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

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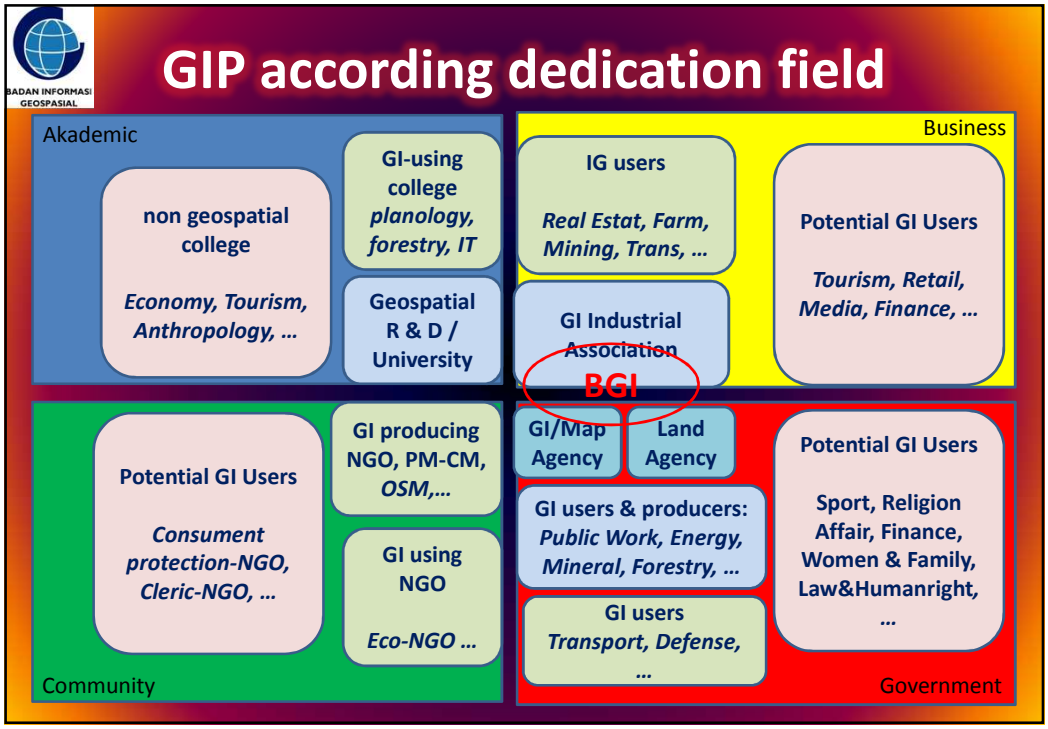
Objectives

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*

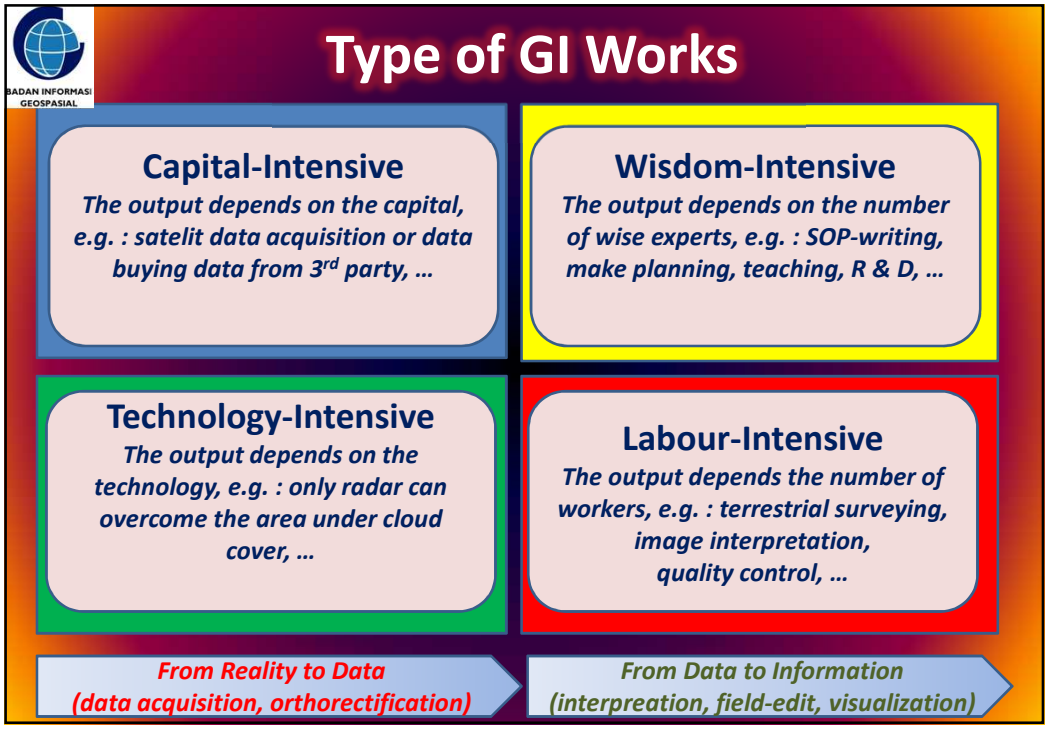

GIP according dedication field
Akademic
non geospatial college
Economy, Tourism, Anthropology, …
GI-using college planology, forestry, IT
Geospatial R & D / University
Business
IG users
Real Estat, Farm, Mining, Trans, …
GI Industrial Association
BGI
Potential GI Users
Tourism, Retail, Media, Finance, …
Community
Potential GI Users
Consument protection-NGO, Cleric-NGO, …
GI producing NGO, PM-CM, OSM,…
GI using NGO
Eco-NGO …
Government
GI/Map Agency
Land Agency
GI users & producers: Public Work, Energy, Mineral, Forestry, …
GI users Transport, Defense, …
Potential GI Users
Sport, Religion Affair, Finance, Women & Family, Law&Humanright, …

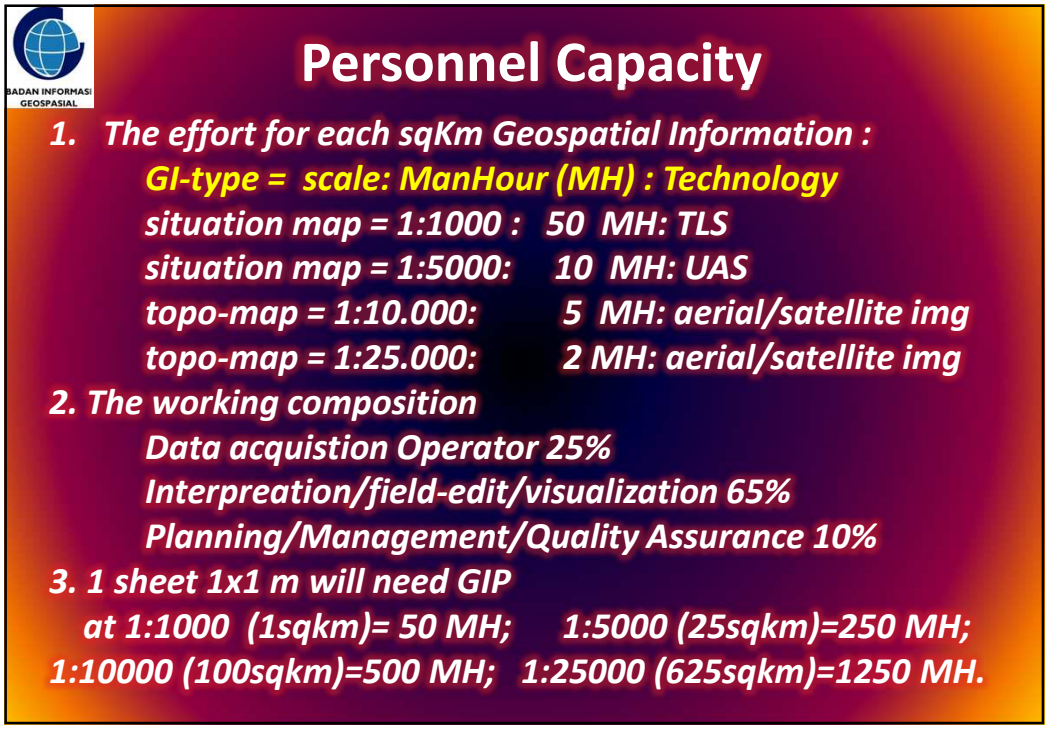

Research Methods
1. Economy Cake (state budget USD 200 B → GI ? → GIP ?)
2. Benchmarking (to some ASEAN countries)
3. Objective Simulation
A. Position → close / remote areas
B. Size → widely varied areas, land & sea
C. Number of Administrative Area → boundary
D. Scale → level of detail
E. Worktypes → Technology → Production speed
4. Observation

Position, Size and Numbers

Scale (Level of Detail)

1. *Not the whole country should be in the homogene 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. : satelit 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
(interpreation, 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 acquistion Operator 25%
Interpreation/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, hollidays 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-graduee, many could be trained for 1-3 month according to specific competency*
6. *The same model should be work for Thematics GI*

SKALA PETA RDTR KAB/KOTA SE INDONESIA

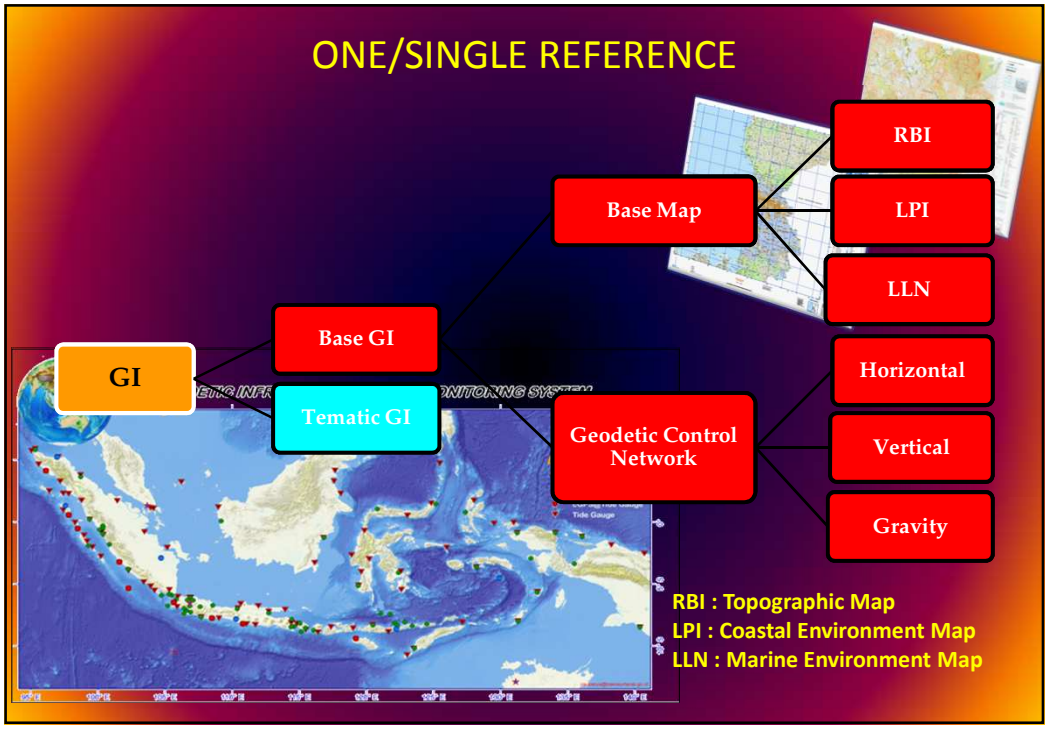
NO PER	KODE	NAMA KABUPATEN / KOTA	JUMLAH KEC	JUMLAH KEL	JUMLAH A	LUAS WILAYAH	JUMLAH PENDUDUK	Density
3	21.03	KAB. NATUNA	9	6	44	1511.88	87354	57.8
4	21.04	KAB. LINGGA*)	5	3	36	411.1	77078	187.5
5	21.05	KOTA BATAM	8	51		969	572452	590.8
6	21.06	KOTA TANJUNG PINANG	4	18		239.4	160918	672.2
1	31.01	KAB.ADM.KEP.SERIBU***	2	6		8.69	21217	2441.5
2	31.71	KODYA JAKARTA PUSAT	8	44		50.56	912290	18043.7
3	31.72	KODYA JAKARTA UTARA	6	31		162.95	1478729	9074.7
4	31.73	KODYA JAKARTA BARAT	8	56		212.39	2146324	10105.6
5	31.74	KODYA JAKARTA SELAT	10	65		122.46	1943473	15870.3
6	31.75	KODYA JAKARTA TIMUR	10	65		183.24	2609638	14241.6
1	32.01	KAB. BOGOR	40	16	410	3357.92	4038764	1202.8
7	31.07	KAB. TELUK WONDAMA	6		56	5788	14165	2.4
8	31.08	KAB. KAIMA	7	1	77	18500	27908	1.5
9	92.71	KOTA SORONG	4	20		717.9	141839	197.6

	1:50k	1:25k	1:10k	1:5k	1:2k	50	25	10	5
Jumlah	34	117	126	125	38	0	0	0	0
	A	B	C	D	E	A	B	C	D
	1	2	3	4	5	1	2	3	4
	9.2	68.2	504.3	3726.2	27533.1				
	9.2	68.2	504.3	3726.2	27533.1				
		B					1512		
			C					411	
				D					969
				D					239
				D					9
					E				
					E				
					E				
					E				
				D					3358
A						5788			
A						18500			
			C					718	
						658781	771385	299888	124739
						35.4%	41.5%	16.1%	6.7%

Prov-Density | Kab-Density-exp | Kab-Density-RDTR | Kab-Density-RDTR (2)

Ready 80%

Skala 1:	OJ/km2	area (km2) @1 m2 peta	OJ utk 1m2 peta	Luas wil Indo dalam skala ini	OJ-tuntas	OT OJ/1000
A	B	C	D	E	F	G
1,000	50	1	50	3,804	190,200	190.2
5,000	10	25	250	124,739	1,247,390	1247.4
10,000	5	100	500	299,888	1,499,440	1499.4
25,000	2	625	1250	771,385	1,542,770	1542.8
50,000	0.8	2500	2000	658,781	527,025	527.0
		Luas Daratan Indonesia =		1,858,597	Jumlah =	5006.8



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*

   Governement: There are 34 Provinces, 520 Municipatilies,

   ➔ 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

	Government	Business	Community	Academic
Basic GI	200	800	2000	700
Primary TGI	5550	22.200		
Potential TGI	350	1400		
GI-Infrastructure	200	800		
Jumlah	6300	25200	2000	
	34200			

- *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-graduee will work in Geospatial World. Estimated only ~ 50% !!!*
2. *The distribution of personnel field & qualifiaction 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-graduee)

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*
6. *Others branch: 3000 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)*