Mendapat Penghargaan Smart City, from official website of kota Solo). The implementation of innovation in technology that supports the smart city in Solo is an application, namely “Solo Destination”.

The innovation that comes from the invention of internet is inevitable. However, communicating the innovation is also an important thing. Sharing it with the people is important. People need to know the innovation. They need to get the information about what is it, how to get it, where to get it, how to use it, what are the functions of it, and many more questions that need to be answered. This paper is an initial stage of the more complex process on communicating the innovation, called diffusion of innovation. Therefore it is important to be done, so that further research about the whole process of diffusion of innovation can be done.

2. Solo Destination, An Implementation of Internet of Things Application for Smart City

There are so many applications that can be used to support a smart city. By looking at the definition, smart city means a city that smart. The element of smart comes from some technology innovations as the representation of IoT for every aspect of human’s life.

Solo Destination application was launched in February 2014 (Primartyanto, 2014). It is an android basis application which is established due to the challenge in modern era where information should be fulfilled by a touch of the finger on the screen. Based on data, Indonesia is the largest market for smartphone among other countries in Southeast Asia. IDC, a market research agency, has just published a data about the shipping of smart phone in Southeast Asia in 2015. It is showed that Indonesia is the biggest market of total market (29%). Thailand and the Philipine are in the second and the third position (22% and 14%) (Hidayat, 2016). The data showed that many people already choose smart phone as their communication tool. In line with the increasing market of smart phone, Solo Destination application is launched to answer the need of the people relating to the easiness of fulfilling their daily needs.

Solo Destination is an application as a part of Solo city as the smart city that can provides some information about potential excursion for the traveler specifically and for the people generally, such as tourist attraction, culinary, traditional shopping centre, and hotel. By installing it, people don’t need to type the address of a site before they need the information. It will safe more time. Another advantage from the application is the ability of showing the real time information, for example the schedule of Batik Solo Trans (BST – a shuttle bus in the city). People will know how long they must wait for the next bus that will take them to their destination.

Beside, the application will give its users a notification by the time they come into the city. The notification will provide cultural agenda of the city. Moreover, it also has a link to other application that still has connection with the tourism matter, such as information for traffic, alternative route,

alternative way to get to a place, the cost for taking some transportation means, and so on. More subscribers are seemed after the application provides the flight schedule and the status of flight schedule in Adi Sumarmo Airport in the city.

Conceptually, IoT is an internet connectedness and the ability of computing system with the objects, tools, sensors, and everyday's item (Karen, et., al., 2015). The keyword of IoT is connectedness. The smart city concept, as part of an IoT also has the same principal. It needs to be supported by some aspects. There are at least four aspects that supports smart city concepts, they are people, data, things, and process (Mitchell, et.al., 2013).

Each of the aspect plays the same role to support the success of the smart city concept. Nowadays, people connect to the Internet using their devices and social networks. By the evolving of the internet, people will be able to be connected in more relevant and valuable ways. In the future, it is possible to check on our health without seeing the doctor, but through a secure internet connection. The second aspect is the data. With IoT, devices will collect data and stream it over the Internet to a central source. Later, it will be analyzed and processed, by combining data into more useful information, and then the useful information will be sent back to machines, computers, and people for further evaluation and decision making. The following aspect is the things, they are kind of physical items such as sensors, consumer devices, and enterprise assets that have connection to the internet and each other. They have the ability to sense more data to help people and machines make more relevant and valuable decisions. Eventually, the last aspect in smart city concept is the process. Process plays an important role in how each of these aspects — people, data, and things — works with the others to deliver value in the connected world. With the correct process, connections become relevant and add value (Mitchell, et.al., 2013).

In the context of Solo Destination as an application that support Solo as a smart city, the concepts that support an IoT can be explained : (1) People – the human resources that can support the application; the information provider such as the seller, the hotel and restaurant owners; the user; (2) Data – the information that is published in the application; and (3) Things – the technical and sensory devices that make the application works.

3. Diffusion of Innovation

As mentioned earlier, the development of technology needs more than just the intervention of innovation itself. After being invented, there still is an important job need to be done. Communicating an innovation is important, so that more people will aware of it, use it, and get the benefit of it. It is what is called diffusion of innovation.

Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. While innovation is an idea, practice, or object that is considered new by individuals or groups of people. The phrase is considered new to an idea, practice or object by some people, not necessarily the most another (Rogers, 1983).

Diffusion of innovation theory has been being used for the studies relates to the new technology in some fields such as education (Lee, et.al., 2011; Ntemana & Olatokun, 2012), gender (Castrillon & Cerradelo, 2014), and bussiness (Ghobakhloo, et.al., 2012; Prasida & Subriadi, 2015). They have studied varying aspects of diffusion of innovation, from the attributes of diffusion of innovation to the effect of the innovation itself.

Diffusion is a special type of communication, where the messages are concerned with new ideas. As the common communication goal, diffusion also tries to reach a mutual understanding between the source and the receiver. In the case of this research, diffusion has a close relation with the mutual understanding between the Transportation, Communication, and Informatics Agency of Solo city as the government agent that in charge in this application, and the people of Solo or the people generally as the targeted receiver. The targeted receiver in this context is the people of Solo city, around Solo city, and also tourists from all over Indonesia, or even tourists from all over the world. Besides, because it is an application that supported by the merchants, the targeted receiver are also the entrepreneurs, shop owners, and hotels or restaurant management. Moreover, the innovation in this case is the Solo Destination application that is considered new by the people, because the involvement of the internet in people's activity, even for regular one. The regular or common activity that can be done easier using this application is finding a place to get food.

From the definition above, it is clear that diffusion consists of four elements, they are: the innovation, communication channels, time, and the social system. In this context, the innovation is the Solo Destination application, the communication channels are the means that are used by the authority to share the ideas of the innovation to the society.

Moreover, the third aspect, time, can be explained that there is a timeline in communicating the application, and the last is social system means that this innovation will give the benefit to social life. It will gain the effectiveness of people's activity and the easiness of doing something that relates to the internet.

In the diffusion of the innovation there is a well-known concept, namely the innovation-decision process (Rogers, 1983). It is a process where an individual passes from first knowledge of an innovation to forming an attitude toward the innovation. Some individual will adopt it, and some of them will reject it. There are five stages in the process: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. Knowledge happens when an individual get the information that an innovation is exist, and understand how it functions. Persuasion occurs when an individual establishes a favorable or unfavorable attitude to the innovation. Decision occurs when an individual engages in activities that lead to a choice to adopt or reject the innovation. Implementation occurs when an individual use the innovation. Confirmation occurs when an individual seeks boosting of an innovation decision that has already been made, but he or she may reverse this decision if something bad in the future.

Establishing knowledge is the first stage that will support others stages. There are some indicators in it, such as the target gets the information about the innovation, the target understands the information about the innovation, and the target knows how to use the innovation. If the targets already reach the three indicators stated above, they will get the benefit of it.

II. RESEARCH APPROACH

It is a descriptive qualitative research, where the data that are being used are descriptive data consists of words and narration. In-depth interview was conducted in this research to gain the data from the informant. The informants itself are chosen by certain criteria, so, purposive sampling is used in this research. The criterion that already is determined is having the knowledge about Solo Destination Application. Since it is an application that support smart city program in Solo city which is established by the local government, so, the informant in this research is the section head of informatics network and information of Transportation, Communication, and Informatics Agency of Solo city. Finally, the data analysis technique used in this research is interactive technique, where data from interview are being cross-checked with the data from review literature.

III. RESULT

Diffusion of innovation is a part of a bigger concept. An innovation will be more valuable if it has affected people's life. The more people who gets the benefit of it, the more valuable an innovation is. Therefore, there is a concept namely adoption. In this concept, people already use the innovation and get the benefit of it for their life. Moreover, this research only focuses in the diffusion process. It is the initial stage, so that it is need to be paid attention to. The success of the whole stages will be determined by the first step, which is how communicating the innovation to the target.

According to head of informatics network and information of Transportation, Communication, and Informatics Agency of Solo city, the agency already did some efforts to communicate Solo Destination application to the target. There are two groups target in this communication process. The first target is the merchants, the second target is the people. For the merchants, the agency often gathers some communities, such as hotel management community, batik craftsmen community, and also food vendor community. In each different occasion for each community, they will be socialized about Solo Destination application. The agency gives the information about the product knowledge of the application. Theoretically, it is a group communication. (Terry, 2013) said that group communication is crucial in forming the trust between the participant, while the trust is needed to reach the goal that has been set on the using of an innovation invention.

Building the trust in the context of communicating the product knowledge of an innovation is not an easy work. It is showed in the process of communicating Solo Destination application to the communities that are being targeted to be the merchants. The involvement of internet technology appears to be an issue that appears among the community.

They have the fear that they might be surveillance for all the time because the GPS feature allows other know their position. It is quite common happens in the communication process of an innovation. One of the challenges of IoT implementation is privacy and security challenge (Chen, 2014). Different from traditional networks, security and privacy issues of IoT become more prominent, because much information includes privacy of users, so that protection of privacy becomes an important security issues in IoT. More management objects and levels are needed to deal with this challenge than traditional network security.

Having group communication with the potential merchant is the communication channel that has been done by the agency as the effort to build the awareness of the merchants about the application. Moreover, as the next step, as in persuasive effort, the agency doesn't have a special strategy to reach the goal in persuasive stage. The agency only does the repetition of the group communication to the merchants without having some specific strategy as the persuasive effort. The messages that are being transferred to the merchants are not quite vary. The agency doesn't give the technical information to the merchants, as it will be just confusing them and might be causing the problem where the merchants might not agree to join in the application eventually.

The second target for Solo Destination application is the market target, it is the people of Solo city or even people from other cities when the visit Solo city. For the second group of target, the agency use online communication channel to communicating Solo Destination application. The agency uses twitter to share the information about the application, using the agency official twitter account @dishubkominfo, mayor of Solo city official twitter account, @pemkotsolo and and a twitter account that actively updated the cultural or regular agenda of Solo city, @agendasolo. The using of twitter account features, such as RT (retweet) and Like becomes an everyday activity for the person in charge.

As the communication channel to the merchants, online communication to the market target also finds challenges. One of the crucial challenges is the human resources, quantitatively and qualitatively. There is no person that special in charge relates to the work on online communication to the market target. Sometimes, they work in shift although they already have another responsibility. The agency have been already trying to solve the shortage of the human resources by hiring some students who will be an intern in the agency for two or three months.

IV. DISCUSSION AND CONCLUSIONS

From the elaboration in the previous part, it can be conclude that the Transportation, Communication, and Informatics Agency of Surakarta city has already apply diffusion of innovation process of Solo Destination application, as one of smart city application. Moreover, there is no specific strategy in communicating it, especially in the stage of persuasion. The channels that have been chosen to communicate Solo Destination application are group communication for the merchants, and online communication for the market target. Meanwhile, some challenges that appear

in communicating Solo Destination application are human resources and security challenge. This research can be developed further by continuing the study of diffusion of innovation and also the adoption of the merchants and the market targets.

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