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Research Paper Biotechnology

Malaysia as Biotechnology Producer: Characters of Local Biotechnology Industry

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ABSTRACT

Malaysia supposedly should not have any problem in becoming a biotechnology producer nation. Malaysia is comparatively more developed than other developing countries and is naturally endowed with bountiful tropical forest, biodiversity, a rich source for genetic materials used as main raw ingredients for biotechnological inventions. In that sense, Malaysia has the extra advantage over other developed nations that are poor in natural resources. The paper investigates the characters of the biotechnology industry locally in preparing the nation towards the national aspiration

KEYWORDS: biotechnology industry, knowledge workers, biotechnological invention, SMEs

INTRODUCTION

Biotechnology as a field of technology is a highly technical, material-intensive and complicated. It mainly deals with isolation replication and manipulation of DNA at cellular level and employs it to the best advantage for mankind. Such procedure is not straightforward. DNAs are actually intricate chemical structures with highly complex physical characteristics. They are packed in minute volumes at molecular level, invisible to naked eyes and mingled with other genetic materials with or without any biological significance. The process to extract the desired molecules is lengthy, delicate and challenging. It requires hefty investment of money, labour, and time to discover and characterize their functions. Highly sensitive tools are used in a series of sophisticated investigative procedures to ascertain, obtain and manipulate those tiny molecules of desired result. Briefly biotechnologists still have limited knowledge on the complex properties of DNA, the possible linkages between each cellular chemical and how any changes in the arrangement of protein subunit could alter the function of the genetic molecule. Bearing these facts in mind any interested country should be prepared to build a strong industry with capable key players before they could finally join the biotechnology producer community.

CHARACTERISTICS OF THE MALAYSIAN BIOTECHNOLOGY INDUSTRY

The Malaysian biotech industry has different characteristics than those found in developed nations. In most probability, Malaysia will likely encounter different technical challenges in becoming a nation of biotechnology producer.

NEW INDUSTRY AND INEXPERIENCED PLAYERS

Biotechnology is a young industry in Malaysia. It reaches Malaysian shoreline about a decade ago. Out of 173 local biotechnology companies interviewed, 130 have less than less than five years' experience in the biotechnology industry as compared to the more experienced transnational companies. Most were previously technology users and had little or no experience as technology producers. This fact illustrates two key points. They are novice to international trade, patent law and the practice of patenting biotechnology. Many are yet to build solid R&D facilities or produce their first biotech inventions. They may need more time to patent or commercialize their inventions.

SMALL IN NUMBER

As at 2010, there were 349 bionexus biotechnology SMEs in Malaysia. Bionexus is a special status accorded to biotechnology companies by BiotechCorp, an agency responsible in overseeing biotechnology industry locally. The companies must satisfy the stipulated minimum requirements first. By the year 2012, the number only increased slightly to 372. They are found in agriculture, healthcare and industrial sector.

SMALL IN SIZE

The bionexus biotechnology company are largely small and medium size organization (SMEs). In Malaysia, a company could be categorized as micro, small, medium or large. A small scale company must have full time employees, not more than 50 with annual sales turnover of not exceeding RM10 million. Medium-scale company employs between 51 to 150 full time employees with annual sales turnover ranging more than RM10 million to RM25 million. Large business should have more than 150 permanent employees. In terms of ownership, the companies could be either a local, foreign or joint ventured, public or privately owned. Currently 75% of them are domestic companies and 25% were foreign companies.

SMEs AS KEY PLAYERS

The SMEs dominate the industry. 89.8% of players in the industry are private and family owned business entities. Another group of players are transnational companies operating locally. They represent 6.2% of the industry whilst the remaining 10% of biotechnology industry is represented by public companies (0.1%), government-linked companies (3.8 %) and research institute (3 %).

FINANCIAL SOURCES

The annual budget allocated by the biotechnology SMEs is generally small. Majority started their business with capital as low as RM300, 000. Big government linked companies poured in a minimum of RM1 million to kick start their operation. These working capitals are small as compared to companies in other countries or transnational entities operating locally. Their net profits are equally small. Their financial funding comes through owners' personal resources or loans. Typically, start-up companies linked to the government usually receive considerable sums of working capital from the state, until they become financially independent.

DIFFERENT MODE OF BUSINESS APPROACH

Perhaps unique to Malaysia alone, but the people behind the business entities and their ethnicity influence the way the business is conducted a lot. This approach may not necessarily suitable or optimal the budding local biotechnology industry. For example, a Chinese company prefer to adopt Chinese business philosophy in running their business. They are almost close to outsiders. All important and senior posts in the company are headed by family members to ensure the family business and trade secret is kept within their circle. They are reluctant to open the investment doors to strangers and are unwilling to share the patent rewards with biotechnologist and researchers who are unrelated to them. Though more than half of the Chinese companies have in-house R&D department, they are very tight lip about each R&D project for fear of commercial espionage. Malay companies are more open. Only top and senior posts in the organization, like chair person, Chief Executive Officer of Chief Finance Officer are handled by family members whilst the rest, are filled by professionals or outsiders. They would consider bringing in new member to the board of directors or accept investments from third party investor. Malay companies have a high level of trust and reliance on the government for information, guidance and support system.

R & D FACILITIES

Not all biotechnology companies have the desired state of art R&D facilities. Only 6% of them mostly research institute or established large size SMEs have the same. They however lack qualified employees to fully utilize them. 45% of new and inexperienced companies do not have any R&D facilities at all. They partnered with public research institutes or universities to conduct the R&D instead.

LOCATION

Biotechnology companies are scattered all over the country. Most are concentrated in Kuala Lumpur and Selangor, the most populous and developed parts of the nation. Some companies establish their headquarters and run their business from the capital city, while locating their research centres and production plants elsewhere.

HIGH TURNOVER

The locality of business organization affected the companies' abilities to find and hire qualified experts for their manufacturing plants. Some experts prefer to live and work in the capital due to the facilities and lifestyle benefits it offers. Some are willing to commute to the research centres or manufacturing plants on a periodical basis, provided all expenses are borne by employers. Others prefer to work outside of the capital due to the lower cost of living and family attachments. These facts are partially responsible for the high turnover rates in the industry. Generally 76 percent of the knowledge-skilled workers stay between three to five years at one organization before leaving for greener pasture. It takes a very long time for biotechnology companies to fulfil the vacancies.

INADEQUATE KNOWLEDGE-SKILLED WORKERS

The industry seriously lacks knowledge-skilled employees like biotechnologists, scientists, engineers and other professionals. In 2012, there were 2,871 workers working in BioNexus companies. Only 1,356 of them are knowledge-skilled workers with 380 in agricultural sector, 501 in healthcare sector and the rest in industrial sector. 502 of them were fresh graduates. Only 436 of them have previous experience in biotechnology industry. These numbers still fall short of the targeted estimation of 100,000 knowledge-skilled by National Biotechnology Policy 2005. The problem is attributed to several reasons. Not many university graduates take biotechnology as their potential career path for lack of information. Not many local universities have biotechnology faculty or offer it as a subject. This problem is deeply inter-twined with the exodus of skilled labour moving abroad in search for better prospects. This brain drain diminishes the country's ability to build the critical mass necessary for technical growth. It is plausible for Malaysia to entice and employ foreign experts to work and train the locals, or send existing local experts abroad to enhance their knowledge on a regular basis. These efforts are temporary and may not work. It requires vast capital investment for selected few. There is no guarantee they will return home upon completion of their stints.

NOT SO HIGHLY QUALIFIED WORKERS

It is common for biotechnologists or genetic engineers in developed nations to have PhD or Masters Degree coupled with several years of working experience as researchers at research institute or universities. The same does not happen locally. Interviews with more than 120 knowledge workers in the industry indicated that 10 of them have PhD degree. They work in universities or research institute. Only 69 of them have Master Degree but without working experience while the rest only hold a bachelor degree.

RELIANCE ON FOREIGN TECHNOLOGY

The above inadequacy significantly affected technology transfer process. The knowledge-skilled workers may require a longer time to understand and gain sufficient self confident in conducting R&D and potentially produce new end products. As a result, the industry lacks players with strong capabilities in R&D or rich portfolio of protected data as reflected in the numbers of domestic patent applications for biotech inventions. As at July 2013, there were 562 patent applications filed by locals as compared to 3561 foreign applications. Only 26 patents were granted to local applications as compared to 1317 patents to foreign applications. Many of the local biotechnological inventions are utility models patent. The rest of the inventions are mostly limited to non-research based manufacture and final stage of marketing the patented invention such as (re)packaging or (re)labelling. Companies are forced to rely completely on technological data from abroad, which are usually protected by patents. Access to technological knowledge and latest technology comes with a price as determined by technology producer. Some companies find the fees quite taxing and beyond their means. The same slows down the rate of technological development and progression. In long term, biotechnology companies may not be able to sustain the practice and will have to leave the industry totally.

DISCUSSION

Malaysia needs more than mere physical development to become a biotechnology producer. The weakness of individual biotechnology player must be strengthened first before they could strengthen the local industry. The industry is currently laden with weak players. The industry could not sustain when Malaysia lacks knowledge workers as well as science, engineering and biotechnology graduates. The industry may need a longer period to fully blossom. Assistance from foreign experts might be necessary to plan and train the locals on their business plans, intellectual property strategies and expedite the technology transfer process. Key players must start to invest their resources and efforts in R&D programs and activities more aggressively. Strategically this is more practical than keep on paying the licensing fees on continuous basis.

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