CHAPTER FIVE

5.0 INTERNATIONAL COMPARISONS ON BIOTECHNOLOGY COMMUNICATION STRATEGIES

This section discusses biotechnology communication initiatives in the UK, USA, Australia, Philippines and Singapore as these countries have a head start in biotechnology, and in some cases in science communication. Discussion is based on a literature review and in-depth interviews conducted with selected respondents who are involved in communicating biotechnology in these countries. All information provided in this section is obtained from the respondents, otherwise cited by other references.

It is crucial to be aware of initiatives outside Malaysia to learn from them and adapt them to suit the local needs and environment in Malaysia. The reasons for choosing these countries have been justified in the Methodology Chapter. Based on the comparisons between the literature review and the results of this research, it has been observed that there are similarities and differences between Malaysia and the countries mentioned in this study in terms of public, scientists and media attitudes. The issues and challenges in communicating science in general and biotechnology specifically is a global phenomenon, whereas public attitudes may differ from country to country based on risk perception, anti-biotechnology activism, ethics and religious principles, and trust on regulatory policies. Thus, comparing Malaysia to these countries and benchmarking it would lead to the development of a robust biotechnology communication strategy for Malaysia, where lessons from other countries could be incorporated. Nevertheless, it must be acknowledged that the public hold a complex set of beliefs about biotechnology and country-specific factors need to be considered. The findings from this study provide the needed information to adapt biotechnology communication strategies in the USA, UK, Australia, Singapore and the Philippines for Malaysian context.

The respondents interviewed for this section is shown in Table 5.0.

Table 5.0: Respondents from the UK, USA, Australia, Singapore and Philippines for international comparisons

Country	Name	Organisation	Designation/Expertise
USA	Prof. Wayne Parrot	University of Georgia	Professor/Plant Biotechnology
USA	Prof. Bruce Chassy	University of Illinois	Professor/Food safety
UK	Prof Chris Leaver CBE	University of Oxford	Professor/Plant Science
UK	Mark Cantley	Directorate General for Research	Advisor/Economics
Australia	Dr. Craig Cormick	Department of Industry, Innovation, Science, Research and Tertiary Education, Australia	Manager of Public Awareness/Journalism & Science communication
Australia	Belinda Griffiths	Victorian AgriBiosciences Centre	Education Manager/Science Communication
Singapore	Prof. Paul Teng	Nanyang Technological University	Professor/Crop Biotechnology & Policy and Communication
Singapore	Dr. Andrew Powell	Asia BioBusiness	Consultant/Plant Science & Communication
Philippines	Dr. Mariechel Navarro	ISAAA	Manager/Communication
Philippines	Jenny Panopio	Philippines Biotechnology Information Centre	Director/Biotechnology

5.1 THE USA EXPERIENCE

USA is the number one producer of GM crops in the world with a total area of 69 million hectares (James, 2011) and is a biotechnology leader (Ernst & Young, 2011). USA is an example where the level of public acceptance cannot be correlated to the level of public understanding of biotechnology. Pew Initiative on Food and Biotechnology (PIFB) conducted four major national opinion polls on agricultural biotechnology since 2001 (Fink and Rodemeyer, 2007). In 2001, a little more than half of Americans reported having seen, read or heard nothing about GM foods (PIFB, 2001). In 2003 and 2004, the number who have not heard about GM foods had increased to more than three-fifths of those responding (PIFB, 2003, 2004), and in 2005, the polls shows a slight decrease in those saying they had heard little or nothing

about GM foods (PIFB, 2005). Americans who have seen, read or heard about GM foods accounted to 44 per cent in 2001, but, in 2003 and 2004, only 34 and 32 per cent respectively, said they have heard something about GM foods (PIFB, 2001, 2003, 2004). PIFB attributed the drop in awareness to the media's ever-changing attention to GM foods.

In the same poll in 2001, the source named as the most trustworthy was the Food and Drug Administration (FDA), with 83 per cent of Americans stating that they trusted FDA a great deal (PIFB, 2001). The poll in 2003, again revealed the same result, with FDA as the most trustworthy source (PIFB, 2003). These results pointed to "trust" as the most important aspect to gain public acceptance on biotechnology and determines public attitude. This has been stressed by Priest et. al. (2003) where the authors argued that trust functions as an engine of public opinion formation. They further suggested that rather than focusing on communication of knowledge to individuals, building trust should be primary consideration in understanding public opinion about biotechnology. This would serve as an important lesson for Malaysia and it would be highly appropriate to incorporate elements of trust in the national biotechnology communication framework.

Although there is no National Policy or Strategy for biotechnology communication, the 1998 Ehlers report had some emphasis in communicating research work to the public. The "Communicating Science" section of the 1998 Ehlers report to the U.S. House Committee on Science, which recommended congressional actions regarding research and science, stated:

> *"Research sponsored by the Federal government should be more readily available to the general public, both to inform them and to demonstrate they are getting value for the money the government spends on research. Agencies that support scientific research have an obligation to explain research to the public in clear and concise way."(House Committee on Science, 1998).*

However, the impact of this recommendation on public understanding of science is not known.

Both the respondents interviewed communicate to the public voluntarily (as many scientists in Malaysia) for the reasons as mentioned below:

> *"Any researcher who cannot defend his/her work to the public has no business doing that research" (Prof. Parrot)*

> *"I believe stakeholders have a right to know why and what we do in science. It is a self-serving reason for making sure stakeholders understand science. If they do not understand and appreciate what we do, they will no longer support what we do."(Prof. Chassy)*

Based on the input provided by the respondents interviewed (Prof. Parrot and Prof Chassy), there are neither coordinated efforts at the national level on biotechnology communication nor dedicated government agencies to do so. Scientists who are personally passionate about promoting biotechnology and enhancing public understanding take this responsibility upon themselves voluntarily. Civil society and industry organisations such as Bio Industry Organisation (BIO), International Food Information Centre (IFIC), CropLife, and Pew are playing a role as well. IFIC's mission is to communicate science-based information on food safety and nutrition to health and nutritional professionals, educators, journalists, government officials and others providing information to consumers. IFIC also conducts polls on public perception towards GM food and this provides useful information to regulators and industry to policy making and developing communication strategies respectively. IFIC provides

monthly e-newsletter, called FoodInsight to its members, which communicates science-based food safety and nutrition information. Besides the e-newsletter, IFIC carries out primary research on public opinion on food safety and nutrition; reports on the latest research on food safety and nutrition in simple language; develop materials and test them with consumers and share the results with media and stakeholders in the public and private sectors; provide science-based information to the media and refer the media to experts in the field; organise conferences and forums that bring diverse stakeholders together to share information and improve understanding of nutrition and food safety issues (IFIC website). According to both the respondents, IFIC's initiatives culminates into better understanding of biotechnology, especially GM foods among American publics.

BIO is another organisation that actively carries out biotechnology communication in the USA. It is the world's largest biotechnology organisation and its mission is to be a champion for biotechnology and advocate for its members who are biotechnology companies. It provides communication services to its members in the areas of agricultural, medical, industrial and environmental biotechnology. BIO organises the largest biotechnology event in the world – BIO International Convention annually; and like IFIC it also produces an e-newsletter, BIOSmart Brief. The newsletter carries the latest information on biotechnology industry, regulations and policies (BIO website). According to the respondents, BIO plays an important role in the USA in reaching out to the public and also engaging the regulators and policymakers on issues related to biotechnology. A similar organisation that could be compared to BIO in Malaysia is BiotechCorp as it represents the industry and has been mandated to facilitate the development of biotechnology companies in Malaysia. Like BIO, BiotechCorp as

discussed under the NRO section, plays an important role both in advocacy and public engagement with biotechnology.

There are some National Institutes of Health (NIH) and National Science Foundation (NSF) funded educational programmes, mostly directed at medical biotechnology. Both respondents agreed that more focus is given to health and medicine than agribiotechnology. The target audiences for these programmes are media, doctors and consumers, whereas, the agribiotechnology industry directly engages the farmers, mainly for the sales of GM seeds.

> *"The industry advertises directly to farmers for agribiotech sales and does an excellent job of explaining the technology to farmers from a sales perspective. (Prof. Chassy)*

When asked about the effectiveness of the communication programmes, below were the responses:

> *"The target audiences are effectively reached, which is why the use of biotech crops is so high in the US, and the pharmaceutical industry does well in communicating medical sciences related to their products. The rest of the population is left out, particularly on agricultural biotechnology" (Prof. Parrot)*

> *"Industry knows how to sell. Doctors understand medical biotech and farmers understand agribiotech. I don't think consumers find the right messages, the media could care less what the trust is, and policymakers only care about what will get them the most votes and or/political contributions or bargaining power" (Prof. Chassy)*

It is clear that communication programmes are industry-driven with marketing their products as the main objectives. However, both respondents said in recent years, a portion of NSF, Department of Environment, US Department of Agriculture's research funds must be set aside to communicate science to the public. As these funds are part of individual research grants, the communication that takes place depends on the research topic of the individual scientist, without any overall coordination on topic or strategy. Furthermore, these grants are primarily targeted at school children. The other option

taken by scientists to fulfill the communication requirement is by just having a website posted. Communication is seen as a burden by scientists who have neither the time nor training for it. This seems to be the case in Malaysia, where scientists' objectives are to promote their research and commercialisation. Nevertheless, Malaysian scientists do not have an obligation to engage with the public, and their research grants do not have allocation for this. This practice could be adopted in Malaysia, but with coordinated efforts so a wider range of audience and topics are covered.

The obstacles in communicating biotechnology identified by both the respondents were that biotechnology companies have the funds for biotechnology outreach programmes, but lack the necessary credibility, whereas, scientists lack the funds and time to engage with the public. Another major obstacle is the lack of media support due to anti-biotechnology stand of most of the editors and journalists and also because scary news sells more than positive news. Suggestions provided were to have a pro-biotechnology NGO that could convey messages to the public, use of proper channels that would reach the public (understanding alternative media such as the internet and the social media), incentives for scientists to communicate with the public, and training the media and the scientists on communicating biotechnology and engaging with the public

From the responses, observation could be made that Malaysia is not lagging behind the USA in terms of biotechnology communication. Although there are similar challenges such as lack of coordinated efforts at the national level, scientists' time for communicating, and training for scientists in this area, there is active biotechnology awareness programmes in Malaysia by various players as discussed earlier. What could be adapted from the USA experience is the allocation of a portion of research grants for engagement with the public.

5.2 THE UK EXPERIENCE

The Bodmer Report in 1985 and the setting up of CoPUS in 1988, created a number of schemes to promote public understanding and appreciation of science (Bodmer, 1985). However, a survey conducted in 1988 among the British public showed only 10 per cent or less of those questioned were scientifically literate (Durant et. al. 1989). A follow up survey in 1996 indicated little change in scientific literacy, but interest in science remained high (Miller, 2001). The reason for the low science literacy among the public in spite of the CoPUS initiatives was assumed to be the "deficit model" practiced (Gross, 1994). This gave rise to the "contextual approach" which was then practiced under the "Science and Society" report by the House of Lord (Miller, 2001).

However, in the case of the UK, public behavior and attitudes towards biotechnology and science are not the same where biotechnology, especially GM food is one of the most contentious issues. A number of events dramatically changed public opinion about GM food (Gaskell et. al., 2001). First, the government's handling of "mad cow" or Bovine Serum Encephalitis (BSE) crisis in late 1980s presented a pivotal issue on food safety (Jasanoff, 1997; Durant et. al., 1998). Second, in the mid-1990s, the launch of the *Flavr Savr* tomatoes was a relative success, in spite of it being clearly labeled as a GM product (Robinson, 1997). However, the temporary success did not last and this was attributed to the company's inexperience in marketing and shipping the tomatoes. The third event took place in 1996, when the first shipment of Monsanto's *RoundupReady* soya beans arrived in Europe (Lassen et. al. 2002). NGOs actively campaigned, making the mixing of GM and non-GM soya as an issue. This caused a heavy-handed response from the industry (Simmons and Weldon, 2000), which was interpreted by the public as biotechnology industry showing disdain for consumers

(Harvey, 1999). The fourth event was known as the *Pusztai Affair*, where Arpad Pusztai, a researcher at the Rowett Research Institute in Arberdeen in 1998, claimed on UK television that his rat experiments had shown that eating GM potatoes could lead to intestinal changes (Poortinga and Pidgeon, 2007). Although the work was then declared as unscientific, it brought the potential risks of GM crops to human health to public attention. The fifth event was the cloning of Dolly by the Roslin Institute in Edinburgh, which sparked an intensive public and media debate about ethics in biotechnology (Poortinga and Pidgeon, 2007). All the events above contributed to the GM controversy and public rejection towards this technology.

The events that led to public rejection and resistance towards GM technology in the UK pointed to element of "trust", similar to the situation in the USA, although the situation in the USA was favourable towards GM technology. These experiences recognise the need to incorporate the element of "trust" into communication strategies. This may be done by engaging a trusted and highly credible champion (e.g.religious scholars in the case of ethical issues), or informing the public of the regulatory processes that are in place, and how scientists, industry and regulators conduct risk assessment and risk management.

To understand the current situation in the UK, the respondents (Prof. Leaver and Mark Cantley) were interviewed for this research. The main agencies involved in communicating biotechnology to the public, according to the respondents are the National Research Councils and Bioindustry Association. Their target audiences cover a wide spectrum – general public, media, students, policymakers, and industry. Each respondent felt differently about the effectiveness of the programmes.

> *"Tricky – and often, not very effective. And the NGOs are often opportunist in seizing on news events. That makes government's propaganda counterproductive" (Mark Cantley)*

> *"Variable – it depends on which agency, which target and the criteria employed. For example the UK media in 2006 was about 2:1 against agricultural biotechnology; and since 2007 it has become roughly 2:1 in favour." (Prof. Leaver)*

According to both the respondents, media plays a major role in providing information to the public, but mostly media's primary information is obtained from anti-biotechnology NGOs, especially on agricultural biotechnology. Media in the UK also shapes public opinion. Both the respondents agreed that there are broad commitments from the government to encourage public understanding of science (including biotechnology), but they are not nationally organised. Thus, a National Policy on science communication is missing. However, there are a number of players who actively engage the public such as British Science Association, the Royal Society, Societies of Biology, Biochemical, and General Microbiology.

Both the respondents concurred that there is funding, though limited, allocated for science communication, but not particularly for biotechnology. Because of the endless on-going debate on biotechnology in the UK and the presence of active anti-biotechnology NGOs, both respondents felt that more funds should be spent on educating young people on the potential of biotechnology. Mark Cantley feels the reluctance of scientists to be drawn into public debate has to change.

When asked what are the obstacles for effective biotechnology communication in the UK, the responses were given as below:

> *"A lack of interest and of understanding among the public together with the poor quality of scientific understanding among the national leadership: no members of the government and almost no Members of Parliament have a science degree." (Prof. Leaver)*

> *"Budgetary constraints, lack of public interest. We should encourage individuals – scientists, policymakers, politicians to engage in public debate. The media fall back upon a limited group of very doubtful quality and integrity." (Mark Cantley)*

Overall, there are many similarities between the UK and Malaysia, such as the government's initiative towards promoting public understanding of science/biotechnology. This is seen in the case of BIOTEK, NRE and BiotechCorp in Malaysia, where government funds are allocated to engage with the people. A number of national institutions undertake public understanding of biotechnology in both countries. What is lacking in Malaysia, unlike the UK, is a national strategy to promote public understanding of science/biotechnology. Another contrast between the UK and Malaysia is that the activism against biotechnology is greater in the UK, though it is confined more to agribiotechnology. Public concerns about undesired effects of scientific-technological development are particularly pronounced in the European Union, including the UK (Lujan and Todt, 2007). Thus, this translates into more resistance towards biotechnology among the public in the UK compared to Malaysia. This is one of the reasons why EU executive branch, the European Commission, has been active in this area, trying to start a dialogue with society on issues related to science and technology. One of the first results is the *Science and Society Action Plan*, which aimed at increasing understanding of science among European (European Commission, 2001a). Another initiative from the European Commission, *The European White Paper* on governance raises the issue of "democratising expertise", where the

commission expressed the need for more citizen participation in policy making in order to increase public trust (European Commission, 2001b). Citizens' trust in decision-making processes is now regarded as one of the fundamental pillars of technology development (Todt, 2003). These initiatives are good models for Malaysia to emulate and justify the need for a biotechnology communication strategy at the national level. Furthermore, the initiatives that came out from Bodmer and Wolfendale reports, which saw an increase in the number of scientists engaging with the public could serve as an example for Malaysia. Though, Malaysia is spared from crisis such as BSE where the trust of the general public is jeopardised, as a number of Malaysian biotechnology sectors are in the embryonic stage, this would be the best time to scale up public awareness programmes and take proactive role to be ahead of anti-biotechnology movements and to enhance public participation in government policies. Malaysia is moving in the right direction but a stronger push is needed for a more coordinated effort among all players involved.

5.3 THE AUSTRALIAN EXPERIENCE

Australia has strong biotechnology communication initiatives that are well coordinated with industry, research and educational groups working closely with government agencies, and this unified message ensures maximum effect with minimal duplication (Cormick, 2011). A number of universities have incorporated science communication modules into science programmes and offer post-graduate degrees in science communication. The Centre for the Public Awareness of Science at the Australian National University is one such example (Bryant, 2003). The "Inspiring Australia" report (Inspiring Australia, 2010) which was an initiative by the Department of Industry, Science, Research and Tertiary Education, proposes a national approach for

community engagement with the sciences. This report is expected to complement Australia's *Innovation Agenda* as a high-quality national strategy for public engagement with the sciences and seeks to increase appreciation of science in Australian culture, facilitate informed citizen participation in decision making and science policy development, boost confidence in the Australian Government's research investment, and ensure a continuing supply of well-qualified science graduates.

Australia has a distinctive programme for politicians to help them better understand the role of science in the development of public policy. This has been discussed by Parsons (2001) in her paper. Commonwealth Scientific and Industrial Research Organisation (CSIRO) initiated the National Awareness Parliamentary Information Program in November 1998. This service delivers email information about CSIRO scientific advances, whereby the information is individually tailored and sent direct to all Members of Parliament. The information can be used by individual Members of Parliament and their staff for policy development; inclusion in speeches delivered locally or in Parliament; briefings providing advice on current issues; preparing their own media releases to local media; and responses to individual inquiries from the public.

Another programme reported by Parsons (2001) is the annual Science Meets Parliament (SMP) organised by Australia's Federation of Scientific and Technical Societies (FASTS) since 1999, where Federal politicians are invited to meet a pair of scientists from their electorate. FASTS had four primary aims: to make politicians more aware of what science can do for Australia; to make scientists more knowledgeable about policy formulation; to make a favourable impact on both the political process and the budget;

and to develop long-term relationships between individual scientists and Members of Parliament.

There are a number of organisations, both public and private that are involved in communicating biotechnology to various stakeholders in Australia, according to the respondents interviewed in this research (Dr. Cormick and Belinda Griffiths). The organisations and their target audiences are as below:

- The Australian Biotechnology Industry Association (AusBiotech): industry and the general public
- Australian Stem Cell Network: researchers and the general public
- AgrifoodAwareness Australia (a group funded by industry to provide information on agricultural biotechnology): farmers, farmer groups, media, politicians, and the general public
- National Enabling Technologies Strategy – Public Awareness and Community Engagement (formerly Biotechnology Australia): the general public interest groups, teachers, media, influencers
- National Health and Medical Research Council: health professionals, patient groups and the active public
- The Commonwealth Scientific and Industrial Research Organisation (CSIRO): general publics, industry, media, schools, and politician
- Australian Centre for Functional Plant Genomics (ACPFG): general publics, media
- NGOs such as GeneEthics, Greenpeace, The Network of Concerned Farmers and the Public Health Association: general publics, media and politicians

The effectiveness of the programmes was described by Belinda Griffiths as:

> *"I would say they are fairly effective at reaching the interested and engaged public (people who seek information), moderately effective at reaching the interested public (people who don't seek information but are interested if they stumble across it) and not effective at reaching the disinterested, disengaged public (people who do not seek information and who actively ignore messages about biotechnology from science organisations or the government."(Belinda Griffiths)*

The Inspiring Report (2010) and the National Enabling Technology Strategies were mentioned as the National Science Communication Policy by both the respondents. Dr. Cormick described the national strategy as:

> *"Rather than a single national communications strategy, there is a network of linked strategies that are coordinated through a national communications group that work to coordinate activities into a web that complement each other."(Dr. Cormick)*

The government allocates funds for biotechnology communication for a number of initiatives such as for the National Enabling Technologies Strategies, CSIRO, and universities. According to Dr. Cormick, the challenges in biotechnology communication in Australia varied according to the field. For GM crops, public are confused by misinformation campaigns by some civil societies, largely based on personal values and not science. Communication on stem cells has evolved from having a debate with anti-stem cell advocates on the inherent values in embryonic stem cell uses to dealing with issues of over-promising cures that need to be tempered with more realistic promises. Synthetic biology suffers from lack of public awareness and understanding, and industrial biotechnology's challenge is to demonstrate how biotechnology could provide economic, environmental and societal outcomes while dealing with issues of food-fuel imbalances for biofuels. Besides challenges that are subject-specific, generic challenges pointed out by Dr. Cormick are: translating the complexity of science to the general public; and getting scientists to take part in public debate.

Belinda Griffiths believes media in Australia generally portrays biotechnology in a positive light, with a focus on the benefits for human and the environment. However, Dr. Cormick felt that the standard of science reporting among Australian journalists is slipping in the mainstream media. Nevertheless, there are a number of very good science journalists who do excellent job (as there are those who do a poor job).

This could be explained as not all media have a strong science unit or science journalist team. The Australia Broadcasting Corporation (ABC) Science Unit, the *Australian*, and the *Age* newspapers have strong science units or science journalists, according to Dr. Cormick. Whereas, other smaller media do not have dedicated science journalists and biotechnology is often assigned to journalists who cover a very wide range of materials and are not readily able to discern good science from pseudoscience. This scenario is even worse in Malaysia, where only one newspaper has a dedicated science desk, *Utusan Malaysia.*

On the whole, Australia is further advanced than the other countries in terms of its national strategies and approach towards public understanding of science. The government is committed towards creating a science-literate society and citizens who are able to participate in government policies (Inspiring Australia, 2010). This offers an ideal model for Malaysia to emulate.

5.4 THE SINGAPOREAN EXPERIENCE

Singapore is Asia's leading investor in biotechnology, with the government channeling US$700 million into biotechnology funds in 2002 (Asia Private Equity Review, 2002), with medical and healthcare biotechnology as the biggest sector. However, public understanding of biotechnology is not a national priority, according to the two respondents interviewed here. There is no national science or biotechnology communication policy or strategy. Biotechnology communication programmes are currently undertaken by Genetic Modification Advisory Committee (GMAC), through it Public Awareness Sub-committee, and the Singapore Science Centre, through its exhibits and programmes. Both these agencies target general public and school children.

The effectiveness of Singapore Science Centre is not possible to be measured according to Prof. Teng, but the centre has thousands of "walk-through" visitors who are exposed to its exhibits. GMAC has limited audience exposure, but the committee has prepared biotechnology information materials in several languages that are widely distributed, but impact assessment has not been carried out. Both respondents were positive about the media's role in covering biotechnology. Dr. Powell said the mainstream media plays a significant role in communicating biotechnology, whereas Prof. Teng said:

> *"There are irregular articles which are well-researched by the media's science journalists. Media is mainly biotechnology-friendly and reflective of the government's pragmatic approach in promoting biotechnology."(Prof. Paul Teng)*

Government funding for public understanding of biotechnology is allocated to the Science Centre and GMAC, but no evaluation has been done to measure the effectiveness of the communication strategies. Generally, both respondents concurred that biotechnology acceptance among the Singaporean public is good and public resistance is not an issue. Thus, the need for an active communication programme does not seem urgent. This in turn becomes a challenge for a more robust biotechnology communication programme in Singapore to enhance public understanding as the current low level of communication is sufficient to create the needed acceptance. The Singapore situation is similar to the USA where public acceptance does not correlate to public understanding of biotechnology. Again, this exemplifies the importance of public trust in a biotechnology communication strategy. However, Prof. Teng feels improvements could be made to the intensity of activities in communicating the benefits of biotechnology by the Science Centre and GMAC, as part of their regular programmes to cultivate awareness of biotechnology.

It is clear that Singapore's biotechnology communication programme is driven by the need to have public acceptance. The government and scientists might be taking public engagement with biotechnology lightly since there is lack of resistance towards the technology. However, public awareness and understanding of biotechnology might be affected due to this. Prof. Teng suggested identifying key stakeholders who are decision makers or potential bottlenecks to biotechnology acceptance and designing an intervention pogramme which targets their concerns by using credible parties to communicate.

In comparison, Malaysia fares much better in her approaches and initiatives in communicating biotechnology to the public than Singapore. Singapore might not be a good model to follow, as Malaysia's public is more heterogeneous and public acceptance is not at the optimal level yet. Nevertheless, media in Singapore is more supportive to biotechnology which could be emulated in Malaysia.

5.5 THE PHILIPPINES EXPERIENCE

The Philippines was the first Asian country to commercialise GM crop when it first started to cultivate GM corn in 2002 (Panopio and Navarro, 2011). Juanillo's (2003) survey revealed that stakeholders in the Philippines (scientists, consumers, businessmen, policymakers, farmer leaders, extension workers, journalists, and religious scholars) had above moderate interest in biotechnology. At least 70 per cent of policymakers, businessmen, and extension workers believed that biotechnology would contribute positively to the agriculture sector in the Philippines. Another survey was conducted by Torres et. al. (2006) after the commercialisation of GM corn, which showed that majority of stakeholders had favourable perception towards agricultural biotechnology. A survey by the Asian Food Information Centre (AFIC) in 2008

indicated that Philippine consumers were knowledgeable and positive about food biotechnology. Consumers largely believed that biotechnology crops have the potential to deliver high quality and nutritional food. And a large majority indicated that they accepted biotechnology as a way to increase food production.

The anti-GMO activities during the commercialisation of GM corn ignited the collaboration between academic and government institutions on an information and communication campaign on biotechnology in 1998 (Panopio and Navarro, 2011). Efforts were geared towards introducing the concepts of biotechnology to the general public with the intent of preparing a favourable environment for commercialisation of biotechnology products. The establishment of SEAMEO Regional Centre for Graduate Study and Research in Agricultural Biotechnology Information Centre (SEARCA BIC) in 2000 further boosted the efforts in communicating biotechnology, especially agricultural biotechnology.

Jenny Panopio, one of the interviewees named the following agencies as being involved in communicating biotechnology to the public: SEARCA BIC, the Biotechnology Media Advocacy Resource Centre, the Department of Agriculture, the Department of Science and Technology and the National Academy of Science and Technology. This draws a similarity to Malaysia where a number of government agencies (NROs) and research institutes are involved in engaging with the public on biotechnology. The target audiences of these institutes are scientists, journalists, and the general public, according to Panopio. Navarro said religious scholars became an important target audience when the Catholic churches went against GM crops (between 2001-2003) and also when the Muslim scholars in the Philippines declared GM crop as "*haram*". However, not all programmes are effective due to the limited resources available and

the inability to reach the entire country. Like the UK, misleading information provided about biotechnology by NGOs is counterproductive to the programmes carried out by scientists. Navarro mentioned the following as the main challenges in the Philippines:

> *"Language barriers; need for translation and simplification of information; science is not an exciting thing to read unless it deals with issues that directly affect readers."(Dr. Mariechel Navarro)*

The media in the Philippines plays an important role, as according to Panopio there is a pool of science writers who are active in publishing biotechnology news. However, the television and radio are not fully utilised and air limited reports on biotechnology. From media monitoring surveys, Navarro observed that the Philippine media generally report accurately about biotechnology. Her survey from 2000-2009 on the top three national English newspaper (Navarro, 2011) showed the majority of articles published were positive (41.3%) and neutral (38.2%). These newspapers published a total of 1,355 articles on modern crop biotechnology during the ten year period or a yearly average of 136 articles. Thus, the media is an important tool for biotechnology communication in the Philippines.

Although there is no National Science/Biotechnology Communication Policy or strategy, the Presidential Proclamation No. 1414 declared the National Biotechnology Week as an annual celebration every last week of November. And according to Panopio, this activity contributes to biotechnology or science communication in the country in terms of raising awareness of the general public.

> *"This week involves the various government departments such as the Department of Science and Technology. the Department of Agriculture, and the Department of Environment and Natural Resources." (Jenny Panopio)*

Funding remains an issue according to Panopio and Navarro. Limited funding is allocated for the different agencies such as Department of Agriculture and Department of Science and Technology.

> *"These departments have specific communication programmes for government-funded biotechnology research." (Jenny Panopio)*

The suggestions provided by Panopio and Navarro on improving the current communication programmes are: key stakeholders such as media, farmers, and policymakers need to be educated on biotechnology; more involvement from the scientists; and enhanced collaboration between key agencies.

In conclusion, the Philippines has an active biotechnology communication programme with good media support and involvement of key stakeholders. This resembles the situation in Malaysia, although media support is not as good as in the Philippines. However, the Philippines success in emerging as the first Asian country in commercialising GM crop for food and feed without the existence of a national biotechnology communication strategy cannot be construed as a good model for Malaysia. Unlike the Philippines, Malaysia does not only focus on agribiotechnology, but the entire biotechnology spectrum ranging from agriculture, industry, and medical. Malaysia has a pressing need to develop its human capital to support its growing biotechnology industry (Malaysian Agricultural Biotechnology Sector, 2009; Malaysian Medical Biotechnology Sector, 2009; and Malaysian Industrial Biotechnology Sector, 2009). Besides human capital development, market acceptance, balanced policies and regulations, and public participation in business ventures call for a more structured and coherent biotechnology communication and public engagement. Due to the huge investments of Malaysian government in biotechnology sector the need for a national biotechnology communication strategy is justified.

5.6 CONCLUSION ON INTERNATIONAL EXPERIENCES

It is seen that communication strategies in each country takes different forms and intensity. Australia has the best communication strategies with well coordinated efforts at the national level. The UK, too has initiatives at the national level, though there is skepticism about its success rate, as shown in surveys on public's level of science understanding (Durant et. al., 1989 and Miller, 2001). The government's efforts in promoting understanding of science became counterproductive due to the anti-biotechnology NGOs' activism, according to the two respondents in this research. The events in 1990s related to GM crops, cloning and BSE too had huge roles to play in public perception of biotechnology. The deficit model practiced was also the cause for the communication failure (Gross, 1994). One-way late-stage communication models have proven ineffective and have only further alienated the very audiences they meant to attract (Ireland et. al, 2007). The USA does not have strong public understanding of biotechnology initiatives, in spite of its strong biotechnology sector. Scientists voluntarily undertake biotechnology communication programmes. However, public acceptance towards biotechnology remains high in the USA, mainly due to the trust in the government and regulatory bodies. Nevertheless, science literacy among the public remain low. In Singapore, given the no-issue situation on public acceptance of biotechnology, communicating biotechnology is not a priority in this city state. And finally, the Philippines, like the UK has an active biotechnology communication programme. Key agencies are involved with the support from the media. This is evident from their success in commercialising GM corn and being the first country in Asia to do so, in spite of the initial resistance from the civil societies and the general public. Taking all the initiatives in these countries into consideration, Malaysia is doing very well, in spite of the lack of a national level public understanding of biotechnology or science movement.

In making international comparisons, the different culture in terms of public behavior and trust on regulatory bodies need to be taken into consideration, as these are the key factors that would determine the success and impact of any communication framework. In Singapore, for example, the need to have an aggressive biotechnology communication programme at the national level is not crucial as the public does not have reservation towards government policies and regulations. This is completely the opposite for the UK, where a number of events in 1990s eroded public trust on regulatory bodies. A strong belief in the benefits of science and technology does not mean that individuals have no reservation about the impact of science and technology (Miler, 2004). Miller et. al. (1997) investigated the relationship between public perceptions of the benefits of science and technology and their concerns about the impact of science and technology in Canada, the European Union, Japan and the USA. In the USA, individuals who hold a strong belief in the promise or benefits of science and technology were significantly less likely to hold a strong reservation about science and technology. By contrast, the correlation between these two beliefs in the European Union showed that individuals in Europe who held a positive view of the promise of science and technology also held moderately strong reservations about the impact of science and technology.

The assumption that public objections stem from ignorance has been questioned by several researchers. Priest (2001) reported that the dominant assumption that objections to biotechnology necessarily spring from ignorance is a misconception. Data from National Science Board (2000) suggests that objections to biotechnology are becoming slightly more prevalent among the most educated segment of the USA population. This directs the attention to the importance of trust in relevant authorities as a factor that determines public acceptance of biotechnology. Judgments about riskiness of new

technologies such as bioengineered foods involve judgments about trustworthiness of scientists and their employers (Priest, 2001). Thus, public trust is a valuable commodity (Priest, 2001) and should be an important component of the biotechnology communication framework. In Malaysia, government is seen as the third credible source of information after the media and scientists. Therefore, it could be concluded that Malaysia has the right culture for biotechnology literacy to grow, which would then lead to public acceptance of the technology.

The comparisons revealed that in spite of Malaysia being a newcomer to the biotechnology sector, there is stronger public awareness programmes compared to countries like the USA and Singapore. Malaysia is comparable to the UK and the Philippines and in fact has advantages over these countries given that Malaysian publics are more receptive towards biotechnology (Amin, 2007) as also shown in the survey of this research. Nevertheless, Malaysia is lagging behind Australia in terms of a concerted national strategy for science communication and in training young graduates during their university programmes. Despite the shortcomings, some Malaysian scientists are passionate about communicating biotechnology, engaging with the public, and also for being trained in this area. This is evident from the inputs provided by the scientists interviewed for this research. There are also a number of NROs that carry out biotechnology outreach programme. The hurdles in Malaysia such as lack of media support, a void in the initiative to train scientists and young science graduates to communicate to non-specialists, and lack of dedicated funds for public understanding of science or biotechnology could be addressed if there is well-coordinated effort on public understanding of biotechnology at the national level like the UK or Australia. Another major aspect that is not in place in Malaysia is an evaluation exercise that measures the impact of all the biotechnology communication activities. The number of scientists

involved in biotechnology communication is also negligent compared to the total number of scientists. Given the strong biotechnology policy in place in Malaysia, the country cannot be complacent with the current biotechnology communication strategy. This is coupled with the dwindling interest in science among its students cited earlier from newspaper reports. Thus, the national framework for biotechnology communication is still needed to elevate the current practice and to synchronise it. Table 5.1 compares the biotechnology communication initiatives in the five countries.

Table 5.1: Comparisons between the UK, USA, Australia, Singapore and the Philippines

	UK	**USA**	**Australia**	**Singapore**	**Philippines**
Media support	Moderate	Poor	Moderate	Good	Good
Funding	Limited	Poor	Yes	Limited	Limited
National Strategy	Yes	No	Yes	No	No
Agencies involved	Government, industry, NGOs	Industry, civil societies, NGOs	Government, industry, universities, NGOs	Government	Government, NGOs
NGO activism	Active	Moderate	Active	No	Active
Public perception	Negative	Moderate	Moderate	Good	Moderate

It is important to note that a number of other countries have aggressively moved towards science communication programmes with the government setting national level strategy. Report by Massarani (2004) on Latin America portrays this region as an example where countries have created national science communication plans. One successful example is the Explora programme in Chile, created in 1995 by COCNICYT (the National Commission for Scientific and Technological Research). Panama is another country that has science popularisation programmes, created in 1997. In Brazil former President Lula's science popularisation plan is being implemented now. Proper training for science communication has been a constant item on these plans and although a number of courses (including masters and PhD courses) have already been created at universities and scientific institutions, many feel that there is scope for more.

In Denmark, an University Act which came into force in May 2003 listed science communication as a third obligation for the universities, in addition to research and teaching. Danish universities are intended to play an increasing role in communicating science which is also the case for many European countries (Nielsen, 2005). Like the UK's Public Understanding of Science (PUS), Germany's science popularisation effort is called "Public Understanding of Science and Humanities (PUSH)" (Schnabel, 2003).

Given the global scenario, it is important for Malaysia to beef up the current biotechnology communication strategy. This is discussed in the last Chapter where the results from this research form the basis for the biotechnology communication framework and strategies for Malaysia.