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Licensing Approach to R&D Commercialization among Government Research Institutes in Malaysia – Lessons from Selected Cases

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Abstract:
The three selected Government Research Institutes (GRI's) in Malaysia, namely Malaysian Palm Oil Board (MPOB), Forest Research Institute Malaysia (FRIM) and Malaysian Agricultural Research and Development Institute (MARDI) being research agencies under specific ministries of the government, are constrained by statutory restrictions in their options for R&D commercialization path – technology licensing is currently the preferred option. In the case of MPOB, technology licensing for the production of palm-based trans-free liquid santan was taken up by two industry players. The market need was well qualified and the commercial production technology was appropriately developed; the major commercialization challenges were in the forms of the need to increase brand and product benefits awareness so it could be accepted by mainstream consumers as alternative to coconut milk. In the case of FRIM's High Temperature Drying (HTD) system, it was developed to address rubber wood furniture industry's need for chemical-free technology and shorter processing time. The commercialization challenge is to convince industry players of the benefits from adopting HTD technology. In the case of MARDI, Clearfield Production System for rice was developed in collaboration with BASF to address the problem of weedy rice. User acceptance (i.e. rice farmers) has been encouraging since substantial financial benefits can be realized. All three cases exemplified clear industry-driven market needs that led to successful R&D commercialization via technology licensing.

Keywords *- Case Study, Government Research Institutes, Malaysia, R&D Commercialization.*

I. INTRODUCTION

The three Government Research Institutes (GRI's) included in this study have played important roles in research and development (R&D) as well as in the commercialization of the R&D in their respective industries.While public universities in Malaysia have more options to R&D commercialization paths (from spin-offs, joint ventures to technology transfer via licensing), GRI's tend to have limited options due to their statutory constraints; their common path to R&D commercialization is via technology transfer

There pros and cons of the different models of technology transfer are well documented [1] and the drivers for licensing are different for different industry [2]. In the case of the three GRI's selected in this study, technology transfer path to commercialization has enabled them to focus on what they do best, i.e. conduct industry relevant R&D, perfect the technology that provides the solution and let the most capable industry player implement it in return for licensing fee or royalty. This way they optimize returns while minimizing the risk of doing it themselves, thus, effectively avoiding the "valley of death" in the innovation diffusion curve. This advantage can be clearly seen in the case of MPOB.

II. CASES AND DISCUSSSION

CASE 1 (MPOB): Palm-based trans-free liquid *santan*

The health and business case for commercial production of palm-based trans-free liquid *santan* was first proposed by Dr. Zaida Zainal and her team in 2008. The technology for palm-based trans-free liquid *santan* was licensed out by MPOB in June 2008.

Two major companies currently took up the technology, namely, (1) Premium Food Corporation Sdn. Bhd. (marketed under the brand "Khalis"); and, (2) FELCRA Processing and Engineering Sdn. Bhd. (marketed under the brand "Suri"). By far "Khalis" is more widely distributed and can be found in most major supermarkets in Malaysia.

The identification and qualification of market need was summarized by Dr. Zaida and her team as indicated below as part of their proposal which was vetted and approved by MPOB's Program Advisory Committee (PAC):

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"*Santan* (coconut milk) is rich in fat and its consumption has been associated with increased plasma low-density lipoprotein cholesterol levels (LDL) and greater risk of arterial thrombosis due to its high contents of short chain saturated fatty acids such as lauric (C12:0) and myristic (C14:0). Therefore, the consumption of *santan* is discouraged. Palm-based *santan* has therefore been formulated to obviate the health risk. It has considerably lower C12-C18 saturated fatty acids, and its consumption, instead of normal *santan*, has been found to lower serum total cholesterol and cardiovascular risk. The additional benefits are that it is more resistant to deterioration (e.g. from oxygen, light, moisture), has better flavour and nutritive value, and is more stable to handling during storage and transport. The product is also trans-free."

Pilot plant to test the appropriate production technology and project economic feasibility were done at MPOB. Once these were completed the technology was then made available to the industry players. The technology takers then engaged MPOB researchers as consultants to help set up commercial production facilities.

The main challenges for the technology licensees were to develop the brand names ("Khalis"and "Suri") while leveraging on the benefits of this palm-based liquid *santan* as healthier alternative to the coconut *santan* in the market. This proved to be quite an uphill battle because Malaysian consumers are so used to the coconut *santan* and would not easily switch despite the benefits of palm-based liquid *santan* and high incidence of obesity and associated health problems linked to coconut *santan* consumption. This is a classic case where a superior product does not necessarily translate into superior business performance (in term of wider consumer acceptance and larger market share). It will take time and effort to change entrenched consumer preference for an inferior product.

CASE 2 (FRIM): High temperature drying (HTD) system

The high temperature drying (HTD) system for rubber wood treatment is slated to make an impact on the Malaysian furniture industry. The HTD technology, which eliminated the use of chemicals in processing rubber wood, would also reduce the processing time from 12 to two days. The technology can reduce energy consumption and lead to a more efficient and cost-saving operation, which will directly enhance the competitiveness of the more than 2,000 furniture players in the industry.

FRIM first licensed its HTD system in 2010 to Techwood Industry Sdn Bhd (TWI), a large rubber wood furniture manufacturer in Malaysia. TWI secured a Ringgit (MYR) 4 million loan (approximately US$1 million) from the Malaysian Technology Development Corporation (MTDC) to commercialize the technology. Unfortunately, this agreement did not lead to successful commercialization.

Although FRIM's first attempt at transferring its HTD technology met with negative results, a second agreement with Advance Low Pressure Systems (ALPS) proved successful, with two HTD treatment centres in Telok Gong, Malaysia, established by 2013 with additional commercialization aimed for Thailand and other rubber wood producing countries. In 2014, the first products made with HTD-processed rubber wood were successfully marketed on a trial basis to the IKEA (Thailand) department store chain and other companies in countries such as Australia, China and South Korea. By the end of 2014 FRIM's HTD technology was poised to be commercially successful in Malaysia and many other rubber wood producing countries. By 2015 FRIM was continuing to identify other commercial uses for its invention in rubber wood producing countries via investing in further licensing efforts.

Despite the advantages of the HTD system, many of current industry players do not readily embrace it. One possible reason could be that apart from the EU, many other rubber wood furniture importing countries, particularly China, do not have stringent laws prohibiting the use of borates. Thus, there is no real incentive for them to switch to this new more efficient and sustainable technology. Additionally, it would require new capital investment in the system for them. This is perhaps an area where the government can play a role by providing incentives for the industry players to switch to the new technology. It would provide a new positioning for the Malaysian industry players in the global market place, i.e. an environmentally sustainable rubber wood furniture industry.

CASE 3 (MARDI): MARDI-BASF Clearfield rice production system

In 2010 Malaysian Agricultural Research and Development Institute (MARDI) and BASF, announced the commercial launch of the Clearfield Production System for rice in Malaysia. The Clearfield Production System combines high-yielding seeds with broad-spectrum herbicides tailored to regional conditions, delivering efficient, season-long weed control, crop quality and global market acceptance.

After switching to the BASF Clearfield® system, Malaysian rice growers who previously harvested four tons per hectare began reporting 10-ton yields. MARDI believes that this yield increase is due to Clearfield®, which provides outstanding weed control, shorter growing time, superior plant vigour, and improved plant health.

Clearfield® allows farmers to eliminate wild weedy rice, a similar-looking species to domestic rice but which does not produce an edible grain. To put the problem in context, 95% of farmer report weed infestations in their fields every season and weedy rice is estimated to affect 10% of total production worldwide. Traditionally farmers had to try and control this problem by hand-weeding, a hugely time intensive exercise. Controlling weedy rice with Clearfield® means lower production costs, increased yield potential and improved crop quality.

In order to get the optimum benefits from the Clearfield® Production System, certain procedures have to be followed and this includes not overplanting the recommended rice varieties. Unfortunately, realizing its bountiful yield, some farmers planted Clearfield more often than they were supposed to. The special padi plant has now cross-bred with the weedy rice or *padi angin*, which is considered a pest in commercial rice fields. As such, the weed, also known as red

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rice throughout the many rice-growing regions, is now resistant to (the herbicide) *imidazolinone*. Farmers are unable to control the weedy rice from growing, making it more expensive to maintain the field. Ultimately, if this is not managed, the initial problem that the system was supposed to solve will be back again.

This is a situation that the relevant agency of the Ministry of Agriculture must address – appropriate rules and regulations should be formulated and enforced; if necessary, some kind of incentive and support system could also complement the Clearfield Production System to ensure its long term benefits to farmers and the industry.

III. CONCLUSION

The path to R&D commercialization via licensing as exemplified by the three Malaysian GRI's has its advantages in that, (1) it minimizes the risk of falling into the valley of death in the innovation diffusion curve; it achieved this by collaborating with industry players who have the relevant knowledge and business infrastructure already in place in the market to carry the product or technology to the mainstream customers (true for all three cases); (2) non-exclusive licensing arrangement to more than one players ensures the best licensee wins, thus, optimizing the royalty streams in case one of the licensees did not perform (true for MPOB and FRIM cases).

Since the GRI's in this study are agencies under the relevant ministries and their R&D commercialization often involves products or technologies that would potentially would bring substantial benefits to society, they should also play an active role in ensuring the successful adoption of these products and technologies. This approach would ensure that the investment in the R&D commercialization could be recouped in the form of royalty streams as well as the intangible economic benefits in the form of healthier lifestyle of the citizens (in the case of palm-based liquid *santan*), a more cost competitive and environmentally sustainable rubber wood furniture industry (in the case of FRIM's HTD) and higher yield of rice for the longer term food security of the country (in the case of MARDI-BASF Clearfield Production System).

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REFERENCES

[1] S. R. Bradley, C. S. Hayter and A. L. Link, "Models and methods of university technology transfer," Working Paper 13-10, The University of North Carolina, Greensboro, Jun. 2013.

[2] U. Lichtenhaler, "The drivers of technology licensing: an industry comparison," California Management Review, vol. 49, no. 4, pp. 67-89, Summer 2007.