An Estimation of Needs and Availability of Geospatial Information Personnel In Indonesia

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Objectives

A. Estimation the number of Geospatial Information Personnel (GIP) which the country needs not only just needed by specific institution.

B. Estimation the number of GIP which the country produces, not just produces by specific learning institute

C. Estimation the gap, which can drive the policy in education and professional development
GIP according dedication field

**Research Methods**

1. **Economy Cake** (state budget USD 200 B → GI ? → GIP ?)
2. **Benchmarking** (to some ASEAN countries)
3. **Objective Simulation**
   - A. **Position** → close / remote areas
   - B. **Size** → widely varied areas, land & sea
   - C. **Number of Administrative Area** → boundary
   - D. **Scale** → level of detail
   - E. **Worktypes** → Technology → Production speed
4. **Observation**
1. Not the whole country should be in the homogenous scale
2. Scale priority according to population density & growth
3. According simulation, coverage of the scale are:
   1:50.000 : 658.781 sqkm (35.4%),
   1:25.000 : 771.385 sqkm (41.5%),
   1:10.000 : 299.888 sqkm (16.1%),
   1:5.000  : 124.739 sqkm (6.7%),
   1:1000  : 3.804 sqkm (0.2%).
4. The larger the scale, the shorter is the update cycle
Type of GI Works

**Capital-Intensive**
The output depends on the capital, e.g.: satellite data acquisition or data buying data from 3rd party, ...

**Wisdom-Intensive**
The output depends on the number of wise experts, e.g.: SOP-writing, make planning, teaching, R & D, ...

**Technology-Intensive**
The output depends on the technology, e.g.: only radar can overcome the area under cloud cover, ...

**Labour-Intensive**
The output depends the number of workers, e.g.: terrestrial surveying, image interpretation, quality control, ...

From Reality to Data
(data acquisition, orthorectification)

From Data to Information
(interpretation, field-edit, visualization)

Personnel Capacity

1. The effort for each sqKm Geospatial Information:
   
   **GI-type** = scale: ManHour (MH) : Technology
   
   - situation map = 1:1000: 50 MH: TLS
   - situation map = 1:5000: 10 MH: UAS
   - topo-map = 1:10,000: 5 MH: aerial/satellite img
   - topo-map = 1:25,000: 2 MH: aerial/satellite img

2. The working composition
   
   - Data acquisition Operator 25%
   - Interpretation/field-edit/visualization 65%
   - Planning/Management/Quality Assurance 10%

3. 1 sheet 1x1 m will need GIP
   
   - at 1:1000 (1sqkm)= 50 MH; 1:5000 (25sqkm)=250 MH;
   - 1:10000 (100sqkm)=500 MH; 1:25000 (625sqkm)=1250 MH.
Needed Land Basic GI Personnel

1. **In one year, effective working average is about 1000 hour**, due to delay in planning-execution, transportation, weather and also re-training, holidays etc.

2. **Considering the area, scale and capacity, the whole country needs for Basic GI is about 5006 Man-Years.**

3. **When the BGI should be updated every 5 years, then for BGI should be reserved about 1000 Men.**

4. **From this personnel, at least 10-20% should be in Gov for Planning, Management & Quality Assurance.**

5. **Not all GI Personnel should be Univ-graduate, many could be trained for 1-3 month according to specific competency.**

6. **The same model should be work for Thematics GI.**
Needed Basic Thematic GI Personnel

1. Primary Demand on Thematic GI Personnel:
   - Land cadaster & tax
   - Energy & Mineral Resources
   - Forestry & Agriculture
   - Fisheries & Marine
   - Construction
   ~ estimated 10 persons in each government-level

2. Assumed
   Government: There are 34 Provinces, 520 Municipalities,
   ➔ 10 + 10x34 + 10x520 = 5.550 personnel
   Business World: 4 x Gov = 22.200 personnel
Needed Potential GI Personnel

1. Almost government activities could be optimized by utilization of Geospatial Information.
2. There are about 70 Ministries & Gov.-Agencies
3. Assumed
   5 persons in each of 70 gov.agencies = 350
   ➔ 4 times in business world.
4. Potential GI will be growth according to the creativity of the actors.

Overview of National GIP Need

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<thead>
<tr>
<th></th>
<th>Government</th>
<th>Business</th>
<th>Community</th>
<th>Academic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic GI</td>
<td>200</td>
<td>800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary TGI</td>
<td>5550</td>
<td>22.200</td>
<td>2000</td>
<td>700</td>
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<tr>
<td>Potential TGI</td>
<td>350</td>
<td>1400</td>
<td></td>
<td></td>
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<tr>
<td>GI-Infrastructure</td>
<td>200</td>
<td>800</td>
<td></td>
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<tr>
<td>Jumlah</td>
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<td>25200</td>
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- GI-Infrastructure: 10 in each of 20 GI-Clearance-Houses.
- Community: about 4 men in each of about 500 municipality
- Academic: ratio teacher:student ~ 1:10, to educate 4 students-years which regerate all needed GI Personnel with regeneration of 20 years.
Problems

1. Not all Univ-graduatee will work in Geospatial World. Estimated only ~ 50% !!!
2. The distribution of personnel field & qualification is still not yet mapped.
3. The spatial distribution of GI personnel is also not yet mapped. Some GI personnels work outside the country.

Demand according Business World

Need of surveyors / mapper (non univ-graduatee)
1. Palm farm 8 jt ha: 5000 persons
2. Rubber farm 10000
   - Expansion for the next 10 year, now 1500 ha/person
   - If setup finished, maintainance 8000 ha/person
   - Geodesy 80% (BSc 15%, non unigrad 65%)
     Geography/Tematic 20% (BSc 12%, non unigrad 8%)
3. In mining industry 5000 persons
4. In construction & engineering 2000 persons
5. In geospatial product reseller / consultant 1000 persons

TOTAL > 26000
Education Output

1. Production till today:
   4 univ with Geography == 400 B.Sc. & ~ 100 diplome
   10 univ with Geodesy == 500 B.Eng. & ~ 200 diplome

2. Production of High School for Geomatics / Surveying
   ~ about 800 graduee

3. GAPS? Needs / year available / year
   Geodetics B.Eng. 320 500
   Geodetics Diplome 320 200
   Geomatics schools 960 800
   Geographic B.Sc. 160 400
   Geographic Diplome 240 100

CONCLUSION

Indonesia needs roughly about 35,000-50,000 Geospatial Information personnel (GIP). Available now is about 10%.

When steped in 20 years, the production of the academic world seem to fulfill the demand, but the problems are
1. type of competency (surveying, photogrammetry, remote-sensing, hydrography, GIS, cartography, geo-IT),
2. level of competency (some B.Eng will do the job of high school / non unigrad level); and
3. spatial distribution
4. broader market (ASEAN Economic Community)