One map policy (OMP) implementation strategy to accelerate mapping of regional spatial planning (RTRW) in Indonesia

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Abstract. A preparation of spatial planning documents require basic geospatial information and thematic accuracies. Recently these issues become important because spatial planning maps are impartial attachment of the regional act draft on spatial planning (PERDA). The needs of geospatial information in the preparation of spatial planning maps preparation can be divided into two major groups: (i). basic geospatial information (IGD), consist of of Indonesia Topographic maps (RBI), coastal and marine environmental maps (LPI), and geodetic control network and (ii). Thematic Geospatial Information (IGT). Currently, mostly local government in Indonesia have not finished their regulation draft on spatial planning due to some constrain including technical aspect. Some constrain in mapping of spatial planning are as follows: the availability of large scale of basic geospatial information, the availability of mapping guidelines, and human resources. Ideal conditions to be achieved for spatial planning maps are: (i) the availability of updated geospatial information in accordance with the scale needed for spatial planning maps, (ii) the guideline of mapping for spatial planning to support local government in completion their PERDA, and (iii) capacity building of local government human resources to completed spatial planning maps. The OMP strategies formulated to achieve these conditions are: (i) accelerating of IGD at scale of 1:50,000, 1:25,000 and 1:5,000, (ii) to accelerate mapping and integration of Thematic Geospatial Information (IGT) through stocktaking availability and mapping guidelines, (iii) the development of mapping guidelines and dissemination of spatial utilization and (iv) training of human resource on mapping technology.

1. Introduction

In general surveying and mapping activities will produce data and information about condition and potential of resources in any region. Data and information are very important for sustainable development of country. The increasing need of data from surveying and mapping activities absolutely requires guidance, policies, strategies and programs.

Based on Republic of Indonesia (RoI) law No 26 of 2007 about Spatial Planning [1], mandated that spatial planning map must be drawn up on a national, provinces, and region levels is spatial structure and pattern. In Indonesia, a spatial planning is a product of regional regulation that would be depicted on map. Geospatial information (GI) is not only used for visualization of spatial planning in form of a map, but GI has been intensified also used for inventory, monitor changes and analysis of various kind of spatial aspect to support spatial planning activities. Under The RoI Law No 4 of 2011 about Geospatial Information [2] defined that, Geospatial is data about location of area, object or an event that...
is naturally or artificially occurring in, on, and above the earth. The data has been processed through certain analysis method is namely geospatial information and this GI could be used as a tool in policy formulation, decision-making and/or implementation of activities related to spatial aspects.

A preparation of spatial planning documents would require accurate and reliable of basic geospatial information (IGD) and thematic geospatial information (IGT) This is important because map would be part of attachment of regional act draft on spatial planning (PERDA). Text description written in the PERDA should illustrated spatially in a map. Therefore, the aspect of precision and accuracy is important. The need for geospatial information for spatial planning divided into two major groups:

- Basic Geospatial Information (IGD), the Topographic map of Indonesia, at scale of 1: 250,000, 1: 50,000 and 1: 25,000.
- Thematic Geospatial Information (IGT), thematic data required for spatial planning is shown at Table 1 [3].

**Table 1.** The need for IGT in spatial planning.

| IGT types                        | Scale               |
|----------------------------------|---------------------|
| IGT climatology, include:        |                     |
| • rainfall map                   | province: 1: 250,000|
| •                                   | district: 1: 50,000 |
| •                                   | city: 1: 25,000     |
| IGT topography, include:         |                     |
| • elevation map                  | province: 1: 250,000|
| • slope map                      | district: 1: 50,000 |
| •                                   | city: 1: 25,000     |
| IGT geology and soil, include:   |                     |
| • geological map                 | province: 1: 250,000|
| • soil type map                  | district: 1: 50,000 |
| •                                   | city: 1: 25,000     |
| IGT minerals, include:           |                     |
| • potential excavation class C map| province: 1: 250,000|
| • potential mining map           | district: 1: 50,000 |
| •                                   | city: 1: 25,000     |
| IGT hydrology, include:          |                     |
| • surface water map              | province: 1: 250,000|
| • groundwater map                | district: 1: 50,000 |
| •                                   | city: 1: 25,000     |
| IG natural disaster, include:    |                     |
| • tsunami disaster risk map      | province: 1: 250,000|
| • volcano disaster risk map      | district: 1: 50,000 |
| • landslide disaster risk map    | • city: 1: 25,000   |
| • flood disaster risk map        | • city: 1: 25,000   |
| • earthquake disaster risk map   | • city: 1: 25,000   |
| IGT land cover and land use map  | province: 1: 250,000|
| •                                   | district: 1: 50,000 |
| •                                   | city: 1: 25,000     |
| IGT integration evaluation of land resources | province: 1: 250,000|
| • land capability map            | district: 1: 50,000 |
| • land suitability map            | • city: 1: 25,000   |
| IGT infrastructure system        | • province: 1: 250,000|
| •                                   | • district: 1: 50,000|
| •                                   | • city: 1: 25,000   |
• transportation system map
• energy/electricity system map
• telecommunications system map
• water resources map

IGT physical development policy
• forestry region map
• mining region map

| Source: the ministry of public works regulation No 20 of 2007 about technical guidelines for physical aspects and environmental analysis, economic and socio-cultural in the preparation of the spatial planning map. |
Availability of IGD and IGT as mentioned above are a prerequisite for ideal conditions. Maximum utilization of geospatial information should involve the accuracy and precision of IGD and completeness of IGT analysis to obtain satisfied spatial planning pattern (landuse plan and structure plan). Implementation of mapping of spatial planning in field has not optimally well because of several conditions. It has been affected for such as the data availability, guidelines, human resources, and as well as technology indeed. The solution to these conditions required a comprehensive strategy that would includes stages of the program that meet the needs for mapping of spatial planning.

2. Analysis of the spatial planning maps condition

To view conditions of spatial planning maps at regional and national levels, it can be grouped into three aspects: (i) the completion progress of spatial planning regulation, (ii) the availability of geospatial information including IGD and IGT, along with guidelines (iii) the trans boundary distribution of human resources.

2.1. The completion progress of spatial planning regulations

Completion of planning regulations refers to the RoI law No 26 of 2007 about Spatial Planning, article 78 paragraph 4 states that: "all the regulations of the district/ city on spatial planning should be arranged or adapted in 3 (three) years since of this law (2007)". The statement urges spatial planning has to be arranged or adapted at least for two years. The table below shows the progress of the legislative drafting on the spatial planning [4].

| Table 2. Status of the spatial planning legislation at provincial district and city. |
| Status | Province | District | City |
|--------|----------|----------|------|
| Not finished | 9 | 70 | 9 |
| Already finished | 25 | 329 | 84 |
| Total | 34 | 399 | 93 |
| Percentage of completion | 73.5 % | 82.5 % | 90.3 % |

Source: www.penataanruang.net (updated May 26, 2015).

According to table 2 can be seen that completion of the spatial plan for the province only 73.5%, 82.5% for the district and 90.3% for the city. A fact that could be drawn, until now there are 9 provinces, 70 districts and 9 cities that have not completed their spatial planning legislation draft yet. Of course more efforts are needed to assist the completion of spatial planning regulation.

2.2. Availability of geospatial information and guidelines

Table 3 shows the availability of topographic map for supporting spatial planning work. The availability of IGD, in form of the topographic map scale of 1: 250,000 has been completed in 2013. However, topographic map scale of 1: 50,000 available at arround 72% of national territory
in 2014. Topographic map scale of 1: 25,000 are available only for Java, Bali, Nusa Tenggara and Sulawesi. The other island such as Sumatra, Central Kalimantan, East Kalimantan, Papua, as well as Banten province have been pushed up to finished topographic maps at scale of 1: 25,000. In general, the availability of topographic maps for small scale (below 1:25,000) spatial planning maps is quite sufficient, however for large scale (above 1:25,000) of spatial planning map the availability of its map limited. The table below shows the availability of the topographic maps at various scales [5].

### Table 3. Availability of topographic maps

| Scale     | Number of sheets | Percentage |
|-----------|------------------|------------|
|           | National coverage | Available | Not yet available |          |
| 1 : 5,000 | 379,012          | 539       | 378,473          | 0.14%    |
| 1 : 10,000| 91,547           | 1,074     | 90,473           | 1.17%    |
| 1 : 25,000| 13,020           | 3,894     | 9,126            | 29.91%   |
| 1 : 50,000| 3,899            | 2,837     | 1,062            | 72.76%   |
| 1 : 250,000| 309              | 309       | 0                | 100%     |

Source: Center for Topographic Mapping and Toponymy, Geospatial Information Agency (BIG).

The RoI Law No 4 of 2014 on Geospatial Information has mandated that the preparation of IGT is the responsibility of the Ministry / Institution, while Geospatial Information Agency (BIG) would be able to organize IGT that has not been conducted by Ministry / Institution instead of BIG. The preparation of IGT for spatial planning has encountered several problem especially in terms of coordination and technical system indeed. Issues relating to the implementation of IGT to support spatial planning may be grouped into four majors:

- The existency and distribution of the IGT for spatial planning still remain unclear that would influence on the speed of completion of spatial planning maps nationally.
- The availability of IGT that could be used for spatial planning still limited. This condition actually can be a trigger for starting point for the completion of IGT nationally.
- Limited guidelines document for spatial plan mapping. The guidelines will accelerate the completion of the spatial planning mapping.
- Lack of action plan in the context of accelerating the implementation of IGT involving all Ministry/Institution.

The roadmap of topographic maps completion at scales of 1: 25,000 and 1: 50,000 have been completed. This means that the need for spatial plan mapping at these scale area already supported. The problems that still need to be resolved is how to coordinate the completion of IGT, concerning the appointment of custodianship, guidelines and make the completion for spatial plan IGT become mainstream so that it becomes a target for the entire Institution.

2.3. *The trans boundary distribution of human resources*

Geospatial Information Law in article 57 mentioned that BIG has a mandate support management of IGT. A fostering Geospatial Information to users can be done through: socialization of geospatial information and its utilization; technical education and training. In order to develop these approachment, BIG has socialized technical guidance for mapping of spatial planning, assistance and supervision of spatial planning maps, and develop human resources through geospatial education and training.

Completion of spatial planning maps are often constrained by the limitations of the survey and mapping human resources. Many regions have good data, the adequate budget, but not supported by the availability of personnel who capable to conduct about the survey and mapping. Therefore trans boundary distribution of human resources in the field of surveying and mapping is very
important. Each district / city should have an adequate human resources in surveying and mapping. In addition to the trans boundary distribution of human resources, it is also related to the technological adaption aspects. Every region should be supported by an adequate survey and mapping equipment. Human resources development policy mentioned that BIG has a big role through education and training, technical consulting, and coaching mapping surveyors.

3. Ideal Conditions
Having these considerations, some ideal conditions should be pursued through programs implemented by Ministry/Institution. The ideal situation are as follows:

- The availability of geospatial information that is accurate and reliable. The availability of geospatial information as baseline data in the preparation of spatial maps are needed in a variety of scales to the new conditions, considering the spatial planning document that could be implemented for a long time (20 years). IGD and IGT are important for spatial planning at the moment at scale of 1: 50,000 and 1: 25,000. As for the detail spatial planning required IGD at scale of 1: 5,000.
- Availability of IGT from multisector that should be integrated with spatial planning data. Spatial planning is a multidisciplinary activity which requires a lot of data, both physical and socio-cultural environment. The data should be available in accurate and appropriate scale to support spatial planning.
- Availability of documents or guidelines about IGD and IGT should be prepare for spatial planning. When such custodianship cannot be able to organize data, the data should be supported and prepared by other sector, with the guidelines that have been set by its own custodian of data it is effective to answer the availability of IGD and IGT nationally.
- The availability of human resources that could be transfer among region and technology that could support for spatial plan mapping in all regions of Indonesia. This is obviously very necessary because the maps of spatial plans are prepared by all the administrative regions in Indonesia.

![Figure 1. Ideal conditions diagram of geospatial information implementation.](image)

Four conditions mentioned above are prerequisite that will have a direct impact on accelerating the completion of PERDA. These conditions encourage the completion of regulation of spatial plans which are equipped with IGD and IGT within the framework of "one map policy".
4. One map policy implementation strategy

One map policy implementation strategy intends to identify problems that have been outlined to be solved systematically. Along with this strategy, there are five clusters based on the analysis of the issue:

4.1. To accelerate completion of IGD for spatial planning map

- Formulate priorities of IGD completion to the specified region by prioritize area that have not completed the spatial plan regulation and region which will revise spatial plan regulations on a scale of 1: 50,000 or 1: 25,000.
- Formulate priorities of IGD completion scale of 1: 5,000 for the mapping of detailed spatial plan.
- Encouraging the use of available IGD to accelerate the completion of spatial plan map through technical consultation and dissemination mechanism.

4.2. To acceleration mapping and integration of IGT

- Inventory availability of IGT based locations nationwide, as well as collecting existing IGT that can directly ready be accessed by local governments.
- Provide alternative solutions to the lack of availability of IGT for spatial planning through guidelines issued by the related Ministry/Institution. This would encourage the use of IGT for spatial planning analysis.

4.3. To develop guidelines for mapping

- Develop an inventory of the existence guidelines and priorities of the guidelines drawn up by BIG and Ministry/Institution relates to spatial planning.
- Prioritize guidance on the preparation of IGD alternative when the topographic maps has not available or not been updated, such as preparing high resolution satellite imagery with the standards of orthorectification that was issued by BIG.
- Disseminating of the existing guidelines for preparation of spatial planning.

4.4. Human resource development on mapping

- To conduct an employees inventory in the expertise of mapping in Indonesia.
- To socialize the requirement post for mapping surveyor and estimate the needs of human resources in spatial planning program.
- To organizes training on surveys and mapping to the government, local governments and the private sector.
- To strengthen national surveying and mapping industry and professional certification in the field of geospatial information, through the certification of the experts on geospatial information.

4.5. Coaching and consulting for spatial planning maps

- Build a team to speed up of spatial planning map program that should coordinated with BIG.
- Provide technical consulting and mapping clinic to the local government, with regional that have not completed spatial planning regulation as a priority.
- Provide technical guidance on mapping to the provincial government so that the approval process of spatial plans in each province goes well. It would become an attention to geospatial information aspect for spatial planning.
5. Conclusion

The need of geospatial information in the preparation of spatial planning that could be divided into two major groups: (i). Basic Geospatial Information (IGD), in the form Topographic maps Indonesia (RBI), (ii). Thematic Geospatial Information (IGT) include basic thematic and infrastructure network.

Obstacles faced by local governments in spatial plan mapping are: the availability of geospatial information; the availability of guidelines; and the trans-boundary resources of human resources and technology.

Ideal conditions to be achieved for spatial planning are: (i) the availability of geospatial information that is updated, (ii) the existence of guidelines for mapping that allow non-custodian to support a thematic geospatial information according to their needs, and (iii) an adequate human resources in each region for mapping of the spatial plan mapping.

A formulated strategies to achieve ideal conditions for mapping of spatial planning are as follows: (i) to accelerate the implementation of IGD on a scale of 1: 50,000, 1: 25,000 and 1: 5,000; (ii) to accelerate mapping and integration of IGT through providing a guidelines for IGT mapping; (iii) to develop mapping guidelines and dissemination of spatial utilization; and (iv) human resource development through training and technical guidance.

References

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