

SYNERGY APPROACH FOR IMPLEMENTING THE POLICY ON HIGH RESOLUTION IMAGERY TO ACCELERATE BASIC AND THEMATIC GEOSPATIAL INFORMATION

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Abstract. Presidential Order no. 6/2012 mentioned explicitly to use ortho-rectified image for the purposes of national program done by all Indonesian governmental agencies. Policy of uses, control quality, processing and distribution of high resolution of satellite data are regulated by this Order. There are some advantages of implementing this Order particularly in accelerating the national geospatial data and information, however, without synergy use of high resolution imagery (including integration, coordination and harmonization), in the present condition so far some obstacles have been discovered. Without synergic actions or approaches, the Order will not provide optimal impact as the main objectives to make more efficient in using the national budget. This article describes the needs of synergy approach to implement the Presidential Order no. 6/2012 concerning the uses, distribution of high remotely sensed imageries.

Keywords: *Remote sensing policy, Basic and thematic geospatial information, Synergy approaches*

1 INTRODUCTION

The policy of Ministry of Agriculture to map the whole country by using high resolution satellite data is very important not only for the Ministry of Agriculture as sector but also for the national development in general. The updated geospatial data as resulted from satellite imageries are very important for mapping the productive agricultural lands that will have implications to the national food security. So, identifying a new potential land for rice fields is very important. For such identification activity, mapping Java island as a sample of the most populated place in Indonesia and the highest rice productivity is very relevant to carry out. For such target, Ministry of Agriculture will depend on the high resolution satellite image from Board of Geospatial Information (BIG) or the National Institute for

Aeronautic and Space (LAPAN) as geospatial image based information producers, because the President Order no 6/2012 stated so. However, BIG and LAPAN are not completely ready to support the budget in providing all development sectors with high resolution data and information. On the contrary, Ministry of Agriculture has already reallocated the budget for procuring high resolution satellite data to other activity of development program in 2014.

The President instructed BIG to convey plan of high resolution satellite imagery data needs to conduct program and activity for the next fiscal year through coordination meeting. By this Presidential Order, it is a challenge for BIG to play important role in managing as one gate in using high resolution

satellite imagery for all departments and institutions related to geospatial information.

A pre-coordination forum called Regional coordination meeting of geoinformation (Rakorda-IG) 2013 was initiated by BIG. This forum is to support the National coordination meeting (Rakornas-IG) reminded the stakeholders to agree on IG availability in general (for provincial, district and city government), and emphasized the importance of more accurate IG based on the President Order no 6/2012. The factual condition is that the data required by local government are not yet completely available. The provincial/district government will take part in preparing IG for their regions (make priority as needed). Applying this Order mechanism with the standard budget from local government will fulfill the standard use of geospatial information. In this Presidential Order, statement as “*LAPAN menyediakan dan yang menegakkan itu BIG*” (LAPAN prepares imageries and BIG corrects them geometrically) – can be interpreted that the local governments assumed that they will automatically receive orthogonal images provided by BIG. Local government seems just to accept clean version of geometric image from BIG. It is understood that to generate high resolution images is not cheap. However, BIG tries to map for the whole Indonesian territories covered by topographic data systematically. It can happen that if all costs of image processing works for local governments are not budgetted, only some priority areas will be selected for detailed mapping using high resolution imageries, due to limited budget in BIG.

In the condition of unavailable high resolution data, local government can actually finance himself to have his own geospatial data. The mechanism is just like procedures in President Order no 6/2012, the problem is not that easy way to solve because there is a budgetting system that has to be approved by

Legislative Body. Other thing that the political will from the Government to update and accelerate geospatial information should be really come from the Government initiation. Local government can select private company/other parties from the tender competition that has a capability in technical image processing and an ability to communicate and synchronize the operational project with LAPAN and BIG.

At present condition, eventhough the Order has been given/passed by the President, it doesn't mean that the implementation of the policy will be smoothly implemented. That's why a synergic approach is needed. Interdepartmental and institutional cooperation to have the same perception and work together in supporting the Order still needs to be improved. That's why the important action is how to make the policy become implementable and easy to be executed.

Harmony or integration to implement the Presidential Order is still complicated, at least it is not easy to integrate since the responsibility will be given to more than one governmental institutions. Some problems of policy integration, can still be caused by the weakness of policy synergy, like program integration, activity coordination and harmonization), budget support and intermediation. In general, synergy is the combined working together of two or more parts of a system so that the combined effect is greater than the sum of efforts of the parts (Rouse, 2006; Mouat *et al.*, 2006). Synergic actions can promote the integration of the issues in a holistic and coordinated manner into the national policymaking and policy-implementation processes. For this context, Mouat *et al.* (2006) applied the synergic approach for the national action programme to combat desertification into other national strategies for sustainable development.

So in this case, we find the policy is still not implemented properly. Two actions or approaches may be already done (integration program and coordination of activity) in some level through the coordination meeting with all related governmental agencies. However, one like harmonization is not done yet, so that the result is still like this.

This article describes the synergy approach for implementing the policy on high resolution imagery to accelerate basic and thematic geospatial information. An application of high resolution images will accelerate geo-information for the purpose of development planning for the whole country. The existing and future development requires new acquisition of geospatial data and information which is basically derived from satellite imageries. Updated geospatial data and information are definitely required because they benefit for any development sectors (Martha, 2013, Martha, *et al.*, 2011, 2013).

2 STRATEGIC ENVIRONMENT: EXPERIENCES FROM DEVELOPED COUNTRIES (i.e. USA AND JAPAN)

Since the operationalization of Landsat Remote Sensing Commercialization Act of 1984, the United States government has promoted civilian uses of governmental satellites. Landsat satellite image was released in 1985. France government, a European country consortium, and other industrialized countries also produced similar economic policies. Later on, at the 1980s, several governments invested in remote sensing satellite programs in preparing new commercial market that will creating job opportunities and export for domestic industry (White House, 2003; Frost and Sullivan, 2003). As stated in Section 5615 data policy for Landsat 7, data policy should ensure timely and dependable delivery of unenhanced data to the full spectrum of civilian national security, commercial and foreign users

and achieve. It also ensure that data distribution system for Landsat 7 is compatible with other national system (United States Code, 2006). Based on that experience, hopefully the regulation or policy like Presidential Order no. 6/2012 will not be something to protect the national private company in remote sensing, and will not be negatively impacted. Before that policy, central and local governments (provincial, district and city level) may order or purchase high resolution images from national enterprises joined with international marketing networks. Started from the existing Presidential Order no. 6/2012, the procurements of high resolution imagery should be done through LAPAN and BIG.

Remotely sensed data in collaboration with other data are very important for mapping and utilizing potential of natural resources. As known, Geographic Information system (GIS) serves as an effective tool in the storage, analysis, integration and retrieval of information. The synergistic use of Remote Sensing and GIS as front line technologies supported to evolve an 'action plan' which was beneficial in planning for sustainable management of natural resources (Perumal, *et al.*, 1994). Remote sensing itself plays important roles in renewing and revising the available data and accelerating the data of the areas where have outdated information or no geospatial data at all (Martha, 2013).

The Presidential Order no. 6/2012 can be regarded as break-through for the remote sensing application for mapping (Martha, *et al.*, 2013). The Indonesian mapping authority should learn from Japanese and other country experiences and policy to provide the latest geospatial information in constant way. Japan has kept Digital Basic Map from remote sensing imageries. The Javanese national mapping authority, the Geographic Survey Institute or Geospatial Research Institute

(GSI) developed “Digital Japan Basic Map” for four years. This new basic map replaced 1:25000-scale topographic maps. (Tachibana, 2009).

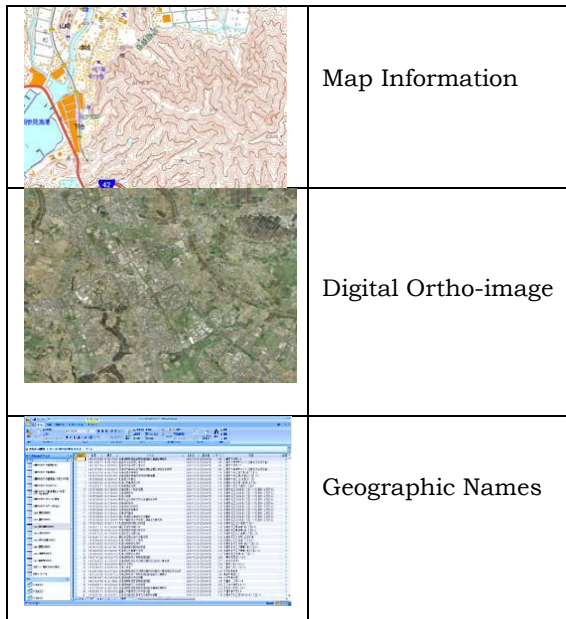


Figure 2-1: Digital Japan Basic Map consists of three components; map information, digital ortho images and geographic names (some modification from Tachibana, 2009)

Those three components are very important as database for development. First, map information is necessary to know the whole integrated information. Second, as information sources, say for public administration purposes, digital ortho images are required to be generated. Third, in relation to update maps, a geographical name dataset is important geospatial information element to be

prepared. For the needs of geospatial data from high resolution imagery it can be actually based on the needs of particular requirements. This cannot be treated the same from one sector to another, one department to the other. For engineering purposes that many projects done in Department of Public Work will be different from social economic and other purposes done in Department of Tourism, for instance. It needs to pay attention for sensor requirements, particularly related to the resolution of image, because resolution will be similar to the accuracy of the objects in the earth surface to be analysed.

For land use planning purposes, like environmental analysis the approximate resolution needed is about the range of 2 to 10 meter. For other application like resource management and agricultural/ forestry, the image having resolution of 3-50m may be enough (U.S. Congress, Office of Technology Assessment, 1993). This may be applied if more monitoring aspects rather than for generating new information. If mapping agricultural land, similar with mapping in general, more detailed data is required and they need images about 1 to 5 m resolution. For mapping the rice field and to know the rice productivity to support national food security in the country of Indonesia, the 4 m resolution satellite image will help much (see the Table 2-1 below).

Table 2-1: Sensor requirements for remote sensing applications

Sensor Requirements for Remote Sensing Market <i>(attention to the needs of period of intended coverage = business opportunity)</i>				
Aplikasi	Bands	Resolusi	Frame Size/ Scene (Min)	Period of Intension Coverage
Resources Exploration: Unrenewable Resources	visible, near-IR, radar	2-30 m	40 km X 40 km	seasonal
Land Use Planning	visible, near-IR, radar	2-10 m	10 km x 10 km	weekly - monthly
Mapping	visible, near-IR, radar	1-5 m	30 km x 30 km	monthly
Resources Management	visible, near-IR, radar	5-30m	40 km x 40 km	weekly - monthly
Environmental Analysis	visible, near-IR, radar	2-10 m	40 km x 40 km	weekly
Agricultures/ Forestry	visible, IR	5-30 m	40 km x 40 km	two days – two weeks
Marine	IR, radar	20-1000 m	80 km x 80 km	2-7 days

Source: U.S. Congress, Office of Technology Assessment, 1993

3 THE NEED OF SYNERGIC APPROACH FOR IMPLEMENTING THE PRESIDENTIAL ORDER NO. 6/2012

According to Act no. 4/2011 concerning Geospatial Information, any thematic maps would never been made as far as thematic geospatial information (tGI) has to refer to the basic geospatial information/bGI (Republic of Indonesia, 2011). This requires the wise way of conduct with a proper harmonization and synchronized approach to implement the regulation. As compared to the US Policy Plan for Landsat 7 for instant, the plan should define the roles and responsibilities of the various public and private sector entities that would be involved in the acquisition, processing, distribution and archieving of Landsat 7 data and operations of Landsat 7 spacecraft. This is an example of policy to be implemented as the responsibility for all, with harmonized and synchronized approach (United States Code, 2006). The synergic approach, again is very important to make the process of implementing the policy will work well. This Presidential Order no. 6/2012 concerning uses, control quality, processing and distribution of high resolution satellite data, indicated the government understands that high resolution satellite imageries with radiometric and geometric correction (ortho-rectified image), has similar use as compared to topographic maps, provides more benefits and may be useful for map revision input for thematic mapping (Republic of Indonesia, 2012).

This Presidential Order is a new breakthrough for national mapping, and will benefit in accelerating and updating basic and thematic geospatial information. As considerant, Presidential Order no. 6/2012 stated: "in order to highly resolution satellite data be optimally used and the national budget can be efficiently saved and to avoid the duplication of budget allocation for procurement of high

cost of high resolution satellite imagery". The important use of satellite data itself may not be part of such important considerant. Meaning, there is no *scientific background* to support this very important role of satellite imagery in development planning. It gives meaning to improve efficiency in budget use and avoid duplication in procurement of high resolution satellite images. For this reason, for all Ministries, National Army commander, National Police, all Heads of Non-Departmental Agencies, all Governors and all Regent/Mayors should understand the use of their allocated budgets for building a high resolution remote sensing data base. Coordinative and consolidated activities and programs for development planning should consider about this Order.

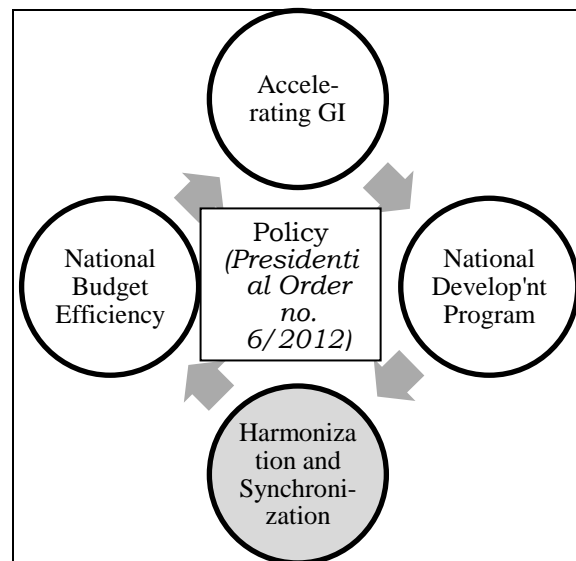


Figure 3-1: Synchronized Approach for Implementing the Policy

BIG and LAPAN have to start operation with the same perceptions to implement Presidential Order. They should have a good cooperation to support this Presidential Order in an harmonized way. They just follow the Order to prepare ortho-rectified image. BIG should not think that a geometric activities is its own competency supported by the majority of skilled and qualified geodesy personnels.

LAPAN cannot think that is more practical if radiometric and geometric corrections are processed by LAPAN. All points stated on the Order (see Table 3-1) needs to share the tasks in synchronized way of conduct. Based on the above Table 3-1, there is no order or instruction for either BIG or LAPAN to conduct geometric correction for high resolution satellite imagery (Orthoimage). This possibly needs to have correction in original text of the Order. It is important for both BIG and LAPAN have duties in quality control. The problem is how to do such control,

because the two institutions have each own authority. It may not be easy to differentiate between the tasks of LAPAN and BIG. How to make a clear distinction between job of two institutes to process imageries with 4 m or less than 4 meter resolution. BIG will improve in using satellite image for national mapping/ geospatial information (point a), and this will motivate BIG to do research on Digital Elevation Model (DEM) to generate topographic maps through ortho-rectified image (point b).

Table 3-1: Order Comparison between two Institutions: LAPAN and BIG

LAPAN	BIG
<ul style="list-style-type: none"> a. Prepare high resolution satellite data with Government Licence; b. Improve capacity and operation of high resolution satellite data acquisition; c. Prepare and produce high resolution satellite data/ images as ruled by existing regulation; d. Process image of high resolution satellite data with spectral and radiometric correction; e. Generate metadata of high resolution satellite data based on Indonesian National Standard (SNI); f. Conduct archieving high resolution satellite data; and g. Together with Head of BIG conducts quality control for high resolution satellite data. 	<ul style="list-style-type: none"> a. Improve capacity and processing system of high resolution satellite data for national survey and mapping purposes; b. Generate ortho-rectified image (high resolution satellite data) for surveys and mapping based on processing result like spectral and radiometric correction done by LAPAN; c. Conduct archieving and securing high resolution ortho-satellite imagery; d. Distribute high resolution ortho-satellite imagery through National Spatial Data Infrastructure; and e. Together with Head of LAPAN conducts quality control for high resolution satellite data.

Source: Republic of Indonesia, 2012.

4 CONCLUSION

- a) As a policy, Presidential Order no. 6/2012 become a breakthrough for the application of high resolution remotely sensed data in Indonesia. The implementation of this Order will affect the acceleration both basic and thematic geospatial information in covering Indonesian territory. This geographic information acceleration will indeed support the acceleration of national development,
- b) It's challenge and advantage for BIG in using National Spatial Data Infrastructure (NSDI) to widely distribute high resolution ortho-satellite imagery. This needs to activate the nodes available as a communication networks and coordination forum for sharing geo-information/data for development,
- c) To implement the policy needs to have harmonization, and synschronization. Finally, the Order is given for the tasks of two institutions, namely BIG and LAPAN. They should have the same perception due to their different tasks will create a possible misunderstanding works. This still needs to have a coordinative forum to synchronise the Presidential Order implementation.

In order to make the goal of the Presidential Order no. 6/2012 well implemented, all sub orders are stated or as mentioned in the Table, needs to be conducted by both institutions in synchronized way.

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