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Problems on Commercialization of Genetically Modified Crops in Malaysia

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Abstract

Modern biotechnology is a potential technology to be developed in Malaysia. Advancement in molecular genetics methods such as the recombinant DNA techniques in genetic engineering improves ways to make use of living organisms to benefit human. From the perspectives of agro biotechnology, the methods which enable the introduction of genetic material to be integrated into plant genome called Plant Genetic Modified Technology (PGMT). Since 1980s Malaysia enthusiastically worked on the development of Genetically Modified (GM) Crops. However, with certain barriers and hindrances, the successful development seems unattainable. This study was conducted to explore the six critical factors and issues which affect the successful commercialization of GM Crops in Malaysia using face to face and telephone interview which involved ten respondents from eight universities and research institutions in Malaysia. The data was analyzed using NVIVO computer software. The results from findings, recommendations and implications to practitioners presented.

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Keywords: Genetically modified crops; Intellectual property; Transgenic; Commercialization; Malaysia.

1. Introduction

Innovation is the vital aspect to be considered as Malaysia shifts towards Knowledge-Based Economy (K-Based Economy) by 2020. Conventionally, with the focus on capital investment, Malaysia seems to be far behind countries like China and India with technology and knowledge driven economy (MOSTI, 2005). Regards to comment above, the chain of creation, research, development and commercialization seem to be the headline of many innovation based industries such as biotechnology and nanotechnology all over the world (AlangEndut, 2007).

Hence, Malaysia emphasis on Malaysia Biotechnology Policy which lines up three stages, Phase I (2005-2010) for capacity building, Phase II (2011-2015) for science to business transition and Phase III (2016-2020) for global presence (MOSTI, 2005). From the perspective of agriculture, modern genetics enhance many agricultural activities in terms of producing high quality seeds using tissue culture and hybrid, bio fuels, biotech seeds, bio-pesticides, and bio-fertilizer (Paul, 2008). The Genetic Modification (GM) Technology is a method of transferring a fraction of DNA sequences coded a particular gene into particular organism. This method is to induce genetic composition alteration which affects the phenotype of the organism. Hence it will produce desired traits or characteristics of transgenic organism (Brooker,
To develop a productive agricultural industry in Malaysia, it is crucial to develop the transgenic plants from the laboratory to the real market.

2. Literature Review

Malaysia has been dealing with GM crops activities since 1985 (Abubakar, 2007). Nevertheless the GM crops study eagerly started from 2000 until today without any successful commercialized GM crops product. Originally, the purpose of starting the GM study at the moment was to overcome the limitations of conventional breeding and improved efficiency of tissue culture activity (MABIC, 2006). According to Ellis (2006), Malaysia currently enthusiastically worked on virus-resistant transgenic rice, papaya, chili and quality enhance of transgenic palm oil and pineapple. While considered Malaysia Agricultural Research Development Institute (MARDI) as the key player of this industry, MARDI continued their research on GM crops since 2000 with developing virus resistance chili pepper, passion fruits, orchids, rice and papaya which are based on agronomic trait. But until today, the significance of GM crops under research is limited to rice and papaya (Abubakar, 2007; Ellis, 2006; MABIC, 2006).

The scenario in Malaysia is supported by Kalaitzandonake et. al (2007) who concluded three major obstacles which slow down the innovation activities of transgenic crops which are the lethargic moves of regulatory approval, decrease research and development intensity towards lower market potential crops and lacking of establishment of new biotech firm. In this study, the indices of the problems affecting GM development and commercialization are based on the perspectives and views of different entities. The opinion of human and financial capital and other requirements (Cohen, 2005; Valvaseyi, 2005; Ismail, et al.,2011a; b; c), bio safety regulation (Cohen, 2005; Kalaitzandonakes et al., 2007; Ethugala, 2011), and public acceptance (Februhartanty et al, 2007; Ismail et al., 2011a), Intellectual property protection (Paul, 2008; Ismail et al., 2011b), institutional roles (Cohen, 2005; Paul, 2008; Ismail et al., 2011b), technical constraint (Valvasevi, 2005) may have views on the different perspectives of the main key player.

3. Research Methodology

Eight institutions in Malaysia either directly or indirectly involved in GM crops development were covered; two ministries, Ministry of National Resources Environment (NRE) and Ministry of Agriculture (MOA), two Government Research Institute (GRI)s; Malaysia Agricultural Research and Development Institute (MARDI) and Malaysia Palm Oil Board (MPOB) and four universities; Universiti Putra Malaysia (UPM), Universiti Teknologi Mara (UiTM), Universiti Teknologi Malaysia (UTM) and Universiti Kebangsaan Malaysia (UKM). Respondents are researchers, regulators and administrative personnel. Non probability sampling method was preferred as it enables the researcher gain in debt information from diverse respondents from a variety of background. Although the sample population is little, it is consistent with Ritchie and Lewis (2003) opinion that qualitative samples may be little in size, but the yield is usually rich in details. Two modes of interview were used in this study; the face to face and telephone interview. From the feedback, the main factors mostly highlighted by respondents are, issues on the human and financial capital and other capital requirements and institutional roles which scored 90% of feedback. In contrast, the less concerned issues were the bio-safety regulatory issues and intellectual property protection with only 40%.

| No | Issues/respondents | M1 | M2 | M3 | M4 | R1 | R2 | R3 | R4 | R5 | R6 | Percent age |
|----|-------------------|----|----|----|----|----|----|----|----|----|----|-------------|
| 1 | Human Capital and Other Capital Requirements | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 90% |
| 2 | Bio safety Regulation | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 40% |
| 3 | Institutional Roles | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 90% |
| 4 | Intellectual Property Protection | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 40% |
| 5 | Technical | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 60% |
| 6 | Public acceptance | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 50% |

Table 1: Summary of the Findings (Compiled from the interview)
Success or lack of success was the denomination given by the respondent, who compared the effects of commercialization in relation to the GM crops regarding the 21 sub-elements included in six major factors. In agreement with the methodology, each main component corresponds to a set of isolated variables, which by applying the multivariate analysis technique were reduced, aiming at facilitating data interpretation. Some isolated variables considered are equally significant for all the sectors and it enables examining similarity and differences between the sectors.

In the cases where the performance was equal or surpassed expectations, they were classified as the factors that affect the performance on commercialization of GM crops. They are limited numbers of researcher, inexperienced researcher, limited funding and grant, collaboration issues, less intention to commercialize the product, issues on Discovery Phase (gene and trait identification), issues on Phase I (proof of concept) and knowledge and awareness. In opposition, data revealed that researchers and management personnel are lacking of interest and awareness on ownership issues of intellectual property protection. Protection is very important because these exclusive rights allow owners of intellectual property to benefit from the property they have created, providing a financial incentive for the creation of an investment in intellectual property, and, in case of patents, pay associated research and development costs.

The same scenario occurred for regulatory issues. In this study, the regulatory issues were related to Bio safety regulation and the Intellectual property (IP) protection factors. The efficiency of resources allocation especially in terms of the funding determined the successful establishment and implementation of the regulation. On the other hand, the institutions are also responsible to the public acceptance issues, to
persuade and educate the public to solve the issues on knowledge, awareness and perception towards the product.

4. Conclusions and Recommendations

With a deeper understanding of the critical issues, the effort to tackle the issues becomes easier. With the combination of the previous study and this study finding, the study had answered all the research questions which include the identification of factors that can affect the commercialization process of GM crops, determination of the most important factors and key players on successful commercialization process of GM crops.

Although important technology has been developed primarily in the industrialized countries, the better utilization sites are likely to be found elsewhere—largely in the tropics and southern hemisphere and developed perhaps through joint technology contracts. Additionally, much of the basic research necessary for the development of genetically modified crops has already been completed and is part of shared knowledge in the scientific community. The techniques for applying genetic engineering to crops are well known and, in fact, being used in laboratories and field tests around the world. Many of the remaining challenges to commercialization and deployment are associated with deregulation and public acceptance.

As a conclusion, the study showed that all the six factors were significant to the GM crops development. However, the views of the issues were only based on the early phase of the GM development parallel to its current development stage in Malaysia. Policy makers and practitioners should be guided by these recommendations;

- a) Institutions should collaborate to form intensive and centralize GM crop research group with focus on potential to commercialize varieties.
- b) Increase awareness and knowledge about the product through educational programs and media (television and radio program, text book syllabus, seminar etc).
- c) Increase the awareness to commercialize the product by promoting the university research and focus towards production.
- d) Heavily enforced the establishment and collaboration of institutions, unit and bodies to coordinate the regulation and activities.
- e) Improve funding allocation for capacity building to minimize the distraction of resource limitations.

Finally, a model was proposed based on the findings of the study which is consistent with the Monsanto model, with the six major factors as discussed earlier.

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