

STAKEHOLDERS' INTENTIONS TO PURCHASE GM RICE IN MALAYSIA

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ABSTRACT

*Rice is a staple food for most of the world's population, and its production must be increased to meet a growing population. Genetically modified (GM) crops continue to be a controversial global issue since its commercialisation in 1996. For GM technology to be fully implemented and used commercially, it is important to assess the public's intention to purchase GM products. Hence, this study was conducted to assess stakeholders' intention to purchase GM rice that contains a "yield gene" from wild rice, type *O. rufipogon* in Malaysia and the associated predicting factors. The questionnaire was administered via face-to-face survey of 509 adult respondents. The results of this study found that the Malaysian stakeholders rated GM rice as having moderate benefits, risks and moral issues and moderately acceptable by their religion. Thus, they expressed moderate intention to purchase GM rice. In conclusion, despite the potential of GM rice to address food security issues in Malaysia, the Malaysian public were moderately enthusiastic about it.*

Keywords: GM rice, Stakeholders, Intention, Purchase, Malaysia.

INTRODUCTION

The world's population will continue to increase, and it is expected to be 34 per cent higher by 2050 (FAO, 2009). It is also forecast that in the future, population growth in developing countries will exceed population growth in developed countries (FAO, 2009). Limited land resources may require more intensive food production and strategies to feed the growing demands of the world's population (Dubock, 2017). Rice is known as an important food crop, thus, its production must be increased (Nelson et al., 2019; Khush, 1997). Moreover, rice is an excellent source of carbohydrates and it is rich with nutrients, vitamins and minerals (Seck et al., 2012). Farmers have been responsible for cultivating and breeding rice for many years. Scientists, however, are still working to improve the quality of rice, for example, to defend it against diseases, increase yields and reduce its costs of production (Brookes & Barfoot, 2003). It has been reported that the introduction of new rice and wheat varieties during the Green Revolution in the 1960s, contributed to economic growth and a substantial reduction in poverty and malnutrition (Nelson et al., 2019; Demont & Stein, 2013).

Genetically modified (GM) crops are grown extensively and have become part of people's diets in America and China (Burke, 2004). Aside from GM crops, research efforts have actively focused on GM rice (James, 2011). Most varieties of GM rice that have been developed have focused on consumer benefits, and are known as second-generation GM crops (Demont & Stein, 2013). Provitamin A-rich (Golden Rice) is a popular example of this type of GM crop that helps prevent vitamin A deficiency (Demont & Stein, 2013).

Regarding public attitudes towards GM foods, European consumers were seen as more negative and less accepting compared to North American consumers (Lucht, 2015; Frewer et al., 2013). However, in China, studies reported that the public was positive towards GM foods, especially if the product is enhanced (Lucht, 2015). Moreover, in order to overcome the food demands of its large population, the government of China has invested a huge amount of money towards the research and development of GM crops (Lucht, 2015). Nevertheless, without consumers' acceptance of GM rice, its development and commercial production is useless. The successful development and commercial application of new technologies such as GM rice are greatly dependent on public support and their intentions towards the technology (Pin, 2009). Hence, this study aims to assess the Malaysian stakeholders' intentions to purchase GM rice containing a "yield gene" from the wild type, *O. rufipogon* to increase yield. It is important to assess the Malaysian stakeholders' intentions to purchase GM rice for its successful commercialization in Malaysia.

Perceived Benefits and Perceived Risks

The perceived benefits and perceived risks of the technology are identified as important determinants for public acceptance associated with the technology (Amin & Hashim, 2015; Giles et al., 2015; Frewer, 2017). Many past studies reported that when respondents perceive the technology as having greater benefits than risks, the acceptance of the technology will be positive (Amin et al., 2017; Frewer, 2017). However, both variables are difficult to conceptualize separately, and some researchers believe that they are both dependents (Gaskell et al., 2003).

Perceived Moral Concerns

Moral concern has been identified as a major influencing predictor for risk perception and attitudes towards biotechnology products and GM foods (Gaskell et al., 2000; Amin & Hashim, 2015). Consumers would be willing to accept its associated risks if the product or technology is perceived as beneficial, yet may have a few moral concerns (Amin et al., 2014). These concerns are usually related to the risk effects of GM food crops towards health and the environment (Wohlers, 2013).

Religious Acceptance

Religion is one of the dominant factors that may influence public opinion and perception of technology (Allum et al., 2014). To date, various studies conducted by Amin et al. (2014 & 2017) have mentioned that Malaysian stakeholders, regardless of their background, are generally attached to their religion and customs. Chen & Li (2007) mentioned that religious acceptance should be considered with regards to the acceptance of GM food. Moreover, scientific research is encouraged in Islam, and considering the effects of the study towards humans, society and the environment, must be in accordance with Shariah principles (Amin & Hashim, 2015).

Behavioural Intention

Behavioural intention is a term used to refer to consumers' acceptance or their purchase intention associated with the products (De Steur et al., 2010). The term is used because the GM products are still not available in the market. In a food context, intention to purchase food products is one of the most important behavioural indicators (Salleh et al., 2015). Moreover, Armitage & Conner (2001) described intention as a superior predictor of

future behaviour. Consumers' attitudes and acceptance of GM products vary greatly across cultures, as well as countries (De Steur et al., 2010). Previous studies conducted in European countries reported that the public's acceptance of GM food is predominantly negative; this is in contrast to the United States (Magnusson & Hursti, 2002). However, different cases are reported in less developed countries, where the public is more accepting (Anand et al., 2007).

RESEARCH METHOD

The survey began in March and lasted until December 2013. The study involved a total of 509 adult respondents living in the Klang Valley region of Malaysia. The Klang Valley was selected as the study's location because it is the centre of socioeconomic development and fulfilled the requirements for the respondents' backgrounds for the study. The respondents were stratified in accordance with eleven (11) groups: Producers (n=40), Scientists (n=50), Policymakers (n=32), Non-governmental organizations (NGOs) (n=36), Media (n=46), Religious scholars (Islamic scholars=34; Buddhist scholars = 33; Christian scholars=31; Hindu scholars=36), University students (n=41), and Public (n=130). The instrument items and variables used in this study were modified based on previously published studies. The variables for the application included perceived benefits (Macer, 2001); perceived risks (Rohrmann & Chen, 1994), perceived moral concerns (BABAS, 1999; Comstock, 2000), religious acceptance (Kelley, 1995; Nicholas, 2000), and intention to adopt GM rice (Gaskell et al., 2003). The respondents were requested to give their answers using a 7-point Likert scale. The questionnaire was prepared in Malay and English. Information relating to GM rice was also asked.

RESULTS

Table 1 presents the overall mean scores of Malaysian stakeholders' intentions to purchase GM rice and its associated factors. Taken together, these results suggest that Malaysian stakeholders' intention to purchase GM rice is at a moderate level (mean score of 4.71). They claimed GM rice has moderate benefits and risks (mean score of 4.46 and 4.06, respectively), and claimed its application may cause a moderate moral issue to the country (with a mean score of 3.57). With regard to religious acceptance, they also expressed that GM Rice is moderately acceptable on religious grounds (mean score of 4.42).

Variables	Mean score ± standard deviation	Interpretation
Perceived Benefits	4.46 ± 0.96	Moderate
Perceived Risks	4.06 ± 1.04	Moderate
Perceived Moral Concerns	3.57 ± 1.31	Moderate
Religious Acceptance	4.42 ± 1.28	Moderate
Behavioural Intention	4.71 ± 1.18	Moderate

Note: 1-2.99: Low; 3.00-5.00: Moderate; 5.01 – 7.00: High

DISCUSSION

The results of the study indicated that all the stakeholders in the Klang Valley region expressed moderate enthusiastic intentions to purchase GM rice. The reasons behind this might be due to the fact that they considered GM rice has moderate benefits. They also believed this application may bring moderate potential risks to their health and the environment and moderate moral issues. Thus, it negatively influences their perception to purchase GM rice. A previous study reported by Amin et al. (2013) indicated that the

Malaysian public was supportive of GM foods and GM insulin. They also mentioned that the public was not familiar with and had a low level of awareness and knowledge of modern biotechnology. Apart from this, a study on willingness to purchase GM rice in China also demonstrated that the public are moderately interested in the benefits of GM rice in reducing poverty, while at the same time they considered that GM rice may cause dangerous side-effects to the biodiversity of the environment (De Steur et al., 2010). In Europe, GM acceptance among consumers is lower (Lucht, 2015). When it comes to moral concerns, it has been reported that many countries indicated GM crops may cause high moral issues, especially in North America and Asia (Frewer et al., 2013). These issues could highlight patents, the negative effects on small farmers, and that large companies may get benefits compared to small companies (Lucht, 2015). Religious acceptance is another important factor that should be considered with the introduction of any modern biotechnology product for it to be well accepted by Malaysian society (Amin et al., 2015). This finding shows that Malaysian stakeholders indicated the GM rice containing a “*yield gene*” can be accepted from a religious point of view.

CONCLUSION

This study has attempted to provide an insight into the Malaysian stakeholders' intentions to purchase GM rice. It can be concluded that the Malaysian stakeholders were only moderately enthusiastic towards GM rice. New technologies are being developed to ensure sustainable food supply to feed the growing population. However, the success of new technology depends heavily on consumers' acceptance. GM rice could be accepted in Malaysia if the public recognizes its benefits as greater than its risks, while their concerns about the moral and safety issues should be addressed through appropriate regulation.

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