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Research Article

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Mevcut Rekabette Hayatta Kalmak için Endonezya Jeo-uzamsal Sektörünün Geliştirilmesi

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ÖZ

Coğrafi Bilgi Teknolojileri karar verme aracı olarak hızla gelişmektedir. Ancak Endonezya, jeo-uzam endüstrisi için potansiyel pazarlara sahiptir. Şu anda, coğrafi alan endüstrisi yetersiz görünüyor. Bu nedenle uygun bir plan politikası, düzenlemesi ve eğitimi gereklidir. Mevcut çalışma, coğrafi alan endüstrisinin rekabet gücünü ölçmeyi amaçlamaktadır. Amaca yönelik rastgele örnekleme ve kümeleme yöntemi kullanılarak alınan populasyon örneği. Rekabet endeksini analiz etmek için kompozit performans endeksi yöntemi kullanılmıştır. Sonuç olarak, toplam jeo-uzamsal rekabetçilik endeksi değeri 100'lük bir ölçekte ortalama 26,48'dir. Jeo-uzamsal sektör rekabetçilik endeksinin araştırma sonuçları dikkate alındığında, Endonezya hükümeti eğitim ve yeni fırsatlar yaratarak jeo-uzamsal sektörü desteklemeli ve geliştirmelidir.

Anahtar Kelimeler: ASEAN ekonomi topluluğu, Rekabetçilik, Karar verme, Mekansal endüstri.

Enhancing Indonesian Geospatial Industry to Survive in the Current Competition

ABSTRACT

Geospatial Information Technology is developing rapidly as a decision making tool. However Indonesia has potential markets for the geospatial industry. Currently, the geospatial industry seems incompetent. Hence a proper plan policy, regulation and training is needed. Current study is aimed at measuring the competitiveness of geospatial industry. Population sample where taken using purposive random sampling and clustering method. Composite performance index method is used to analyze the competitiveness index. The result shows, the overall geospatial competitiveness index value has an average of 26.48 on a scale of 100. Considering the research results of geospatial industry competitiveness index, the government of Indonesia must urgently support and enhance geospatial industry through training and creating new opportunities.

Keywords: ASEAN economic community, Competitiveness, Decision making, Geospatial industry

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1. INTRODUCTION

The Geospatial Information (GI) practice is spontaneously expanding, essentially, in spatial related businesses and as a decision-making tool. The international geospatial industry has been considering Indonesia as a potential market for sale of geospatial industry. The passive advancement of Indonesian geospatial industry suggests its unpreparedness to withstand the international GI market. The dependence on small scale project from government is one the significant obstacles for the geospatial industry advancement, consequently, much needed is planning, training and a policy to thrive in local and international market. To survive in GI market a high demand of skilled GI technicians, Investment, licensing regulation, research and development for technological innovation, international networking, familiarity in GI application trends, marketing and quality assurance. In order to regulate the growth and competitiveness the government must have a decision support system. There have been rapid developments in computing and IT infrastructures in recent years, which have led to enhancements in the ability to handle large amounts of geospatial data (Deb, 2014). The current explosion in web and mobile-based location services will provide continuing opportunities to utilize geographic information and knowledge to support effective policies and decisions (NGAC, 2012).

It's need a good strategic plan and readiness model for the development of National Spatial Data Infrastructure (NGAC, 2013; Fernandez *et al.*, 2012; and Federal Geographic Data Committee, 2013). The adoption of geospatial information technology is increasing in government and private sectors, especially in decision making areas where extensive understanding of a location is needed (UN-GGIM, 2013). The contemporary GI trends might have a major impact in the future that might need exhaustive referenced location information and also questioning our understanding what constitutes the GI itself.

As the result, the private and the public sectors will continue to play a significant role in providing the technologies and information required to maximize the available opportunities. In the both sectors, are likely to provide valuable elements of geospatial information, technologies and services required to maximize it.In the addition,by offering thoseinformations to the end-user base, it'll cause them to interest to participate within too (UN-GGIM, 2013).

Procurement of reliable GI source by the user is highly significant in decision making of long term planning and emergency response and to ensure the user about the potential benefits of a fully spatially enabled society (UN-GGIM, 2013). The AEC was created for the political stability to gain economic growth, regional competitiveness, poverty rate reduction and enhancing standard of life with in the ASEAN (Association of South East Asian Nation) community (Bustami, 2015). Some companies that use geospatial capabilities to geo-enable their digital enterprise are taking advantage of real-time situational awareness and decision-making. Lufthansa Systems, an airline IT specialist with more than 300 airline customers, has demoed a geospatial analytics application that shows how the impact of weather events can be easily analyzed and how impacted flights can be rerouted live, taking into account live and forecast weather data and cost-related parameters such as estimated fuel consumption and expected delays. Featured use cases include an eruption of the Eyjafjallajökull volcano in Iceland and a hurricane approaching the East Coast of the United States. The results will help to improve their flight planning and fuel optimization software "Lido/Flight" (Zenus, 2017).

Since the entry in to AEC in 2015, Indonesia had been skilled and competent human resources in the Geospatial Information. Current population of Indonesia approximately 240 million which makes one third of total ASEAN Economic Community population. Additionally, considering the current reproduction rate, an increase in 60% population growth is estimated by the year 2020 (IMF, 2014). Human resources in service sectors (include in the geospatial work) are very important component (Manning and Aswicahyono, 2012). Mapping of Indonesian Skilled Workers and Projection of Geospatial Human Resources In Indonesia Until 2025 were done (Keliat *et.al*., 2013; Amhar *et al*., 2016). It's need a manpower planning especially in geomatics fields (Fairbairn, 2014).

The Geo services are consist of Satellite receivers and manufacturing, Electronic maps, Satellite navigation, Satellite imagery, and Location based search. Based on the analysis (Oxera, 2013), Geo services business

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transaction is about $150-$270 billion per year (compared with video games industry $25 billion and Airline industry $594 billion).Geospatial global value is around $100 billion per year. The Geo services save 1.1 billion hours of travel time per year globally, and also save 3.5 billion liters of gasoline per year-approximately 0.1% of the total world production of 5 trillion liters of liquid oil products. Geo services facilitate competition, leading to preserve the bought goods and services up to $0.5-$2.8 billion. Furthermore, the Geo services aid faster emergency response; for example, in England,The Geo services may able to save at least 152 lives per year. It is also can improve agricultural irrigation and helping to achieve the global cost savings per year for $8-$22 billion. The students who being educated with using Geo services can expect 3% higher average wages within five years after graduation than those who weren't.

2. METHOD

The method used in this research is descriptive analysis with quantification to describe the existing condition of national geospatial industry in Indonesia. The foundation for benchmarking is potential, constraints and development challenges as well as analysis of geospatial industry conditions in developed countries. To collect information derived from geospatial industry, a questionnaire designed specifically designed to map the existing condition of geospatial industry in Indonesia. The questions for companies / geospatial industry include the types of activities in the field of geospatial information which includes: A. Surveying (terrestrial, cadastral, hydrography); B. Mapping & Cartography (lidar, radar, photogrammetry); C. Survey & Thematic Mapping (e.g, forestry); D. GIS & Remote Sensing; E. Geomatics/Geoinformatics Consulting Service; F. Geospatial Software Development; and the other Geospatial Fields.

This grouping is based on real activities in the field. For the industry activity, theyare also asked for Total Sales (turnover) which based from their Activity Field Information Geospatial (related services or products) per year. Similarly, in order to know the independence of domestic geospatial industry, the source of funding is comes from government or private, domestic or foreign and so on. Other issues that being asked in the questionnaire is related to the ownership of hardware/software that supports GI, corporate spending structure, Research and Development budget, HSE (Health, Safety and Environment), constraints facing the company and Prospects and growth of the geospatial industry in the future.

In general, the stages of the implementation of the study include the preparation stage, the stage of survey and data collection, the stage of analysis and data processing and the stage of report preparation. Preparation stage, carried out by conducting brainstorming, FGD and collecting secondary data / literature, designing and testing the questionnaire model to be refined before distributed to the target group (respondent), and set the target respondent. Survey and Data Collection Stage, conducted by field survey, in-depth interview and data collection required. Stages of data processing and analysis is done by processing the incoming data, as well as comparing with the world IG industry as benchmarking. Comprehensive presentation of results, so it can be easily understood for decision makers in order to prepare the guidance of IG Industry in a more planned, programmed and with a rational stage.

Field survey activities are conducted in accordance with the design of the area division and the target of the respondents. The representative of the region, the location and the target of the survey have been agreed upon in the Focus Group Discussion (FGD) activity, so it can be said that the sampling location has been representative of the regional typology and the geospatial industry's performance in Indonesia. Data requirements related to the analysis requirements identified in the study methodology which is focused on the secondary data and literature studies in developing priorities, policies and strategies for the development of the geospatial industry. The main data that being used is Primary data and Secondary data.

The Sampling that being used is Stratified Random Sampling method, but the overall method is Purposive Random Sampling. Stratified Random Sampling emphasizes on the strata (level) of sampling in the population, which is based from the area and density of a district / city. The clustering of districts is divided into clusters, namely: cluster A (Jabodetabek), cluster B (other big cities in Java, Sumatra, Sulawesi, Kalimantan), cluster C (district / municipality, Balikpapan city as central in Kalimantan, Lampung as the central south of Sumatra, the city of Banda Aceh as central north of Sumatra), cluster D (the city of Batam and other small towns as central in

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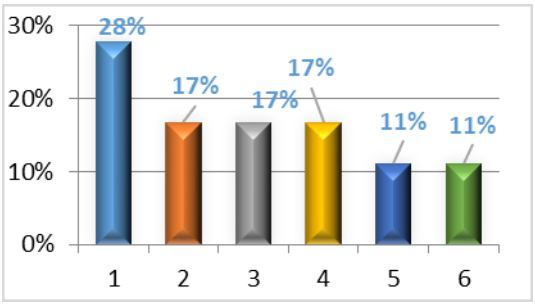
Sumatra archipelago and central Java, Palu city as central in the central part of Sulawesi), cluster E (Sorong city as central West Papua), cluster F (Palangkaraya city as central Kalimantan), cluster G (Mamuju Regency as central west of Sulawesi), and cluster H (Berau district as northern central Kalimantan).

The Purposive Random Sampling emphasizes on the determination of certain agencies that deliberately made the sample by considering the existence of geospatial industry and provider of GI implementation such as: central agencies (Ministry/Institution), National Business Board, mining and plantation companies, property companies, and industrial associations GI. The details of Purposive Random Sampling are as follows: (1) Government Agencies (Ministry of Agriculture and Spatial Planning, Ministry of Environment and Forestry, Ministry of Public Works and Housing, Ministry of Energy & Mineral Resources, Ministry of Agriculture, Ministry of Marine Affairs and Fisheries, BNPD, LAPAN, Ministry of Home Affairs, BKD); and (2) IG Industry Association (APSPIG, AKSLI, INKINDO, Indonesian Contractor Association, Indonesian Cocoa Association (ASKINDO), Indonesian Palm Oil Companies Association (GAPKI), Real Estate Indonesia Company Association, Indonesian Oil and Gas Drilling Association.

Primary Data, in the form of primary survey data and IG Industry for the determination of development priorities. Secondary data, in the form of study literature data, static data of National IG industry development, and international / world (sourced from journal, report and website), national and international IG industry profile data (sourced from comparative study), regulatory and regulatory data, etc. The questionnaire results are being processed and analyzed with using descriptive statistical approach. The analysis included the analysis of existing geospatial industry and its predicted development over the next 5 to 10 years, benchmarking analysis (comparing the conditions of the geospatial industry in ASEAN, ASIA, and even the world, to see future geospatial industry trends). This analysis is supported by the related national policies to serve as legal umbrella and the competence of GI personnel expertises, ranging from BIG legislation, vision, mission and work program in general up to the standards of every element of geospatial industry work.

3. FINDINGS

Results of mapping of GI-related activity areas in ministries / agencies (Figure 1) show that there are six areas of activity being carried out, where the surveying activities are relatively dominant against others (28%). It also appears from the survey that the geomatical consulting services and the geospatial software development and development services are still relatively low compared to the other four areas (surveying, geodesy, mapping & cartography, and remote sensing).



Remark:
1. *Surveying (cadaster, land, hydrography, geophysics, etc.)*
2. *Geodesy, Navigation & Positioning (GPS)*
3. *Mapping & Cartography (Photogrammetry, geophysics, etc.)*
4. *Remote Sending (Aerial Photography, satellite, radar, lidar, etc.)*
5. *Geomatics Consultation Services*
6. *Development & geospatial software production*

Figure 1. Scope of activities in the Government Institution

The implementation of these six areas of activity are still not optimal, and as evidence, there are many obstacles encountered, including: low market demand, lack of marketing ability, lack of skilled human resources, lack of standardization, low access to capital/finance and data access/expensive, and lack of government/regulatory policy support. Among the constraints (Figure 2), the most frequently perceived are weak policy and regulatory support (20%), high technology costs (18%), high data (16%), difficulty accessing data (13%) and access to capital (11%) respectively.

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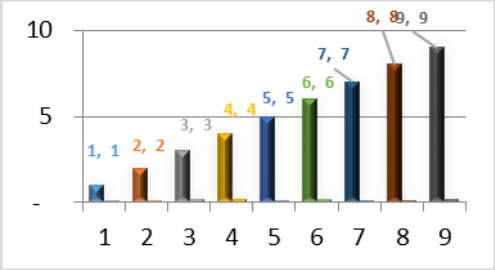

Remark:
1. Market Demand
2. Marketing Capabilities
3. Skilled Labor
4. Quality Standard
5. Funding Access
6. Data Access
7. Expensive Data Price
8. Technology Budget
9.GovernmentPolicy/Regulation

Figure 2. Constraint Faced

Trends in Surveying Budget increases in PSDG-Ministry of Energy and Minerals Resources also appear to increase (Figure 3 and Figure 4). These improvements indicate that surveying activities at this ministry are increasingly the type and variety of surveys.

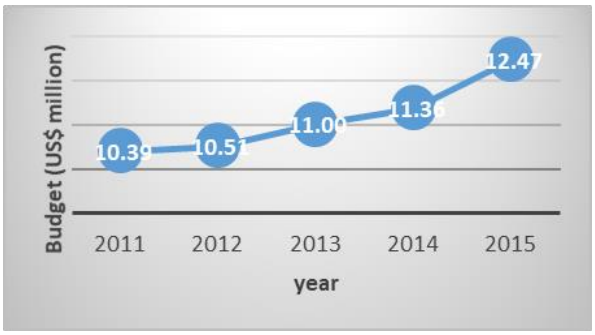

Figure 3. Budget Trend of Surveying

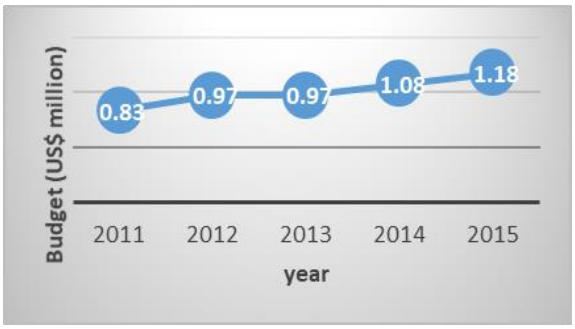

Figure 4. Budget Trend of Geospatial Software

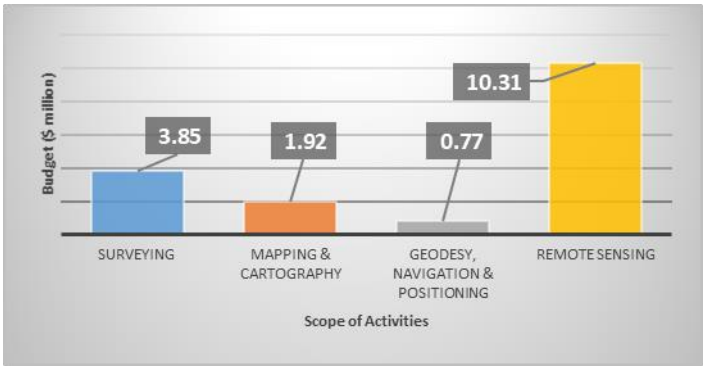

Figure 5. Budget Spent by Ministry of Mining & Renewable Energy (2015)

Likewise for other GI field of activity, it also shows an increasing trend of budget, especially for geospatial software development and manufacturing, although the numbers are still relatively small (Figure 5). Based on the results of the questionnaire processing, it appears that geospatial industry Turnover in Indonesia is still relatively small, i.e most Industries (32%) have a turnover of product sales <US$ 1 Billion (Figure 6). Whereas companies with sales service turnover (Figure 7) are <US$ 1 Million (25%), between US$ 1-10 Million (12%), US$ 10-50 Million (19%), and> US$ 100 Million (12%).

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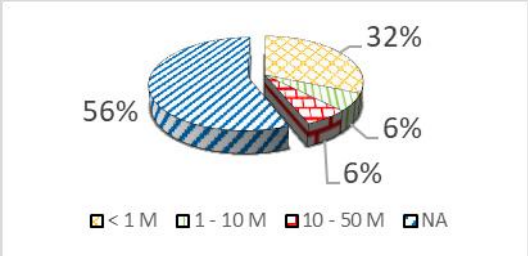

Figure 6. Turnover of Product Sales

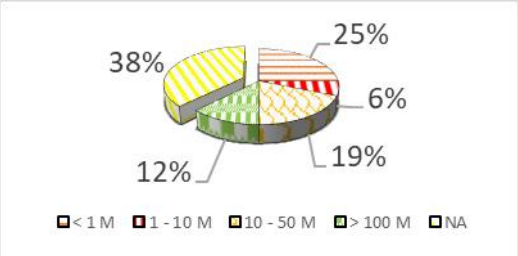

Figure 7. Turnover of Services Sales

The National geospatial industry Dependency on Government funding source is still relatively large, where dependence> 80% of government funds which is 40% and only a few companies (7%) are dependent <40%. On the other hand, based on the survey of dependency of private sources of funds> 80% is only 7%. This explained that the ability of the competition to work on the private sector is still considered weak. Similarly, when being seen within the competitiveness wheter able to compete in the global level, The Revenue Rate of Foreign Funds Source (60% -80%) is considered weak, i.e only 7% of companies. In other hand, while the dependence of domestic funding sources with a dependency rate between 60% -80% and it reached 33%. This condition can be interpreted as the weak competitiveness of the national geospatial industry at the global level.

The competitiveness index of the Indonesian geospatial industries has been analyzed through questionnaires, that where collected offline and online sources. Based on the focused group discussion outcome, there are nine items of criteria could be used to analyzed the competitiveness index. Table 1 shows the list of category of items required for indexing.

Table 1. Weight of Criteria

No.	Criteria	Weightage
1	Activity Types Diversification	0.08
2	Geospatial Services Turnover	0.19
3	Geospatial Product Turnover	0.15
4	Private Sector Order	0.12
5	International Order	0.12
6	Private Sector Collaboration	0.04
7	Equipment Asset	0.08
8	Geospatial Expenditure	0.19
9	Non Geospatial Expenditure	0.04

The weightage of criteria has been used in the data analysis through a composite performance index (CPI). Based on the data of 12 geospatial companies shows the Indonesian geospatial competitiveness index average as 26.48 (on a scale of 100) as shown in Table 2.

Table 2. Competitiveness Index of Indonesia Geospatial Industries

No.	Company Name	Competitiveness Index
1	PT. Fugro Indonesia	80.74
2	PT. Pageo Utama	57.06
3	PT. Narcon	44.98
4	PT. Waindo SpecTerra	38.64
5	PT. EXSA Internasional	22.45
6	PT. Alat Ukur Indosurta Cabang Balikpapan	23.02
7	PT. Agri Utama Konsultan	14.02
8	PT. Visitama Daya Solusi	8.60
9	PT. Ekadelta Consulindo Utama	8.20
10	PT. Ciptaning	7.05

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11	PT. Thiess Indonesia	7.05
12	PT. Cipta Buana Sorong	5.90
	Average	26.48

4. DISCUSSION

Basically in Indonesia surveying sector (Figure 1) of geospatial industry is in high demand indicates the significance and vulnerability of the national geospatial industry in the open AEC market. Additionally, current market can potentially pose a threat to the existence of national geospatial industry. To enhance the geospatial industry coaching and government support is needed.

Based on the results of the analysis as well, the three field indicates that are interrelated fields and each other. Meanwhile, the field of geomatical consulting services and the development of geospatial software production also appear to be balanced. Based on the (Figure 1) three clusters of Geodesy – navigation – positioning, mapping and cartography and remote sensing has uniform demand.

However, geomatical consulting services and the geospatial software development have similar demand in GI sector and has developed a variety of application to support travel, tourism and hotel industry. The national GI industries surviving largely on government projects, contrary to that private companies has an increasing demand due to their capability of multiple sector service provision namely in oil mining and tourism industry. The problem is the private sector is very selective and competitive in determining partners. Only the geospatial industry that really has the capacity and capability that can indeed partner with the private sector. Due to difference in the standards and expertise the private companies tend to outsource the local jobs making the existing geospatial industry more vulnerable.

To solve the above private sector market trend and to empower national geospatial industry the government should make policies to enhance the local professional by strengthening through training, licensing and certification facilities. The increase in the budget for surveying field in the government agencies like ministry of energy and minerals resources, similarly, the budget for procurement of geospatial software is increasing too. However, the budget for remote sensing activities is limited. Table 2 indicates multi-national companies based in Indonesia have a highest index value, whereas the national companies have low index value (< 50 on a scale of 100). Typically, low index value is a result of low product & service sales as it is dependent on government budget, limited company network and research & development.

Conclusion and Recommendation

Thriving on limited funding and small scale projects from the government holds the growth of the geospatial industry. There is an urgent need to develop research and development GI is required by creating a thematic application of Geospatial Information.

Initially the existing performance of national geospatial industry must be evaluated according the international standards. Extensive comparative study must be initiated to learn and compare the international geospatial industry standards which will allow to gain new knowledge and exposure to global trends by the local GI professional.

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