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Smart City and Geospatial Information Availability, Current Status in Indonesian Cities

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Abstract

Developing smart city requires many types of information, including geospatial information. Geospatial information serves as the base data from which other data will be referenced upon. The production, provision and dissemination of geospatial information in Indonesia are regulated by Law 4/2011 on Geospatial Information. However, only few areas have been mapped at the scale of 1:10,000 and 1:5,000. This situation left many cities without large scale map able to depict building footprints or parcel boundaries. To obtain information on the geospatial information availability in Indonesian cities, a survey has been carried out nationally from April – July 2015, as part of a research on spatial data infrastructure. 90 cities/districts participated in the survey. The findings show that majority of the cities/districts have limited availability of large scale topographic maps and land parcel maps. With regard to developing smart cities, these issues should be put in the mainstream to get higher priority.

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1. Introduction

1.1. The needs for geospatial information

Geospatial information is required in many types of city's activities, from developing spatial plan, issuing building permit, to monitor city's growth. Amongst local government decisions and activities, around 80% has

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spatial footprints (O’Looney, 2000). Although the conclusion was based on situation in the United States of America, nonetheless it reflects the importance of geospatial information.

There are many geospatial information applications which support smart city concepts, such as sanitation, calculation of (drinking) water based on household and location distribution, energy budget, CO₂ emission based on households and traffic pattern (Walker and Daniels, 2011). These can be achieved if there is large scale map able to depict individual houses. Further, location and allocation problem is better managed by fine resolution geospatial information. Developable and non-developable land can be better determined after consideration of, for example, location of natural and man-made hazards.

To achieve those conditions, many types of geospatial information is required, specifically large scale ones. These includes land parcel map, building footprints, and map of detailed spatial planning (RDTR). Land parcel map usually made in the following scale, 1:1,000, 1:2,500 and 1:10,000, while RDTR map made at scale of 1:5,000. At these scales, individual houses can be plotted accurately which can be used to facilitate smart city development. Knowing geospatial information availability at the local government is essential to evaluate smart city implementation.

1.2. Geospatial information production and availability

Geospatial information is geospatial data which has been processed in such a way that they can be utilized for facilitating planning, decision making, and all relevant activities related to location (Law 4/2011). Several methods can be used to develop useful geospatial information, i.e. terrestrial survey, photogrammetry, remote sensing using very high resolution satellite imagery, LiDAR mapping, and UAV photos. Each of these methods has their own strength and limitation. For example, terrestrial survey provides highest accuracy but at the expense of time and cost. Combination of LiDAR and photogrammetry is currently being the most reliable method to map large area with detailed 3D information. UAV photos is also gaining a lot of attention for its mobility and ease of use. Regardless of the method to develop geospatial information, the geospatial information availability is of high importance.

The national mapping program has been started since 1951 by the establishment of Board of Survey and Mapping, regulated in Government Regulation 71/1951. In the following years, the name of the agency responsible for national mapping was changed several times, from the Board of National Surveying and Mapping, and Command for Surveying and Mapping (Presidential Decree 263/19965) to Coordinating Agency for Surveys and Mapping/Bakosurtanal (Presidential Decree 83/1969) and finally to Geospatial Information Agency (Badan Informasi Geospasial: BIG) regulated in the Presidential Decree 94/2011.

Mapping activities is a huge task, especially when considering the total land area of Indonesia which is almost 2 million square km. Beside time consuming, survey and mapping activities is expensive. Funding and expertise were the two most challenging conditions hampering early mapping activities in Indonesia. Therefore, it is understandable that the mapping land area in Indonesia has not been completed. However, recent requirements in several laws indicate that there is an urgent need to have medium to large scale map available prior to commencement of development. For example there is a requirement to use basic map at scale 1:5,000 for the development of detailed spatial plan. Topographic map (or peta rupabumi in the official BIG naming system) at this scale is limitedly available. As an alternative, district/city has to rely on 2D map (without height component), to develop RDTR.

This research is a follow-up of similar survey conducted in 2008 (Sutanta, 2008), 2013 (Sutanta et al., 2013), and 2013-2014 (Sutanta et al., 2014). The 2008 survey was focused on online availability of maps in local government (district/city) websites, which was later widen to cover provincial websites in 2013. The 2013-2014 survey investigated Spatial Data Infrastructures (SDI) Readiness in local government, of which geospatial data availability is one of the element (Eelderink et al, 2008). The difference between previous researches is on the focus, methodology, and coverage.

This research broaden the scope of the previous surveys to cover all local government in Indonesia. There was no such comprehensive survey for the whole local government conducted in single year. It is essential to have this type of information to facilitate better planning for national mapping activities. Information gathered in this research is sought from returned questionnaire. We assume that all head of local planning agency (Bappeda) instructed the right person to fill in the questionnaire and the staff who received this duty consult others who may have better knowledge.

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