

Identification Indicators and Variables to Measure the Implementation of Smart Safety and Security (a Study in Bandung City)

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Abstract

The increasing number of world population and high levels of urbanization require government to seek more efficient and effective ways to solve urban problems. One of the problems is safety and security. This research finds out the variables to measure the smart security and safety implementation of a city. By using qualitative method, this study able to formulate a model that can be used to measure smart safety and security in Indonesia as well as in other countries.

Keywords

Smart city; smart safety & security; urban; Indonesia.

1. Introduction

Global trend urbanization in addition to create business opportunities also had significant risk, one of them is factors of safety and security. Urbanization is an issue first most significant impact on economies, societies and culture in the world in the end of 2025 [1]. According to the Central Bureau of statistics of the year 2016, this research obtained information that the percentage of the population of the urban areas in West Java Province is 72.9% in 2015 and is expected to increase to 83.1% in 2025 [2]. So that West Java Province has the highest level urbanization in Indonesia and Bandung as the capital city of West Java has been impacted badly.

The increasing population of the city will impact positively and negatively, one of negative impact is increasing safety and security risk in urban areas. Safety and security is a very important factor for the citizens and the city itself. With the providing safety and security to a city, it would support the process of sustainable development and increase the level of comfort and happiness of the citizens. In accordance with basic human needs, safety and security is an important factor and fundamental to be fulfilled.

The factors of safety and security that need to be anticipated and managed properly are the factors that have impacts on the safety of inhabitants of the city or the residents, security of infrastructure/properties and data information. The damage could be caused by criminal action, accidents or natural disasters. The utilization of information and communication technologies (ICT) can be one of the solutions to the problems such as the use of ICT by the citizen and government to respond or prevent any safety and security problems, in particular is in applying the concept of the smart safety and security solution

2. Research Objectives and Questions

In applying the concept of smart security and safety as part of smart city solutions in cities across Indonesia there has not been a clear standard particularly in Indonesia. Hence there is still the need to identify variables of the standard application of the concept of a smart city in particular on smart safety and security dimension with the object of research is Bandung city.

The objective of this study is to determine the variables that can be used as a reference in measuring smart city, in particular variables related to smart safety and security which are obtained based on literature reviews and depth interviews as well as focus group discussion.

3. Research Methodology

This research used qualitative method. Research methods involving data analysis in the form of descriptions and the data is not directly can be quantified where qualitative data is done by administering the code or category [3]. Researchers use a qualitative approach to understand the indicators of smart safety and security that can be used to measure part of smart city. This approach is also used because researchers are trying to get a deep and complete picture of the smart safety and security indicators with the object of research that has experience in terms of smart city. This study is also expected to contribute academically and practically in the concept of smart safety and security as a part of smart city.

In addition, this study is also an explorative research, as expressed by Creswell that in qualitative project, researchers describe the research issues that are really easy to understand way of exploring an a particular concept or phenomenon [4]. In this study the researchers would like to illustrate the important variables that are associated in the measurement of the smart safety and security.

This study was conducted with the following research stages:

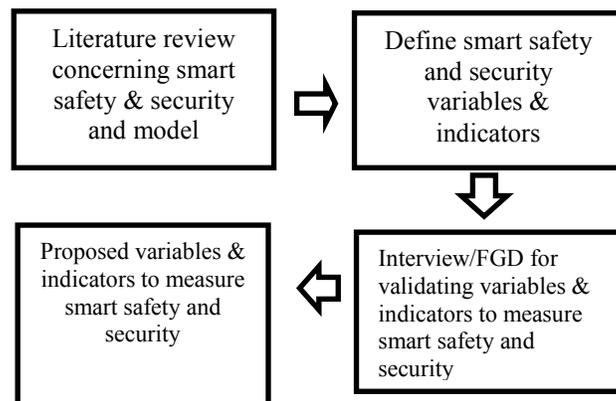


Figure 1. Smart Safety and Security Research Stages

The literature review means that this study searches relevant theories related to theories of smart city, the definition of smart safety and security and variables of smart safety and security. The next step is filtering variables

which is founded in all existing literatures. The result of this stage is to determine of the variables to be used in the research.

In depth interviews and focus group discussion (FGD) are the process for confirming the variables that have been obtained through literature review by asking and face-to-face questions and answer between the interviewer and the informant.

In this study, researchers used *purposive sampling* method for selecting the informant. Purposive sampling in the study is done by deliberately choose a few people from each category of stakeholders that are considered to have the capability to answer the questions of research. This study has certain subject characteristics to be used as a data source. Some characteristics of informant used in this research are :

1. Involved actively in the implementation of the smart safety and security areas covered during the last 3 years (from 2014 to 2017), where the involvement form:
 - (a) Do some research or observations related area actively the implementation of the smart safety and security.
 - (b) Resolving policy and management related areas actively the implementation of the smart safety and security as part of the duties and the powers that run.
 - (c) Provisioning product or service-based Information Communication Technology (ICT) that support the implementation of the smart safety and security.
 - (d) Receive benefits over the implementation of the smart safety and security in Bandung.
2. Have the academic background of the relevant Bachelor's degree equivalent.
3. Have knowledge about the concept of smart city and aware over the development of the application of smart city, smart safety and security especially in Bandung during the last 5 years (from 2012 to 2017).

According to these characteristics, Researchers collected data with type of respondents as shown on Table 1.

Table 1. List of Respondent

Type of Respondents	Definition	List of Respondent
Researchers / Observers	The researchers, observers or advisors who serves as the drafter or related academic Developer Smart City especially smart safety and security	Smart City Research Team From The College
		The Consultants Observe Smart City
		Research Team Development of Industry
Government	Bandung City Government and related institutions which play a role in the management of the implementation of the smart safety and security	Smart City team of Bandung City Government
		Communication and Information Department
		Fire Service & Disaster Management Department
		Police
Industry	The service provider or information and	PT. Telekomunikasi Indonesia, Tbk.
		PT. Telkomsel
		PT. PINS

	communication technologies in the field of smart safety and security	
Citizen / Customers	Users or subscribers of smart safety security	Users

In analyzing the data that has been retrieved in this study is the data analysis that include the reduction of data (data reduction), the presentation of data (data display) as well as the withdrawal and verification of conclusions [3], [4].

Qualitative method of data reduction is a form of analysis that voting, sharpening, simplifying through summary or outline, classified in a wider pattern, direct, dispose, and organize the data such that the conclusion conclusion can be drawn and finally verified. Data reduction or transformation process is continued until the final report is completed [3], [4].

Further process is coding the data, the process of organizing the data by collecting the pieces and write the category within the limits. This is done by giving the code on data obtained using predetermined indicators. After identifying the theme during the process of coding, researchers capitalize further on this, to make the analysis more complex. Researchers attribute the theme in a series or develop these themes into one theoretical model (such as in the grounded theory). Researchers can make code to describe all the information, and then analyzing it through case studies. The application of the coding can create categories. This categories divided into smaller ones usually being the main results in the research [3], [4].

The final step in the analysis of data is making qualitative research interpretation or interprets the data. Interpretation of the data can be a comparison between the results of the interview or FGD with the information derived from the literature. Researchers justified their research results by confirming or approving precisely the information derived earlier. Interpretation could be definition and also be new questions that need to be answered next. Conclusion and verification is performed during the data collection activities carried out [3], [4].

4. Smart Safety & Security Criteria: Literature Review Result

The literature study was conducted to find out the definition of smart safety and security. Afterward deepening of reference used to obtain dimensions and indicators of smart safety and security.

4.1 Definition of Smart City

In recent decades, the concept of smart city has grown to solve the problems of a city. Some studies attempt to define the concept of smart city according to their prespective contexts. Understanding this concept has a very broad meaning that leads to there is no standard definition of a smart city.

Smart City is a city that is applying Information and Communication Technology (ICT) to enhance the feasibility of residential, performance and sustainability of city life [5].

Smart City is a holistic approach that aims to meet the challenges of the current urban and exploit opportunities in ICT advances and related increase in urbanization[6].

Smart City deals with a principle which the cities are using ICT to be able to utilize the resources of the city with a more intelligent and smart, efficient and effective and the inhabitants of the city benefit in the form of living conditions better because a lot of positive changes occur [7].

One of the results of conference ITU [8] stated that a sustainable smart city is a city full of innovation using ICT and various other devices to improve the quality of life, the operating efficiency of the city and his Ministry, as well as power competitiveness, while keeping the city in order to meet the needs of present and future generations in relation to aspects of economic, social and environmental.

4.2 Smart Safety & Security Variables

Researchers classify the variables research based on a review of the literature that has been done. Based on some of the literature that was studied, the researchers summarize six variables that can be used in this study. The following is an overview of the smart safety and security variables.

Table 2. Smart Safety & Security Variables based on the Literature Review

No	Variables of Smart Safety and Security	Smart Cities Council 2013	Frost & Sullivan 2014	Economist Research 2015	Roita & Gartner 2015
1.	Regulation / Policy	✓		✓	
2.	Awareness	✓		✓	
3.	Experts	✓	✓	✓	
4.	Monitoring and control system		✓		✓
5.	Emergency system			✓	✓
6.	Prevention system		✓		✓

5. Smart Safety & Security Variables: Based on in-Depth Interview & FGD Results

Data collection techniques used to obtain data are in-depth interview and focus group discussion (FGD). This study has adjusted the in-depth interview and FGD with the conditions of Indonesia to make the study fit with the social and culture background of Indonesia [9].

With the characteristics of the objects that has been determined, some speakers has been taken are government, business player, experts and customers.

Based on the results of research through interviews and FGD, this research obtained new variable to be added to the existing variables in existing literature, namely system recovery which is defined as the existence and effectiveness of recovery system over the impact of the accident, crime or disaster. The results of the second phase of this research can be seen in Table 3.

Table 3. Smart Safety & Security Variables Based on Interview and FGD

Variables	Percentage
Regulation / Policy	71%
Awareness	79%
Experts	90%
Monitoring and Control System	81%
Emergency System	67%
Prevention System	80%
Recovery System	83%

From Table 3 it can be seen that the seven variables examined and presented to the respondents were all approved (assuming the validation threshold was > 50%), since the lowest percentage of respondents who approved the variable is 67%. Therefore, this study concludes that the entire seven variables can be used to measure the smart safety and security dimension of smart city.

6. Conclusion

This research found that there are seven variables that can be used to measure smart security and safety dimension of smart city, the variables are: 1. Regulation / Policy, 2. Awareness, 3. Experts, 4. Monitoring and Control System, 5. Emergency System, 6. Preventive System, and 7. Recovery System. The first six variables are derived from the existing literatures and the last variable (recovery system) is a new variable derived from interview and FGD. Therefore, this research suggests a model for a smart safety and security measurement in a smart city as presented in Figure 2.

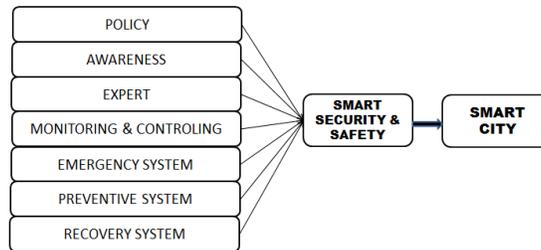


Figure 2. Proposed Model to Measure Smart Safety & Security in Bandung

Research on smart safety and security's variables can be continued by exploring the indicators of each variable and doing pilot test to the variables and indicators obtained. The obtained and tested variables and indicators can be used to calculate index of readiness of city government and its society in applying smart safety and security as part of smart city.

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Biography

Indrawati was born in Indonesia and received her master degrees from Padjadjaran University (UNPAD), Indonesia, majoring in Management. She received her Ph.D. in Faculty of Management, Multimedia University (MMU) Malaysia. Indrawati's research interests include Adoption of Services based on Technology, Competitive Intelligent, Innovation, New Product Development, New Product Acceptance, Creative Industry, , E-commerce, and Smart City. She has published more than 300 articles in newspaper, tabloid, magazines, national (in Indonesia) and international proceedings and journals, as well as books. Several of her articles have got awards in several events, such as: the eight best articles on the 4th International Conference on E-Commerce with Focus on Developing Countries (ECDC), Kuala Lumpur Malaysia on 3-4 November 2009, the best paper on Smart Collaborations for Business in Technology and Information Industries (SCBTII) Conference, Bandung Indonesia August 15th -16th

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2016, and the best paper on International Seminar and Conference on Learning Organization (ISCLO) 2016,
Bandung Indonesia, October 26th 2016.