

Evaluating Consumer Purchase Intentions for Genetically Modified Food in Malaysia: A Comparative Study of Muslim and Non-Muslim Consumers

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Abstract: This study is an attempt to identify the status of genetically modified food consumption in the developing countries like Malaysia. From preceding literature, a theoretical framework was developed to show the effects of perceived risks, perceived quality and social norms on the consumer purchase intention for genetically modified food. The sample of 392 respondents was randomly selected from two leading hypermarkets in Johor Bahru. Results from Multiple Regression revealed that among the three predicting variables, perceived quality and social norms had significant and positive relationship with the consumer purchase intentions while perceived risks did not have any significant relationship with it. A comparative analysis of Muslim and non-Muslim consumers revealed significant difference of the purchase intentions for GMF between the two groups. Implications and future research suggestions are also discussed.

Key words: Consumer purchase intention, genetically modified food, perceived quality, perceived risk, social norms

INTRODUCTION

As biotechnology is becoming more and more a commercial reality, its impact on consumers as well as producers are well known. This new technology serves as a platform to overcome the problem of fulfilling a number of basic needs such as food, cloth and medicine. Malaysia is not producing sufficient amount of food to meet its nation's needs. This gives GM technology a space to overcome the issues as foods and crops could be produced through GM technology. The introductions to GMF are expected to produce sufficient amount of food production is regarded as a chance to enhance food production technologies and/or product differentiation in the food chain and finally consumer preference for diversity (Font, 2009).

However, literature sheds light on the various issues regarding the acceptance of GM foods in developed countries (Hallman *et al.*, 2003; Chen and Chern, 2004; Font, 2009) and especially in the developing countries like Malaysia (Daud, 2002). These issues can be resolved, however, by providing appropriate knowledge of the potential benefits of the biotechnology and GM foods (Smith, 2004; Sukman *et al.*, 2009). Moreover, the

tendency of much negative perceptions about GM technology and food round the globe (Chern and Rickertsen, 2002; Curtis *et al.*, 2004) is a factor of consumers' perceptions regarding risks for health and quality of food (Thom, 2007; Poveda *et al.*, 2009; Linh, 2009), labeling of the product (Chern and Rickertsen, 2002; Batrinoue *et al.*, 2006) as well as the influence of social norms on individuals' intentions to buy GMF (Thom, 2007). It has been found that other than age, education and gender (Hallman *et al.*, 2003; Klerck and Sweeney, 2007); consumers' religion has also been found to be affecting these intentions of buying GMF (Norkumala, 2006). In Malaysia, essentiality of recognizing the importance of bio-technological advancement and acceptance of consumers' for these changes in technology has been raised to transform it into well-developed industrialized nations by 2020 (Johan, 2006). Furthermore, the effect of religion and customs on the predispositions for accepting biotechnological advancements in Malaysia regarding GM food entails further studies in this line in order to catalyze the pace of approval for GMF among Malaysian consumers (Sukman *et al.*, 2009). This study has a dual purpose of assessing the role of perceived risks, perceived quality and social

norms on consumers' purchase intentions for GMF as well as identifying the difference of purchase intentions between Muslim and non-Muslim consumers in order to get a closer look on the areas of improvement for the policy makers to bolster up the consumers' purchase intentions for GM food in Malaysia.

LITERATURE REVIEW

With the global rush for technological developments to reap their benefits for society and environment the need to make consumers prepared for the acceptance of these developments pop in vigorously (Hallman *et al.*, 2003). Bio-technology is one big buzz word in the technological world which has shown its significant role in uplifting the national economy and facilitating societies in terms of resources (food, medicine, cloths etc.). Regarding its importance in the economic growth in the developing countries, Tonukari (2004) argued that investing in bio-technology research and entrepreneurship development the developing countries like Nigeria can gain benefits in terms of economy and be in the line of the future prosperous regions of the world. In Malaysia, bio-technology has been categorized among the five most important technological developments in paving ways for the transformation on Malaysian traditional industry into advanced hi-tech industry till 2020 (Sukman *et al.*, 2009). Nevertheless, it is one main field that had been prone to face negativity of opinion from the consumers for its product innovations regarding perceptions of risks (health and environment) and quality (Fridell, 2006; WHO, 2010). Literature has identified the importance of society and customers in the success of any technological innovation (Dunphy and Herbig, 1995).

Bio technology and genetic engineering: Regarding the advent of Genetic Engineering and innovations in terms of genetically modified food, the consumer acceptance is a critical issue round the globe. Genetic Engineering (GE) is a sub specialty of biotechnology and it is concerned with the targeted modification of the genetic materials. GE is used widely in medicine but today it is also practiced in agriculture and food industry (BASF, 2010). GE requires four basic steps: Generation of DNA fragment, joining to a vector molecule, introduction into a host cell for amplification and selection of required sequence (Nicholl, 2002). GE has been used to alter poultry animals such as cows, sheep, chicken and pig. In plants GE is used to produce better crops which are resistant to disease or insects, produce more fruits, better fruits or increase in total harvesting by provoking the desired traits and removing the unwanted ones from the crops (Stanley, 2000).

Genetically Modified Food (GMF)-Benefits and Controversies: Generally speaking, GE is all about making the best plants and animals by alteration of DNA,

to enhance their productivity and effectiveness (Freedman, 2003). GM foods are hence, the plants and animals that have undergone gene manipulation. As far as the GM crops are concerned, they are being grown in most parts of the world except Antarctica (Freedman, 2009). In developed countries like USA and UK, many studies have been conducted to identify the factors involved in affecting the consumers' intentions to buy GMF. The debate considering whether GMF is a blessing or curse for health, environment, biodiversity and local economies is still going on in many parts of the world (Freedman, 2009). GM technology in crop production has been well received so far for its marvelous contribution in bringing in innovations in the traditional ways of farming and crop production (Cohen, 2005). provides a list of benefits gained by these bio-technological and GM technological advancements in terms of crop, animals, environment and society. It is denoted that the crops produced by this technology have improved taste and quality, have shorter maturity time, enhanced resistance to disease, pests and herbicides, are more nutritious and bring in novelty. Similarly, the animals reared by GM technology show high resistance, productivity and yield efficiency; and improved health conditions and diagnostic methods are seen. As far as the benefits for environment and society are concerned, improved methods for natural waste management, conservation of soil, water and energy and counteraction of scarcity of food for growing populations are on top of the list.

However, Bennete (2009) described that most of the international environment groups like Greenpeace do not prove GM technology to be safe for the humans or environment. Moreover, this technology, according to them is only beneficial for the businessmen and not the consumers. Nevertheless, GENOMICS (2008) identified some controversies related to GM technology and its effects on safety, access and intellectual property, ethics, labeling and societal benefits. The GM food production and its consumption is a factor of the consumers' intentions for purchasing GM food. Hayes and Laudan (2008) demonstrated that acceptance and rejection of GM food is a matter of perception. Those who welcome GMF perceive it as a route towards healthier food with higher efficiency, environmental friendly and attribute benefits for farmers as well. However, those who oppose it think it as a threat to human health and environment in the long run for the mutations involved in the whole production process (Fridell, 2006). Nevertheless, Curtis *et al.* (2004) found that in developing countries consumers generally underrate the GMF products as they do not have a positive perception about the ingredients used in the manufacturing of these products.

Consumer Purchase Intention (CPI): Any novelty and innovation in technology must go hand in hand with its ultimate consumers as the viability of its success is

dependent on its perceptions among consumers. According to Fishbein and Ajzen (1975), intentions has four elements, the behavior which is intended to perform, the target object at which the behavior is directed, the situation in which the behavior is to be performed and the time at which the behavior is to be performed. Moreover, the inherent intentions of the beholder (positive or negative) are most likely to determine their consequent behaviors (positive or negative) towards the object. The consumers' purchase intentions are therefore defined as the likeliness of buying or rejecting any commodity by the consumers (Whitlar *et al.*, 1993). As intentions are based on the perceptions the consumers behold for the product or services at disposal, these intentions are influenced by a number of factors. Ness *et al.* (2010), in his study on identifying the consumer purchase intentions in six European countries found similar results in all countries regarding the significant effect of consumers' perceived value for the product on their behavioral intention to buy it. Moreover, they found mediating effect of satisfaction in this relationship. Study in Taiwan by Chen (2007) showed that consumers' attitudes and purchase intentions in relation to the organic food are influenced by four main factors of positive attitude, positive subjective norm, behavioral control and perceived difficulty. The first three factors play positive role in determining the purchase intentions of the consumers, however, perceived difficulty is negatively related to the purchase intentions.

Factors affecting consumer purchase intentions for GMF: Literature has identified that perceived risks, social norms, perceived quality, availability, convenience and trust are some of the major factors involved in determining consumers' purchase intentions (Thom, 2007; Linh, 2009). Regarding purchase intentions of GM food, Cook *et al.* (2002) found that it was influenced by self-identity, attitude, social norm and perceived behavioral control. However, the most important factors in determining the purchase intentions of the consumers towards GM food are perceived risks (Poveda *et al.*, 2009; Font and Gil, 2009), perceived quality (Schiffman and Kanuk, 2004; Linh, 2009) and social norms (Schiffman and Kanuk, 2004; Sharma and Malhotra, 2007). Among demographics of the consumers, other than age, education and gender (Klerck and Sweeney, 2007), religion has also been found to effect the purchase intentions of the consumers (Norkumala, 2006; Weirich, 2007; Drees, 2009). Literature shed light on the ignorance of giving priority to inculcate these factors in determining success and adoption of GM food by the producers and government (LANCET, 1999) which is restricting the consumers as well as the producers to get ultimate benefits from these technological advancements.

Perceived Risk (PR): With the advancements of bio-technology the issues related to risk perceptions for these advancements arise simultaneously. According to Cruz

(2000) and Insel *et al.* (2009) consumers get alarmed by the food production through bio-technological developments and start considering its potential effects on human beings and their environment. Conner and Jacobs (1999) also noticed that consumers perceive risks and hazards related to the consumption of GMF and their health due to the involvement of GE processes in producing them. With the growing concerns of the consumers for purchasing GM food are provoking the economic benefits to the producers of the GM foods also (Poveda *et al.*, 2009). Font and Gil (2009) revealed that perceived risks are an important construct underlying the attitudes and purchase intentions towards GMF. Poveda *et al.* (2009) in their study of introducing GMF in Spain found that perceived risk for the GMF is related to the information about GMF and whilst disinformation increases the perceived risks, the credibility of information reduces it. Similarly, Chen and Li (2007) identified that more knowledge about GMF tend to reduce perceived risks as willingness to consumer GMF was found to be higher among more knowledgeable consumers than the less informed and knowledgeable consumers. Gaskell *et al.* (2004) argued that risk perceptions seem to be relevant but not for a larger group of respondents as they found perceptions for the benefits more contributing. Han (2006) found differentiated results regarding risk sensitivity for GM meat products and GM crops and found higher risk perceptions for the GM meat than GM crops.

H-1: Perceived Risks of GMF have a negative relationship with consumer purchase intentions towards GMF

Social Norms (SN): Norms refer to a group's general acceptance of the way of thinking, acting or feeling and it emerged due to the societal interaction. People are often influenced by other's ideas, and this is where the interaction with others causes the member of a group to become more alike (Sharma and Malhotra, 2007). According to the theory of reasoned action model by Fishbein and Ajzen (1975) and core psychological model by Hoyer and Macinnis (2009), to understand the intention subjective norm need to be measured as it influences consumers' feeling of getting favorable or unfavorable response from his/her family, friends and peers on action being performed. Similarly, Nysveen *et al.* (2005) describes social norm or normative pressure on an individual as a person's perception about behavior in question as acceptable or unacceptable by most of the people important to him/her. Social norms are found to be positively related to customer loyalty (Lee *et al.*, 2009) and acceptance internet banking (Hanudin, 2007). Study conducted by Thom (2007) revealed that there is a positive impact of social norms on the consumption of fish.

H-2: Social norms have a positive relationship with consumer purchase intentions towards GMF

Perceived Quality (PQ): Consumers often evaluate the quality of a product or services based on informational cues that they gain about product or services. The cues are either intrinsic or extrinsic to the product or services. As for products, the intrinsic cues are based on physical attributes of the product such as the smell, taste, size or color of the product in order to judge the product's perceived quality. The extrinsic cues are external to the product such as the price, image of the brand, image of the manufacturer, image of the retailer or the country origin of the product (Schiffman and Kanuk, 2004). Carrol and Buchholtz (2008) identified eight dimensions of the quality for products and services that must be well understood to respond strategically to this factor. These dimensions include performance, features, reliability, conformance, durability, serviceability, aesthetics and perceived quality of the product/service. Tsotsou (2005) evaluated effects of different levels of perceived quality (low, medium, high) for sport shoes on purchase intentions of 204 Greek university students and found that consumers with high levels of perceptions for quality are more likely to have high levels of satisfaction, involvement and intentions to purchase that commodity in future and vice versa.

Linh (2009) in his study of purchase intention and consumption of fish in Hanoi explored the negative impact of perceived risks of the product on its perceived quality. It showed that when consumers perceive high risks for any product their perceptions for its quality are lowered and vice versa. Moreover, this perceived quality is related to its corresponding intentions to purchase that product. Thom (2007) also found that perceived quality had the strongest impact on the global attitude and purchase intention.

H-3: Perceived quality of GMF has a positive relationship with consumer purchase intentions towards GMF

Religion and purchase intentions for GMF: Issues regarding religion had been raised by the emergence of new technologies. The bio-technological advancements of introduction of genetically modified organisms, GMF and GE have jolted up the issues regarding religious standpoint and related consumers' purchase intentions for GMF globally (Drees, 2009; Froman, 2009). According to Weirich (2007) consumers avoid GMF for different religious and ethical reasons. This is because different religions have limitations and delimitations regarding food intake for the practitioners.

In Malaysia, Islam is the religion worshiped by its major population comprising of almost 60.8% (Norfariza, 2001). However, other religious groups like Buddhists,

Hindus, Christians and others also exist and can be broadly categorized as the Non-Muslim groups. According to the study of Sukman *et al.* (2009) on the consumption of GMF soybean in Malaysia, it was found that among different factors affecting the attitude towards GM soybean like technology optimism, perceptions for benefits and risks, and predisposition to science and technology, religion and custom also played a significant role. The Muslims worldwide give importance to the crucial issue of "Halal" food and since the majority of population in Malaysia is Muslim; the debate over the acceptance of GMF is associated with 'Halal certification' of all food products (Shaikh, 2002). Norkumala (2006) discussed acceptability of GMF in Islam dependent on the potential benefits to the society and human beings with taking in account the sayings of Quran regarding permissible food. Moreover, this issue of certifying the GMF as Halal, the debate on labeling the GMF as Halal also arises. According to Duke (2000) and Kaneko and Chern (2003), consumers need information in the form of label to make decision regarding food quality and goodness in terms of health. The basic consumer needs regarding labeling are information about ingredients, nutrients, potential allergic affects or food additives, processing methods and expiry and handling or storage of the food to be consumed (Duke, 2000). Many false perceptions for GMF can be mitigated by providing satisfactory labeling details (Carneiro *et al.*, 2004). Joshling *et al.* (2004) argued that the labeling of the GMF can handle the differences in consumer perceptions and sensitivity among distinct countries. Batrinoue *et al.* (2006) explained that adding minor details of approval of GMF can increase the positive attitude of the consumers towards GMF. They found 30% reduction in the negative attitude for GMF among the consumers when the labeling was changed from "GMF" to "GMF approved by EU". Where Blake *et al.* (2004) found more labeling details to encourage consumers' willingness to buy GMF in New Zealand, O'Fallon *et al.* (2007) described that the purchase intentions for GMF may reduce by more information about the details of GM organisms in the labeling.

H-4: There is a significant difference in the means consumer purchase intention scores for non-Muslim and Muslim consumers

Conceptual framework: The conceptual framework of this study comprises of three independent variables (Perceived Risks, Social norms and Perceived Quality) and one dependent variable (Consumers' purchase intentions towards GMF) (Fig. 1). The model is developed by studying distant literature on the factors affecting the consumers purchase intentions generally and specifically for GMF and is a combination of models proposed by Linh (2009) and Thom (2007).

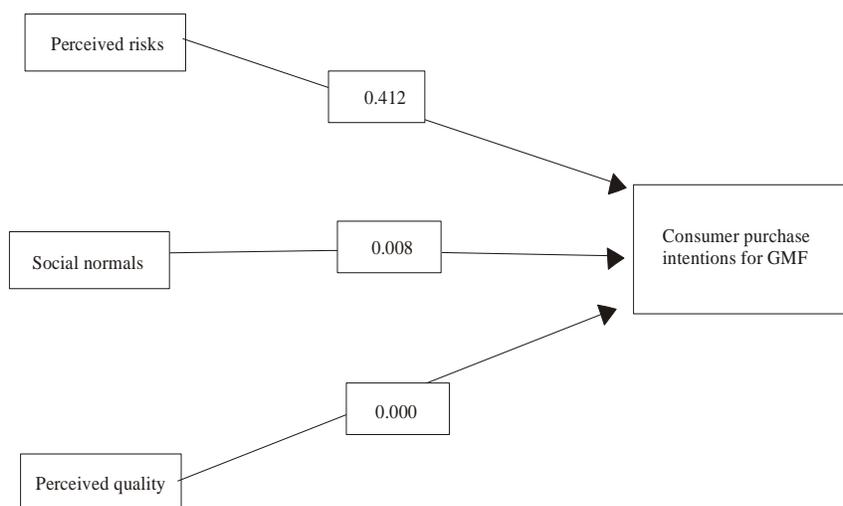


Fig. 1: Conceptual model of the study (showing p-values)

MATERIALS AND METHODS

In this exploratory study, investigation of the factors affecting consumer purchase intentions towards GMF in was evaluated. The study was carried out in the second most populous state of Malaysia, Johor Bahru, using mail survey method. The research instrument used for the study was based on questionnaire comprising of 3 sections, where section A consisted of four general questions, section B included questions items against each construct under study and section C was developed to study demographics of the respondents. The questionnaires were distributed among 400 respondents from two renowned hypermarkets of Johor Bahru i.e. Tesco Hypermarket, Tebrau and Giant Hypermarket, Plentong by using random sampling. However, the questionnaires used for analysis were 392 as 8 questionnaires were discarded for being semi/un-filled. For general questions, first three questions had dichotomous scale for getting response while against the fourth question categorical scale was used to get response option from the respondents. Section B comprised of 18 questions where the already validated scales for the constructs by different scholars were used to ensure the reliability of the scale. To study response against 6 items of Perceived Risks (Font, 2009; Linh, 2009) and 3 items of Social norms (Thom, 2007), 5-point Likert’s scale was used (1 = Strongly Disagree-5 = Strongly Agree). Seven items for Perceived Quality (Linh, 2009) were given against the 7-point Numerical scale ranging from Low/bad evaluation to high/good evaluation. The dependent variable, consumer purchase intention had 2 items (Font, 2009) scaled by 5-point itemized rating scale (1 = Very Unlikely, 2 = Unlikely, 3 = Neither Unlikely Nor Likely, 4 = Likely, 5 = Very Likely). Pilot study was conducted prior to research made on larger scale in order

Table 1: Reliability analysis

No.	Variables	No. of items	Cronbach’s alpha
1	Perceived Risks (PR)	2	0.911
2	Social Norms (SN)	3	0.928
3	Perceived Quality (PQ)	7	0.961
4	Consumer Purchase Intentions (CPI)	2	0.911

to check the reliability and validity of the scale. Thirty consumers were selected for Giant, Plentong and the data was analyzed by using SPSS 17.0. The Cronbach’s alpha coefficient for all the items for constructs under study were above 0.7 (PR = 0.83, SN = 0.88, PQ = 0.91, CPI = 0.73) and showed that we could carry on with the research.

RESULTS

The reliability analysis was checked by using Cronbach’s alpha coefficient which showed that all the scales against each construct had value 0.9 which is absolutely acceptable (Table 1).

Table 2 showed the descriptive statistics from the general questions. Results revealed that majority of the respondents (51.5%) were aware of the existence of GMF, understood the concept of GMF (58.2%) and almost equal number of respondents (50% each) were found in favor of benefits and importance of GMF as well as against them. Moreover, most of the consumers (52.3%) responded that rice is the important and beneficial GMF for the society followed by corn (19.4%), potatoes (13.8%), wheat (6.1%) and others (2.05%).

The correlation matrix of the variables under study showed that perceived quality (0.458**) and social norms (0.180**) are positively correlated to consumer purchase intention whereas perceived risks (-0.310**) is negatively related to consumer purchase intentions. Moreover,

Table 2: Descriptive statistics showing frequency percentage for general questions

Questions	Consumers' response	Frequency (%)
1-Are you aware of the existence of GMF?	Yes	51.5
	No	48.5
2-Do you understand the concept of genetic modification?	Yes	41.8
	No	58.2
3-Do you think that GMF is important and beneficial to the society?	Yes	50
	No	50
4-What type of GMF do you think would be important and beneficial for the society?	Rice	52.5
	Corn	19.4
	Potatoes	13.8
	Wheat	12.25
	Others	2.05

Table 3: Correlation matrix (N =392)

	Correlations			
	PR	SN	PQ	CPI
PR Pearson correlation	1	-0.640**	-0.310**	
Sig. (2-tailed)	0.985	0.000	0.000	
SN Pearson correlation	0.001	1	0.143**	0.180**
Sig. (2-tailed)	0.985	0.005	0.000	
PQ Pearson correlation	-0.640**	0.143**	1	0.458**
Sig. (2-tailed)	0.000	0.005	0.000	
CPI Pearson correlation	-0.310**	0.180**	0.458**	1
Sig. (2-tailed)	0.000	0.000	0.000	

** : Correlation is significant at the 0.01 level (2-tailed)

Table 4: Model summary

Model	R	R ²	Adjusted R ²	Std. error of the estimate
1	0.474 ^a	0.225	0.219	1.77488

Predictors: (Constant), PR, SN, PQ; Dependent Variable: CPI

Table 5: Multiple regression analysis

Model	Unstandardized coefficients		Standardized coefficients		t	Sig.
	β	SE	β	SE		
(Constant)	3.759	0.635			5.914	0.000
PR	-0.016	0.019	-0.048		-0.822	0.412
PQ	0.081	0.012	0.410		6.920	0.000
SN	0.083	0.031	0.121		2.670	0.008

Dependent Variable: CPI

perceived risks have negative correlation (-0.640**) with the perceived quality (Table 3).

The data analysis to test the first three hypotheses was made by using Multiple Regression. In Table 4 revealed the model summary showing that the model was significant and all the independent variables explained

almost 22% of the variance in the dependent variable with perceived quality having the highest beta value (0.410).

Table 5 showed that perceived quality (0.000, $\beta = 0.410$) and social norms (0.008, $\beta = 0.121$) have significant relationship with consumer purchase intention hence H-2 and H-3 was supported whereas relation with perceived risks was found to be insignificant ($p = 0.412$) therefore H-1 was rejected.

To test H-4, independent sample t-test was conducted. Table 6 showed that significant difference between the consumer purchase intentions of Muslim and Non-Muslim consumers exists in Malaysia ($p = 0.022$). Hence, H-4 was also supported.

DISCUSSION

The main objective of this study was to identify the effect of perceived risks, social norms and perceived quality on the consumer purchase intentions towards GMF in Malaysia. Moreover, it was intended to explore existence of differences between the purchase intentions of Muslim and Non-Muslim consumers towards GMF, if any. Our first hypothesis about affect of perceived risks on the consumer purchase intentions towards GMF was not supported by the regression analysis results although the correlation test showed negative correlation of perceived risks with the consumer purchase intentions. This is consistent to earlier research by Nonis *et al.* (2004) and Gaskell *et al.* (2004) who described that perceived risks cannot be a good predictor to consumer purchase intentions and specifically for GMF perceived risks seem to be irrelevant when larger groups of respondents are involved in the study. However, these results were in contrast with that of Font and Gil (2009) that indicated perceived risks as important construct to determine the underlying attitudes and purchase intentions towards GMF. This contradiction might be a factor of low understanding and knowledge of GMF among Malaysians (Abu Bakar *et al.*, 2005). As knowledge is the key factor in measuring perceived risks among consumers (Chern and Rickertsen, 2002), the less knowledge of Malaysian consumers for GMF might be a reason for failure of perceived risks in predicting their corresponding purchase intentions for GMF. From the regression analysis it was found that perceived quality and social norms were

Table 6: Independent sample t-test

	Levene's test for equality of variances		T-Test for equality of mean			Mean difference	SE difference	95% Confidence interval of the difference	
	F	Sig.	t	df	Sig (2-tailed)			-	-
CPI equal variances assumed	0.063	.803	-2.305	390	0.022	-0.48828	0.21188	-	-
Equal Variances not assumed			-2.299	273.621	0.022	-0.48828	0.21236	0.9484	0.07172
								0.90635	0.07021

positively and significantly related to the consumer purchase intentions towards GMF. This showed that if consumer believes that those people who are important to them think GMF as good, then they are more likely to have positive intentions towards purchasing GMF and vice versa. These results are in accordance to the previous studies by Chen (2007) and Thom (2007) where they found social norms to positively influence the consumer intentions. Equally perceived quality also showed significant positive relation with consumer purchase intentions towards GMF confirming that the more consumers would perceive quality of GMF as good the better and positive would be the purchase intentions for GMF. Our results regarding perceived quality and consumer purchase intentions confirmed the studies by Linh (2009) and Tsiotsou (2005).

A significant difference between the purchase intentions of Muslim and Non-Muslim consumers towards GMF was found from the results showing that religion does affect the purchase intentions of the consumers regarding GMF. These results are in accordance with that of Weirich (2007) who explained that religion or ethical reasons might be an influencing factor in determining purchase intentions of the consumers. Riaz and Chaudry (2004) also explained that most of the Muslim consumers avoid GMF due to uncomfortable feeling over the ambiguity related to 'Halal' issue regarding proper and illustrative labeling of the GM products. In effect, this doubt reduces their intention to buy GMF products. The issue of the "*Halal trade*" is in vogue round the globe due to diversity of demographics found across the countries. As in the case of Malaysia, the activity for 'Halal' certification is very strong and Muslim consumers (making up country's major population) hence shows a noticeable difference in their intentions to buy GMF as compared to their non-Muslims counterparts, if confronted by insufficient information through labeling.

LIMITATIONS AND SUGGESTIONS

Our study with all its strengths of being novel and beneficial to identification of factors behind consumption of GMF in Malaysia is prone to some limitations as well. First of all, our study is limited to only one district of Johor Bahru excluding the other 8 districts in Johor and 13 states in Malaysia overall. So our results may not be generalized over the whole population of Malaysia. Moreover, only two supermarkets were selected from the Johor Bahru district which also limits the generalizability of our results. Therefore, future research with these variables is encouraged by taking in account larger samples from distinct areas of Malaysia.

Secondly, our research is limited to the consumption of GMF regarding crops only. Conversely, previous

studies showed remarkable differences between consumption and purchase intentions for GM crops and GM meat (Hallman *et al.*, 2003; Han, 2006). Hence, it is suggested that similar research should be carried out to reveal the differences among the purchase intentions of GM crops and GM meat among the Malaysian consumers.

Thirdly, we did not used observations and interviewing methods for analyzing the perceptions of purchase intentions among consumers and relied only on the research instrument. This limits the accuracy of analysis due to reliance on the perceptions of the respondents wholly.

Lastly, our study focused on evaluating the influence of three predictors (perceived risks, social norms and perceived quality) on the consumer purchase intentions for GMF where perceived risks did not come out to be a strong predictor of measuring purchase intentions among consumers. This entails the future study to be made by evaluating the intervening effects of other variables in this relationship, like knowledge, attitude and trust. As perceived risks for a product are related to the knowledge about it (Chen and Li, 2007), and knowledge is strongly related to the trust, taking in account these as mediators can be an interesting topic for future research.

CONCLUSION

From this study it is concluded that to foster the consumer purchase intentions towards GMF in Malaysia generally and specifically among Muslim consumers, the government, policy makers and the producers must provoke knowledge and valuable information about benefits of GMF to the consumers taking in account the issues related to their religious limitations as well. Moreover, as perceived quality and social norms are important predictors the purchase intentions for GMF, better projection of quality can also reduce the perceived risks attached with the consumption of GMF.

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