

Developing the Space Industry of Malaysia: the Policy Frameworks

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Abstract

The space sector in Malaysia is quite developed, but in the absence of a standard framework of development, it is mainly driven by commercial and business forces. A space policy for the country is proposed with a focus on re-organizing the sector, namely, the local industry – emphasizing the downstream activities; the nation's capacity building – the human capital, the necessary infrastructure, and most importantly, the governance – setting a domestic regulatory regime and a designated authority to ensure the responsible use of space in the country. This paper proposes the inclusion of several activities in the related sector as the downstream space industry in Malaysia.

Keywords: Space industry development; policy framework

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1.0 INTRODUCTION

Malaysia has long been in the space business, having launched its own satellites, successfully carried out its *Angkasawan* program, and has employed and benefitted from space technology and its application since the early eighties. These achievements and progress, in the absence of a national development framework, have been accomplished in an ad-hoc manner, mainly driven by the commercial and business sector. Consequently, although the space sector has contributed to the economy, it has not been fully identified as such (Hassan and Subari, 2015).

Space is indeed a strategic sector with a high potential of return. Numerous developed countries have garnered benefits from it. Therefore, there is a need to position Malaysia in this sector in order to reap benefits yielded by it. Unfortunately, space is also expensive to venture in, hence, the need for a strategic plan in order to ensure the return of investment is significant. One top priority in space development is the capability to sustain this venture, and therefore the need to build the local capacity and capability (Subari and Hassan, 2015).

For this, a framework of the country's venture in space, in the form of a National Space Policy, is desirably needed, at least for the next ten years, until the year 2020, where Malaysia's 2020 Vision as a fully developed nation is realized.

2.0 MALAYSIA IN SPACE

Malaysia is already deep in space. There is a complete list of Malaysia's involvement in space, ranging from adapters of space technologies and applications, generating related human resources, developing satellites, operating space systems, participating in regional and international initiatives, and, more significantly, serving and leading the world in space.

2.1 Applications in Space-related Technologies

In the early 1980s, satellite images were used for weather predictions. Remote Sensing applications then started to be employed for environment monitoring and planning purposes. Before that, in the late 1970s, satellite communication was also used by local telecommunication companies, local and international business entities using Very Small Aperture Terminals (VSATs), Television Broadcasting and etc. ASTRO dishes have been in the houses of the majority of Malaysians. In terms of satellite navigation applications, Global Positioning Satellite (GPS) receivers are commonly used by fleet managers whether on land for cars and trucks, in the sea for vessels, or in the air for large and small sized planes. Individual hitch-hikers and fishermen have also started using GPS receivers in the country.

2.2 Institutional Development

Several space-related entities have already been set in place since the 1980s. The National Space Agency of Malaysia (ANGKASA), the agency mandated to develop the space sector, was established in 2003. Prior to that, a division by the name Space Science Study Division (BAKSA) was operating the National Planetarium, and carried out the first satellite technology acquisition program for the country, the TiungSAT-1, which is a micro satellite. In the space application sector, the Malaysian Remote Agency (ARSM) was setup in 1989, pursuing the application of remote sensing applications for mostly government agencies. The Malaysian Meteorological Department (JMM) and end users of space technology, utilized satellite images for meteorological applications. A government-owned company, Astronautic Technology (M) Sdn. Bhd. (ATSB), which was setup in 1998, undertook satellite technology development projects.

Malaysia also has several satellite owners and operators such as the Malaysia East Asia Satellite (MEASAT), and several satellite-based service providers such as BayComm Sdn. Bhd and Celcom. In terms of the downstream space industry players, we have numerous remote sensing-related companies, GNSS-related companies and satellite communication-related companies, among others.

2.3 International Relations and Cooperation

In most of the country's space ventures, we have been collaborating with various international space-state players. Even in the earliest venture, the operation of the Kuantan ground receiving station received transmission from the Palapa-B Indonesian communication satellite. Subsequent activities in remote sensing used images received from various international remote sensing satellites, and the satellite positioning applications in geodetic border determination with Indonesia and Thailand used the US's Transit satellites. Some of the international collaborations that were carried out are; the TiungSAT micro-satellite development with the United Kingdom (1966-2000); the space science scientific payload in SunSAT with South Africa (1995); the MEASAT's satellite procurement with the US and India (1996 – current); the RazakSAT satellite with South Korea (2000-2005); the Angkasan program; and the micro-gravity experiments with Russia.

2.4 The Human Capital Development

There are various universities and other Institutes of Higher Learning that currently conduct space-related courses, mainly in the downstream related areas, such as aeronautics, astronautics, geoinformation engineering, communications, electronics and computers, aviation and aircraft maintenance, GIS, remote sensing, geomatics, and others. Within the downstream sector, these graduates could easily become employed in this industry, as well as in various government agencies. Some universities also offer programs in space science-related courses, such as astrophysics, and astronomy. Certain topics on space and astronomy are embedded in the primary and secondary syllabus, while various co-curricular programs and activities are conducted by many NGOs.

2.5 Malaysia is serving the World in Space

In 1996, a local company, Binariang Satellite Sdn Bhd, (currently MEASAT Satellite System), launched its two communication satellites, namely, the MEASAT-1 and MEASAT-2. Subsequently, another satellite, the MEASAT-3, was launched, and currently MEASAT is serving telecommunication services to not only local customers, but to the rest of the world as well. In December 2007, Mazlan Othman, a former Director General of the Malaysian Space Agency (ANGKASA), taking up the post as the Director of the United Nation Office for Outer Space Affair (UN-OOSA), marks another significant Malaysian contribution to the world.

■ 3.0 THE SPACE INDUSTRY IN MALAYSIA

Currently, the Space economy share of Malaysia's GDP remains rather small compared with other major Malaysian industrial sectors. However, if we take a positive decision to go for growth, we can raise the contribution share significantly. One area to focus on is the downstream industry sector, e.g., the communication satellite related applications and services, as well as the navigation and remote sensing related applications and services, which are quite significant and fast growing (Hassan and Subari, 2015).

The space industry in Malaysia can generally be divided into two broad categories: the 'Upstream' sector and the 'Downstream' sector. In the broad definition, the upstream sector includes activities involved with the development, construction, launching and operations of Space systems, as well as the associated ground segments; while the downstream sector includes activities in the utilization of space systems, such as the exploitation of satellite capabilities and the selling of commercial products and services directly to end users.

3.1 The Space Economy Outlook

It is difficult to estimate the Space industry's contribution to Malaysia's overall GDP. However, the aerospace industry, which is closely related to Space, contributed to RM 25.7 billion (1.4 %) of the GDP in 2010 (SIRIM, 2008). The three main aerospace sectors considered the primary contributors involve security, enforcement and defense, which comprise over 200 companies.

The telecommunications sector, which depends heavily on space technology, contributes 7-8% of GDP every year. The downstream industry contributes the majority of the revenue, up to 99% of the total revenue. In terms of downstream Space market value, the telecommunications services provides the bulk of the revenue, consisting of more than 90% of the total, followed by Navigation and Remote Sensing services combined. Currently, less than 30 local companies are involved in the three Space-related sectors.

In 2005, the Space downstream industries contributed by RM16.73 billion compared to RM0.003 billion by its upstream counterpart. The huge gap trend in revenue generated continues to the year 2006, where the downstream and upstream industries generated RM21.61 billion and RM0.035 billion, respectively, to the local economy.

The trend of the global satellite industry segments shows a very similar Malaysian Space industry trend. Among segments such as satellite manufacturing, launching, ground equipment manufacturing, and satellite services that include communication, the most lucrative part is the services industry. The service segment easily comprises more than 60% of the total revenue from the industry. To be more precise, amongst the three main telecommunication services, the broadcasting segment is the most lucrative compared to the other two segments of mobile and broadband services.

3.2 The Satellite Communication Sector

The most visible satellite communications service in Malaysia is the direct home broadcast services operated by ASTRO, which offers more than 150 TV channels and Astro-on-Demand. The latest statistics show that the residential subscriber base is more than 3 million, or 54% of Malaysian homes (Table 11). Indeed, the DTH subscription in Malaysia is considered among the highest in the world in the Ku-Band. Its radio business has 10.6 million listeners over its eight stations each week. ASTRO leases transponder capacity from MEASAT.

Space has proven to be one of only very few sectors where growth can remain resilient through the world-wide recession. This has been possible because of the diverse range of customers for Space-enabled services, from commercial telecommunications, to institutional surveillance.

Table 1 Comparison of Asia Pacific DTH Subscription Base

Country	2006 (million)	2007 (million)	Growth (%)
Australia	1.17	1.35	15.4
India	1.49	2.31	55.0
Indonesia	0.17	0.27	58.8
Japan	3.73	3.66	-1.9
Malaysia	1.94	2.17	11.9
New Zealand	0.67	0.73	9.0
Philippines	0.11	0.12	9.1
South Korea	1.98	2.12	7.1
Thailand	0.40	0.46	15.0

3.3 The Remote Sensing Sector

With regards to the remote sensing sector, the number of agencies for both public and private sectors are increasing on a yearly basis, which indicates a positive business trend. The future of the remote sensing downstream business in Malaysia is looking better than ever. In a review exercise conducted by the Agency of Remote Sensing Malaysia of the local remote-sensing market, the growth of the industry over the next decade looks strong (ARSM, 2010). The study indicates that government agencies represent a significant revenue source for many remote sensing-related companies.

Table 2 Agencies Involved in RS Activities (2000-2006)

Year	2000	2001	2002	2003	2004	2005	2006
Public	34	35	50	35	63	70	76
Private	21	13	27	18	14	35	34
Total	55	48	77	53	77	105	110

To indicate the potential demand for remote sensing data, both sectors were requested to select the types of data they use from five types of data providers. Both the public and private sectors show preference to SPOT, Landsat and Radarsat data. These types of data are commonly used in a variety of development applications, such as municipal planning, vegetation analysis and transportation management.

It is worthy to note that, beginning 2004, there was a stark difference of increasing trend on the number of entities involved, types of data usage and applications, for this sector. Overall, the remote sensing sector indicates steady growth during the coming decade. The ongoing challenge in the remote-sensing industry is to make high-quality data more accessible to more users, at an affordable price. The use of maps, aerial photos, and digital aerial and satellite imagery has already evolved dramatically during the past three decades, from

primarily scientific and academic applications, to commercial use in the media and on the Internet. Widespread consumer application of geospatial data has evaded the remote-sensing industry thus far, but there are several technological developments that have the potential to broaden the access and use of geospatial data. The number of remote sensing applications, for example, has grown by more than 300%, clear evidence of the healthy business trend in this industry.

In revenue terms, there is an increasing trend for ARSM, the main government agency that is responsible for remote sensing activities. The revenue for remote sensing data services amounted to RM117,856 in 2004; and increased by nearly fourfold to RM562,844 in 2005. In 2006, it shows a more positive growth to RM823,970 from the previous year.

3.4 The Satellite Navigation Sector

Within the satellite navigation and positioning sector, generically known as the Global Navigation Satellite System (GNSS), the conventional post-processing precise positioning applications and real-time navigation applications have merged. Precise GNSS systems for surveying, mapping as well as location-tracking applications have been widely used in Malaysia. Vehicle navigation systems are common, and even the use of GNSSs for high precision navigation such as aircraft approaches and landing is currently being witnessed. The GNSS has also given the much needed precise time-scale for commercial transactions, including e-banking, service billing and others.

In order for Malaysia to attain success in the space industry, we should carve out niche areas and not attempt to get into the big league with the United States, China and Russia. There is no need for Malaysia to spend huge sums of money for space technologies through innovation. For example, we can process and develop data for multiple uses, namely, humanitarian, civil and commercial applications. The key is to take the lead and start. Although space technology is being used for sensitive purposes such as for defense and security, there is also much non-sensitive data that can be collected, which could be bought through proper arrangements and reprocessed using innovation for sale to other countries. The data processed could be useful for many purposes, depending on the needs of the countries, such as early warnings and alerts for tsunamis, earthquakes, and forest fires, the early detection and location of cargo ship course adjustments due to changes in weather and piracy threats, as well for fuel conservation.

The revenue breakdown in terms of the three main segments of the downstream Space industries shows that the telecommunications sector (including broadcasting) monopolizes over 99% of the total revenue generated. In 2006, for example, the telecommunications sector churned out RM21.61 billion in revenue compared to a meager RM0.00082 for both the remote sensing and navigation sectors.

For the sake of the future of our economic growth and its place on the international table, Malaysia needs not only a national space strategy, but its own industry, supported, in part, by the government. Having space assets is a critical catalyst for Malaysia's economic growth.

■ 4.0 THE DRIVER: THE PROPOSED POLICY FRAMEWORK

It is then proposed that the nation needs to establish clearly the direction of its venture into space. Having realized that space is a strategic sector with huge potential, it is envisioned that once it becomes a developed nation in 2020, Malaysia should be capable of embracing space as a strategic sector for national well-being.

This paper is part of a proposal to the Malaysian Government in 2010 to set up its Space Policy, which could then provide guidance to develop the country's potential in the space sector in order to support the development of the new economy, and strengthen the national security infrastructure.

Several policy thrusts were proposed to achieve the objectives:

1) Space as the frontier of knowledge generation

To explore the frontier of space to generate new knowledge that helps shape the scientific and technological civilization of the future with the early phase of up to the year 2020.

2) Space technology and infrastructure development for economic benefit and safeguarding the nation's sovereignty

To accelerate space technology and infrastructure development, and create value for economic benefits, as well as safeguarding the nation's sovereignty/security and well-being.

3) Space industry development for sustainable economic growth and enhanced quality of life

To sustain the development and support of the local space applications industry for the direct benefit (ROI) of the public and societal well-being, and enhance the quality of life and enrich society through empowering it with space applications.

4) Supportive governance policy

To develop and sustain a comprehensive national legislative and regulatory framework for peaceful, safe and secure utilization of space technologies for the nation.

5) R&D, application and commercialization of space technology for sustainable development

To strengthen the capability and enhance innovation in space research and development, and to commercialize research output for sustainable development.

6) Human capital and talent development

To ensure an adequate availability of a qualified, talented and competent workforce to develop and sustain space technology development.

7) International relations and diplomacy

To effectively engage in international relations and diplomacy, and to actively foster and promote international cooperation in order to safeguard and enhance national sovereign rights of access to space, as well as to promote peaceful use of outer space and support the international de-militarization of space.

The key driver behind increasing government interest is the acknowledgement that space activity, whether satellite communications, remote sensing, or navigation applications, ties directly to national power, economic benefits, and societal wellbeing. At the same time, new industries have emerged around remote sensing, such as imagery products and location-based services, many of which also tie into space-enabled navigation and transportation services. Effective space strategies and policies must align national objectives and capabilities to the investment in critical infrastructure, programs and applications development, as well as education, training, and outreach, to stimulate end-user demand in order to maximize national interest, usage, and social benefits (Lukaszczyk, 2011).

■ 5.0 CONCLUSIONS

Malaysia's involvement in the space industry is part of a broader effort to attain the Vision 2020 objective of transforming Malaysia into a fully developed country. To bring about progress, the government has to implement various initiatives, one of which is Malaysia's foray into the space industry.

The new coverage of the local space industry will give 'space' a new status in the country. If space is seen as a one-way huge capital investment by the government without a clear ROI, the downstream applications of space technology would clearly give growth to the economy at the scale of 2-3% GDP, currently valued at about 3-4 billion annually, and would well increase to around 4% of overall GDP by including other potential applications such as the geospatial industry.

This Policy will provide an outline for the country's space sector development until 2020, with the objectives of preparing the country's potential in the space sector to contribute to the development of the new economy, as well as of strengthening the national security infrastructure.

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