Comparison of World Views Related to Attitude Towards Modern Biotechnology Across Religion and Races

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ABSTRACT

Modern biotechnology has been classified as a complex emerging issue that exhibits high salience combined with limited knowledge on part of the public. It has been suggested by social scientists that any complex object may be located in a variety of general classes where its evaluation may be strongly affected by extraneous concerns. From the perspectives of several earlier researchers, attitudes towards biotechnology would be expected to follow from the more general class of attitudes to which they pertain, also termed as worldviews. These worldviews include general biotechnology promise and concern, societal values ,impact of technology, confidence on key actors, and religious attachment. Demographic characteristics have been known to affect many attitudes and values. The purpose of this paper is to compare these worldviews across religion and races. A survey was carried out on 1017 respondents from various interest groups in the Klang Valley region. Results of the survey have shown that there were differences in general biotechnology promise, confidence on key actors, impact of technology, societal values and religious attachment across religion and races while general biotechnology concerns only differed across races but not religion.

INTRODUCTION

Modern biotechnology has been classified as a complex emerging issue that exhibits high salience combined with limited knowledge on part of the public. It has been suggested by social scientists that any complex object may be located in a variety of general classes where its evaluation may be strongly affected by extraneous concerns (Pardo et al. 2002). From the perspectives of several earlier researchers, attitudes towards biotechnology would be expected to follow from the more general class of attitudes to which they pertain: predispositions towards Science and Technology in general. They may also be related to

attitudes towards the natural environment, technological progress, towards religious and moral beliefs and several other sets. According to the review by Rohrmann (1999), the evaluative process of risk perception is determined by the norms, value systems and cultural idiosyncrasies of societies. He included eco-centric worldview, technology skepticism and safety culture in his model as well risk-taking attitude. Gaskell et al. (2003) also found out that a matrix of variables including interest in aspects of the public domain such as science and politics, optimism about technologies, social and cultural values, engagement with the issue of biotechnology and confidence in industry, regulation and other civil society groups, all contribute to the public's representation of and opinions about biotechnologies. Kelley (1995) proposed that attitude to genetic engineering is determined not only by the worth of potential benefits offered minus the perceived risk (rational worries) and anxieties or fears (irrational worries) but also on knowledge on genetic engineering and having a scientific world-view and plus/minus various minor factors such as background factors.

Worldviews are general social, cultural and political attitudes or certain core beliefs and values such as environmentalism that appear to have an influence over people's judgement about technological risks and complex issues (Sturgis & Allum 2004). The terminologies were conceptualized by Dake (1991) as orienting dispositions because of their role in guiding people's responses. According to the review by Rohrmann (1999), the evaluative process of risk perception is determined by the norms, value systems and cultural idiosyncrasies of societies. He included eco-centric worldview, technology skepticism and safety culture in his model as well risk-taking attitude. Gaskell et al. (2003) also found out that certain general value orientations were associated with different level of support for biotechnology. Those who are more concerned about nature are less optimistic about biotechnology, while those espouse materialistic values are more optimistic.

According to the cultural approach of risk research, the evaluative process of risk perception is determined by the norms, value systems and cultural idiosyncrasies of societies or societal groups (Rohrmann 1994). Macer et al. (2000) also noticed that there was diversity of opinion and reasoning across different culture. Lorence et al (2006) reported association between race and health information seeking behaviour while Tucker at al (2006) found that white respondents tended to perceive lower levels of perceived food risks compared to the non-whites. Background characteristic such as religion has been found to affect people's attitude (Gaskell et al. 2003). The objective of this study is to assess the worldviews of the Klang Valley respondents and to compare these worldviews across religion and races.

METHODOLOGY

Survey data collection

The people in the Klang Valley region were chosen as the targeted population as it is the centre of country's economic and social development (numerous existing universities and R&D institutions, biotechnology related industries) besides the respondents in this region meet the requirement of diverse background stated in the model. The respondents (n=1017) were adult representatives (age 18 years old and above) from various interest or stakeholders groups including producers, scientists, policy makers, NGOs, media, politicians and religious experts. The questionnaires were administered face to face to the respondents.

In this study, a wider range of interest groups including producers, scientists, policy makers, NGOs, media, politicians, religious experts, university students and general public were surveyed. They were chosen using multi-stage sampling technique. The respondents (n=991) were adult representatives (age 18 years old and above) from various interest or stakeholders groups mentioned earlier. Each stakeholders group will have a minimum target sample of 40 respondents except for the general public. Since the majority of the Klang Valley residents comprised of the general public, this group was allocated 550 respondents. The general public was further stratified according to their occupations classification by Malaysian Standard Classification of Occupations 1998 (MASCO). The ratios for different races and religion of the residents in the Klang Valley were also taken into account.

Instrument

General classes of attitude included general promises and general concerns of modern biotechnology, nature/material value, technology optimism, predisposition towards Science and Technology, religious and custom attachment.

For the general promise of modern biotechnology (α=0.87), five items were included: modern biotechnology has the potential to contribute to Malaysian agricultural sector, good for Malaysian economy, cure serious diseases, enhance quality of food and useful in the fight against third world hunger. Each item was measured on a 7-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). A higher score indicates higher promise.

General concern of modern biotechnology (α=0.89) was measured by six items: modern biotechnology products might be harmful to health, harmful to the environment, worry to consume, harmful to future generations, worry

about sanctity values, and unnatural. Each item was measured on a 7-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). A higher score indicates higher concern.

Societal value (α=0.78) was assessed by asking the respondents to state their preferences on five bipolar statements concerning nature and materials value. Each item was measured on a 7-point scale, ranging from 1 (strongly preferred nature value) to 7 (strongly preferred material value). A higher score indicates higher material value.

Impact of Technology (α=82) was measured by four statements describing the impact of Science and technology on humanity and nature. Each item was measured on a 7-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). A higher score indicates higher negative predisposition towards Science and Technology.

Religious attachment (α=0.95) comprised of five items involving the importance of religion and religious rites in the respondents' life. Each item was measured on a 7-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). A higher score indicates higher religious attachment.

Statistical analysis

Initially reliability tests and confirmatory factor analysis were carried out using SPSS version 12.0 to assess the consistency and uni-dimensionality of the constructs. ANOVAs were also carried out using the same statistical package.

RESULTS

General attitude includes general promise and concerns of modern biotechnology, confidence on key actors (scientists, industries and government), impact of technology, societal values and religious attachment.

Comparison across Religion

Mean scores for general attitudes across religions were shown in Table 1. Respondents from all religions perceived high promises and moderate concerns of modern biotechnology, moderate confidence on key actors, moderate negative impact of technology and moderate post-material values. With respect to religious attachment, the Muslims, the Hindus and the Christians professed to have higher attachment while the Buddhists claimed to have only moderate attachment.

ANOVAs were significant for general promise ($F=8.26$, $p < 0.001$), confidence on key actors ($F=20.21$, $p < 0.001$), impact of technology ($F=19.12$, $p < 0.001$), societal values ($F=4.12$, $p < 0.01$) and religious attachment ($F=130.40$, $p < 0.001$) across religion (Table 2). Post Hoc tests highlighted the difference in opinion between the respondents from different religions. Although respondents from all religions ranked modern biotechnology as having high promises, the Muslims were the most positive towards the general promise modern biotechnology compared to the others (Table 3). Looking at their confidence on key actors, the Muslims and the Hindus have more confidence on the scientists, industries and government compared to the Buddhists and Christians (Table 4). On the other hand, the Muslims were more negative on their opinion towards technology than the Buddhists and Christians while the Christians have significantly more positive opinion of technology compared to the Muslims and also the Hindus (Table 5). With regard to societal values, only the Buddhists have significantly lower materialist values or more inclined towards nature, compared to respondents from other religions (Table 6). Post Hoc tests to compare religious attachment across religions showed significant differences between all groups of respondents (Table 7). The Muslims were the most attached to their religion followed by the Hindus, the Christians and the Buddhists.

Table 1: General attitude across religions

Variables	Mean score ± std dev.	Interpretation
General promise		
Islam	5.62 ± 1.00	High
Buddha	5.34 ± 0.92	High
Hindu	5.26 ± 1.35	High
Christian	5.23 ± 1.01	High
General concerns		
Islam	4.46 ± 1.21	Moderate
Buddha	4.37 ± 1.12	Moderate
Hindu	4.67 ± 1.21	Moderate
Christian	4.55 ± 1.10	Moderate
Confidence on scientists, industries and government		
Islam	4.74 ± 1.11	Moderate
Buddha	4.13 ± 1.18	Moderate
Hindu	4.88 ±1.14	Moderate
Christian	4.09 ± 1.11	Moderate
Impact of technology		
Islam	4.80 ± 1.18	Moderate
Buddha	4.30 ± 1.28	Moderate
Hindu	4.61 ± 1.17	Moderate
Christian	3.89 ± 1.36	Moderate
Societal values		
Islam	3.63 ± 1.20	Moderate
Buddha	3.34 ± 1.01	Moderate
Hindu	3.79 ± 1.19	Moderate
Christian	3.44 ± 1.23	Moderate
Religious attachment		
Islam	6.59 ± 0.76	High
Buddha	4.77 ± 1.51	Moderate
Hindu	6.09 ±0.89	High
Christian	5.57 ± 1.53	High

Table 2: One way ANOVA to compare general attitude across religion

Variable	F-value	Sig.
General promise	8.26	0.000***
General concerns	1.74	0.158
Confidence on scientists, industries and government	20.21	0.000***
Impact of technology	19.12	0.000***
Societal values	4.12	0.006**
Religious attachment	130.40	0.000***

***p < 0.001, **p < 0.01, *p <0.05

Table 3: Games Howell Post Hoc tests to compare general promise across religions

Religion	Mean score	1	2	3	4
1. Islam	5.62		*	*	*
2. Buddha	5.34				
3. Hindu	5.26				
4. Christian	5.23				

***p < 0.001, **p < 0.01, *p <0.05

Table 4: Scheffe Post Hoc tests to compare confidence on scientists, industries and government across religions

Religion	Mean score	1	2	3	4
1. Islam	4.74		***		***
2. Buddha	4.13				
3. Hindu	4.88		***		***
4. Christian	4.09				

***p < 0.001, **p < 0.01, *p <0.0

Table 5: Scheffe Post Hoc tests to compare impact of technology across religions

Religion	Mean score	1	2	3	4
1. Islam	4.80		***		***
2. Buddha	4.30				
3. Hindu	4.61				
4. Christian	3.89	***		***	

***p < 0.001, **p < 0.01, *p <0.05

Table 6: Scheffe Post Hoc tests to compare societal values across religions

Religion	Mean score	1	2	3	4
1. Islam	3.63				
2. Buddha	3.34			*	
3. Hindu	3.79				
4. Christian	3.44				

***p < 0.001, **p < 0.01, *p <0.05

Table 7: Games Howell Post Hoc tests to compare religious attachment across religions

Religion	Mean score	1	2	3	4
1. Islam	6.59		***	***	***
2. Buddha	4.77	***		***	***
3. Hindu	6.09	***	***		**
4. Christian	5.57	***	***	**	

***p < 0.001, **p < 0.01, *p <0.05

Comparison across Races

The Klang Valley respondents irrespective of races saw high general promises and moderate concerns of modern biotechnology, moderate confidence on key actors, moderate stance on the impact of technology and moderate post-material values (Table 8). On the other hand, when asked questions pertaining to their attachment to their religion, the Malays and the Indians scored higher mean value while the Chinese obtained a moderate mean score.

ANOVAs were significant for general promise ($F=12.24$, $p < 0.001$), general concerns ($F=4.48$, $p < 0.05$), confidence on key actors ($F=26.67$, $p < 0.001$), impact of technology ($F=22.06$, $p < 0.001$), societal values ($F=5.17$, $p < 0.01$) and religious attachment ($F=183.46$, $p < 0.001$) across races (Table 9). Post Hoc tests showed that the Malays perceived significantly higher biotechnology promises compare to the Chinese and Indians (Table 10) while the Chinese saw lower biotechnology concerns than the Indians (Table 11). With regard to confidence on scientists, industries and government, the Malays and the Indians tended to have more confidence compared to the Chinese (Table 12). Respondents from all races differed significantly in their opinion on the impact of technology. Post Hoc tests showed that the Chinese were the most positive on their assessment of the impact of technology followed by the Indian and the Malays (Table 13). On the other hand, the Chinese were also more inclined towards nature and professed to have less post-material values than the Malays and the Indians (Table 14). In term of religious attachment, Post Hoc tests confirmed significant differences between all races (Table 15). The Malays seemed to be the most attached to religion followed by the Indian and Chinese.

Table 8: General attitude related to modern biotechnology across races

Variables		Mean score ± std dev.	Interpretation
General promise			
	Malay	5.62 ± 1.00	High
	Chinese	5.35 ± 0.90	High
	Indian	5.20 ± 1.37	High
General concerns			
	Malay	4.47 ± 1.21	Moderate
	Chinese	4.32 ± 1.10	Moderate
	Indian	4.69 ± 1.23	Moderate
Confidence on scientists, industries and government			
	Malay	4.76 ± 1.11	Moderate
	Chinese	4.12 ± 1.09	Moderate
	Indian	4.76 ± 1.24	Moderate
Impact of technology			
	Malay	4.80 ± 1.18	Moderate
	Chinese	4.17 ± 1.31	Moderate
	Indian	4.52 ± 1.24	Moderate
Societal values			
	Malay	3.62 ± 1.19	Moderate
	Chinese	3.36 ± 1.05	Moderate
	Indian	3.70 ± 1.20	Moderate
Religious attachment			
	Malay	6.59 ± 0.78	High
	Chinese	4.99 ± 1.61	Moderate
	Indian	6.04 ± 0.96	High

Table 9: One way ANOVA to compare general attitude across races

Variable	F-value	Sig.
General promise	12.24	0.000***
General concerns	4.48	0.012*
Confidence on scientists, industries and government	26.67	0.000***
Impact of technology	22.06	0.000***
Societal values	5.17	0.006**
Religious attachment	188.01	0.000***

***p < 0.001, **p < 0.01, *p <0.05

Table 10: Games Howell Post Hoc tests to compare general promise across races

Race	Mean score	1	2	3
1. Malay	5.62	**	**	
2. Chinese	5.35			
3. Indian	5.20			

***p < 0.001, **p < 0.01, *p <0.05

Table 11: Scheffe Post Hoc tests to compare general concerns across races

Race	Mean score	1	2	3
1. Malay	4.47			
2. Chinese	4.32			*
3. Indian	4.69			

***p < 0.001, **p < 0.01, *p <0.05

Table 12: Scheffe Post Hoc tests to compare confidence on key actors across races

Race	Mean score	1	2	3
1. Malay	4.76			
2. Chinese	4.12	***		***
3. Indian	4.76			

***p < 0.001, **p < 0.01, *p <0.05

Table 13: Scheffe Post Hoc tests to compare impact of technology across races

Race	Mean score	1	2	3
1. Malay	4.80		***	*
2. Chinese	4.17	***		*
3. Indian	4.52	*	*	

***p < 0.001, **p < 0.01, *p <0.05

Table 14: Scheffe Post Hoc tests to compare societal values across races

Race	Mean score	1	2	3
1. Malay	3.62			
2. Chinese	3.36	*		*
3. Indian	3.70			

***p < 0.001, **p < 0.01, *p <0.05

Table 15: Games Howell Post Hoc tests to compare religious attachment

Race	Mean score	1	2	3
1. Malay	6.59		***	***
2. Chinese	4.99	***		***
3. Indian	6.04	***	***	

***$p < 0.001$, **$p < 0.01$, *$p < 0.0$

CONCLUSION

Generally respondents from all religions and races saw high general promises and moderate concerns of modern biotechnology, moderate confidence on key actors, moderate negative impact of technology and moderate post-material values. However, significant differences can be seen on some aspects. The Malays/Muslims claimed to be the most attached to their religion, significantly saw the highest general promise related to modern biotechnology and have more confidence on the scientists, industries and government compared to the Buddhists and Christians. Comparing confidence across races, the Malays and the Indians tended to have more confidence towards the three key actors compared to the Chinese. On the other hand, the Muslims were more negative on their opinion towards impact of technology than the Buddhists and Christians while the Christians have significantly more positive opinion of technology compared to the Muslims and also the Hindus. Although the Chinese/Buddhists were more inclined towards nature, they perceived the lowest general concerns related to modern biotechnology and the Chinese also were the most positive towards technology.

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REFERENCES

Dake,K. 1991. 'Orienting dispositions in the perception of risk: an analysis of contemporary world views and cultural biases. *Journal of Cross-Cultural Psychology* 22, 61-82.

Gaskel, G., Allum,N. & Stares, S. 2003. Europeans and biotechnology in 2002. A report to the EC Directorate General for Research from the project 'Life Sciences in European Society'. QLG7-CT-1999-00286.

Kelley, J. 1995. Public perceptions of genetic engineering: Australia, 1994. *Final report to the Department of Industry, Science and Technology*, May 1995.

Pardo, R., Midden, C. & Miller , J.D. 2002. Attitudes toward biotechnology in the European Union. *Journal of Biotechnology* 98, 9-24.

Rohrmann, B.1999. *Risk perception research: review and documentation.* 1999. Research Center Juelich: RC Studies #68. http://www.kfa-juelich.de/mut/hefte/heft_69.pdf (24.7.2003)

Sturgis,P. & Allum,N. 2004. Science in society: re-evaluating the deficit model of public attitudes. *Public Understand. Sc* 13, 55-74.

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