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PART SEVEN: Labeling and Marketing

39. Public Acceptance of Transgenic Staple Food in Developing Countries The Case of Rice in the Philippines

Philipp Aerni, Sibyl Anwander Phan-Huy, and Peter Rieder

Food Marketing Policy Center
Department of Agricultural and Resource Economics
University of Connecticut
and
Department of Resource Economics
University of Massachusetts, Amherst

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Philipp Aerni

Sibyl Anwander Phan-Huy

Peter Rieder

Department of Agriculture
Swiss Federal Institute of Technology

Chapter 39

Public Acceptance of Transgenic Staple Food in Developing Countries
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Philipp Aerni, Sibyl Anwander Phan-Huy, and Peter Rieder[1]

Introduction

In the Philippines, genetic engineering in agriculture faces opposition led by a coalition of non-government organizations (NGOs). There is an ongoing public debate, including congressional hearings, which focuses mainly on transgenic Bt rice and its potential contribution to future food security in Asia.

The purpose of this study is to examine perception patterns among the main participants in the Philippine debate on transgenic rice and define their political importance. To this end, a survey was conducted in cooperation with the University of the Philippines, Los Banos. In the course of the survey, a semi-standardized questionnaire was used to interview 65 respondents representing scientific, government, legislative and business institutions, 'civil society', the media and those international donor agencies involved in the debate.

The results suggest that non-government organizations (NGOs) and other public interest groups have a negative attitude towards transgenic rice while scientists are generally in favor of it. Most political decision-makers have very high expectations concerning the potential of genetic engineering for solving problems in the Philippine rice economy. However, their attitude is ambivalent with regard to the risks and benefits of Bt rice.

Public Resistance Towards Modern Biotechnology

The findings obtained by cognitive risk research show that the lack of public acceptance of high technologies can be attributed to differing risk perceptions of the lay public and experts. It is argued that this gap arises from the fact that the lay public does not merely perceive risks from a technical point of view. Social aspects also play a role in their risk assessment. Above all, a lay person is concerned with the extent to which he himself and his social environment will be affected by a potential accident. In this context, the public appears to have little confidence in high technologies such as genetic engineering, in particular, since the risks involved are perceived as unknown, not observable, uncontrollable and involuntary (Slovic et al., 1992).

Research findings (Soby et al., 1994) also show that public resistance to high technologies differs from country to country. It is assumed that differences in risk

perception depend on cultural, political and economic conditions. However, comparative research on the subject of public resistance to high technologies has been conducted almost exclusively in industrialized countries. The attitude of people in developing countries is often neglected since it is assumed that public resistance to high technologies is a phenomenon only encountered in affluent societies (Kepplinger, 1994). Nevertheless, the new social movements which have emerged in some developing countries with democratic structures have included 'opposition to genetic engineering in agriculture' in their agenda on multi-sectoral advocacy work. These movements are associated with non-government organizations (NGOs). The major goal of their political activities is to achieve a more just and culturally independent society (Alegre, 1996). Given this background, nationalist feelings may also be important with regard to the opposition to genetic engineering – in particular, in the context of intellectual property rights (see IPR Sourcebook, 1994).

The Situation in the Philippines

In the Philippines, the extra-parliamentary opposition to genetic engineering is led by a coalition of NGOs. They are particularly concerned about genetic engineering in food and agriculture. Issues on genetic engineering are often covered by the national press and discussed in congressional hearings. This, in spite of (or due to) the fact that the Philippines was one of the first developing countries which introduced stringent national bio-safety guidelines (issued in 1991). The Philippine debate on genetic engineering focuses directly on the controversy surrounding the Bt rice developed at the International Rice Research Institute (IRRI) in cooperation with the Swiss Federal Institute of Technology (ETH Zurich). Research on this transgenic rice is financed by international donor agencies and is expected to be to be a major contributor to future food security in Asia. Moreover, it should also provide an alternative to the increasingly inefficient and ecologically toxic pesticide input. NGO affiliated opponents in the Philippines argue that genetic engineering cannot solve the fundamental problems facing the Philippine rice economy. Furthermore, they fear that the health and ecological risks have been underestimated. In short, they see it as a technical solution which cannot be advocated. In this context, they promote their own strategy whereby farmers are encouraged to use their traditional knowledge to breed their own rice and practice alternative pest management. This farming system is already practiced in local communities and the resulting yields are comparable to the yields of high yielding varieties[2]. Emphasis is placed on the participatory approach, which is known as bottom-up approach, whereas research on transgenic rice is perceived as a top-down approach.

In particular, international and national donor agencies in the Philippines find themselves facing a delicate problem: which approach on pest management should receive their full support - the participatory approach practiced by NGOs or the production orientated approach adopted under IRRI's transgenic rice program[3]?

In this context, they have to give due consideration to public acceptance[4] of genetically engineered rice, regardless of whether these two approaches are

fundamentally exclusive or, in fact, supplement one another. Stronger opposition to genetic engineering in agriculture could lead to stricter legislation. In addition, doubts regarding this technology, or lack of confidence in the respective institutions, imply the danger of increasing polarization in the debate and might well hinder future cooperation.

The main objective of the present study is to examine whether public opposition to genetic engineering in the Philippines will have political consequences and, if so, its possible influence on future development policy.

Methodology

Public acceptance can be understood as the aggregate attitude of individuals towards an innovation. In general, an individual's attitude towards an innovation is dependent on his perception of the risks and benefits of the new technology, his or her socially communicated values and perceived trust in institutions. The individual's general perception is formed, in turn, by his sources of information. In this context, the mass media and the social environment are highly relevant (Slovic, 1992; Kasperson et al., 1988; Nelkin, 1996).

However, not every individual has a public voice, or is inclined to go public. Instead, organizations and movements claiming to represent the public concerned, stage events designed to make their voice heard. These groups and the demonstrations they organize receive attention from the media. Mass media broadcasting of these events heightens public awareness regarding the issue. In turn, public opinion formed as a result of this influences the political decision-making processes (Gerhards, 1993).

Public acceptance can be measured either by conducting a representative survey among lay people of a certain country, or it can be assessed by analyzing the strategy, attitude and political weight applied by the stakeholders involved in a certain political debate in their attempt to sway public opinion. Since the political debate on transgenic rice in the Philippines takes place exclusively between members of a small political elite[5], the second approach was chosen for the present survey.

A semi-standardized questionnaire was drawn up in order to examine the political actors' perceptions of genetic engineering and their role in the debate. The questions in the first two parts of the questionnaire concentrate clearly on genetically engineered rice, its perceived risks and benefits for resource-poor farmers and its potential contribution to future food security in Asia. The third part is focused on statements with regard to trust in institutions which represent the different strategies for ensuring food security and part four deals with aspects of position, influence, relations and attitude of political actors in the debate.

In the first three parts, the respondent is asked to express his or her opinion on 80 statements related to the risks and benefits of genetic engineering in agriculture and trust in the institutions involved. The respondent can indicate to what extent he or she agrees

with a certain statement by applying a scale of marks from 1 to 5. The ratings given to the various statements are evaluated by means of a descriptive analysis, whereby the main tools are mean value and standard deviation. Furthermore, a cluster analysis is used to reveal certain perception patterns among the stakeholders regarding the risks and benefits of genetically engineered food in general, and genetically engineered rice in particular.

A test for the real existence of clusters provides the so-called Biplot which is a visualisation technique for principle component analysis. To use the Biplot, the data should be considered as a matrix, in which the column vector represents the subject space while the row vector represents the variable space. In this context, Biplot simply means a plot of two spaces: the subject and variable spaces (Gabriel, 1981). In our case, the subjects are represented by the respondents and the variable vectors a groups of similar statements in the questionnaire.

In the last part of the questionnaire, respondents assess each other with regard to their influence on public opinion, political decisions and the debate on genetic engineering. Moreover, they are asked to specify the type of cooperation with the respective institution (giving or receiving information, directives, financial support) and a personality associated with the institution (provided one is known).

For this purpose, respondents have to fill in their answers concerning each of the 65 stakeholders listed in the policy network table. The answers are analyzed using a simplified version of the policy network analysis (Laumann and Knoke, 1987).

Principal Stakeholders in the Debate

The respondents to the questionnaire are regarded as the principal stakeholders in the biotechnology debate in the Philippines. These political actors represent institutions, organizations, or merely public interest groups.

They were selected with the help of secondary literature, the list of participants in the congressional hearings and 5 key informants. The key informants are experts from government, respectively non-government organizations, academic circles, the media and international organizations. They are familiar with the debate and its political actors.

Between April and May 1997, the questionnaire was answered by 65 respondents from 46 different organizations or institutions classified under the following nine headings:

- *UPLB/Academic Institutions*: Professors from the various institutes of the University of the Philippines in Los Baños (UPLB) who are involved in the debate.

- *Business*: General managers and scientists from several companies in the agro-chemical, food and seed industries, as well as a producers of organic fertilisers.

- *Media*: Columnists who are familiar with the issue, as well as editors of the two big national dailies.

- *International Foundations*: Representatives of big international donor agencies.

- *International Rice Research Institute (IRRI):* Scientists from divisions involved in the debate.

- *International NGOs (Int.NGOs/INs):* Representatives of Swiss NGOs in the Philippines.

- *Government Institutions*: High officials or authorised representatives from each of the departments involved in the debate as well as chairpersons or other personalities attached to agencies which are concerned with genetic engineering in agriculture.

- *Legislative*: Senators and congressmen and women who are active in the debate.

- *NGOs, Churches, Artists*: Leaders of NGOs which are known for their opposition to Bt-rice as well as leaders of the big NGO umbrella organisations and farmer organisations. This 'civil society' group is completed by representatives from other public interest groups such as churches, consumer organisations and artists.

Figure 1 shows the different institution groups and their shares as respondent categories. The figures in parentheses represent the number of respondents in this group.

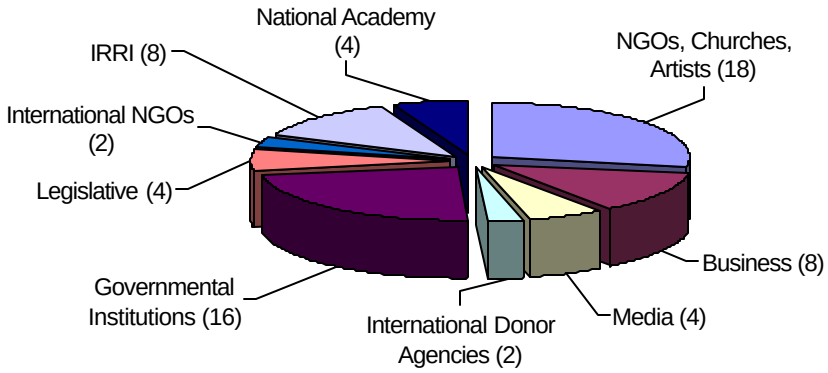

FIGURE 1 Shares of the Different Respondent Categories

Descriptive Data Analysis

The objective of the descriptive analysis is to investigate political actors' perception of the importance of the problems facing the Philippine rice economy and the

potential of genetic engineering for solving them. Furthermore, statements about risks and benefits are analyzed according to the average degree of assent or dissent. Figure 2 below illustrates the actors' assessment of importance of 19 problems in the Philippine rice economy and the potential of genetic engineering for solving them. A scale from 1 to 5 (y-axis) is used to show the average ratings given to the importance of the problems and genetic engineering's potential for solving them, while the respective problems are listed on the x-axis.

The figure shows that a small number of varieties and poor eating or food quality are the only problems rated as less significant (however not insignificant if we consider an average of three to be threshold between important and not important). Moreover, it is noticeable that among the eight most important problems, five are related to structural problems. Fundamentally, it is felt that genetic engineering can contribute towards solving agronomic problems such as high use of pesticides, pest infestation and plant diseases and, to some extent, problems resulting from natural calamities such as drought.

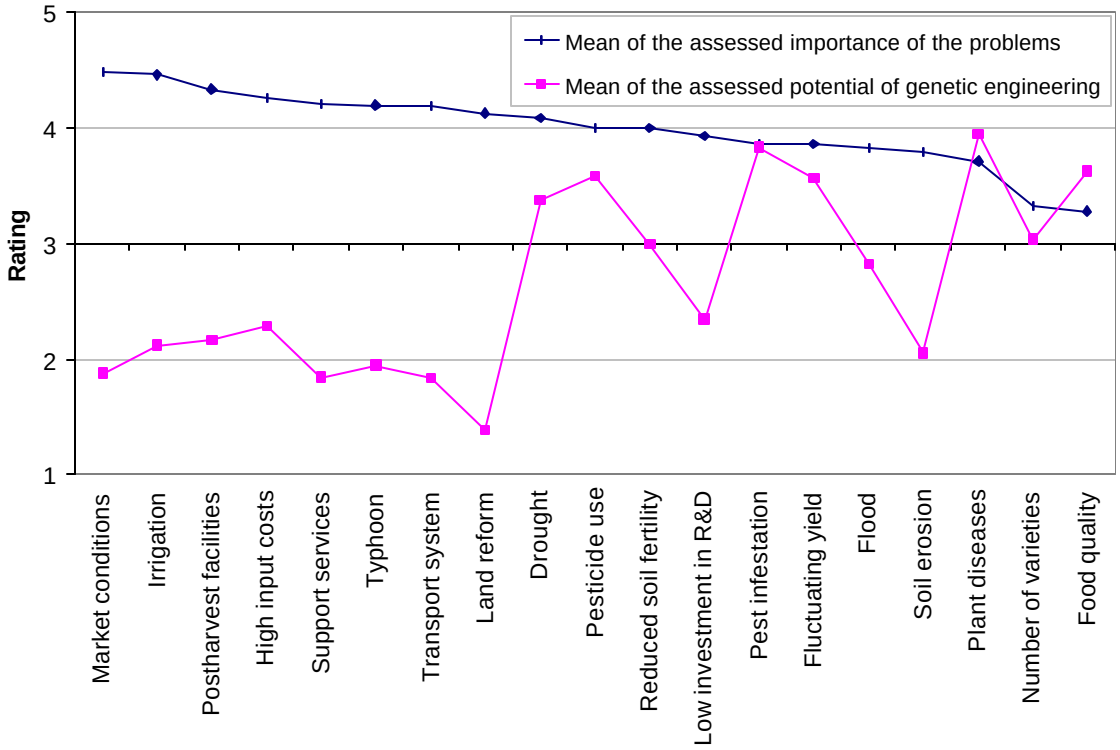

FIGURE 2[6] Global Assessment of the Perceived Importance of the Problems Facing the Philippine Rice Economy and the Potential of Genetic Engineering for Solving Them

In the second part of the analysis, respondents were asked to judge 14 statements regarding the potential application of genetic engineering in agriculture (especially Bt rice). The statements refer to their perception of risks and benefits. Table 1 presents the statements which were submitted to the respondents for their judgment: The statements alternate in their attitude. The first statement is positive towards genetic engineering in

agriculture, the second negative, the third is positive again and so on. These favorable and critical arguments on the subject of genetic engineering were selected from the debate on food security in general, and the debate on Bt rice in the Philippines in particular.

Label	***Statement***
No higher risks	Genetically engineered varieties do not present higher risks for farmers than conventionally bred varieties.
Health risk is serious	Bt rice poses a health risk for consumers.
Food supply in Asia	Genetically engineered rice could help to ensure food supply in Asia.
Sustainability	The potential of stem borers to overcome the built-in resistance of Bt rice raises the question whether genetic engineering in agriculture will in fact lead to sustainability .
Less indebtedness	Genetically engineered rice will reduce farmers' external input costs and will therefore reduce the danger of indebtedness.
APM better solution	Alternative Pest Management (APM) is a better strategy for enabling resource-poor farmers to ensure their own food supply.
Just a new tool	Genetic engineering in agriculture is a new tool that enables breeders to solve problems that currently cannot be solved by traditional breeding methods.
Market inefficiencies	Rice producers won't benefit from genetic engineering through higher revenues nor will consumers benefit from lower prices.
Less price fluctuation	An increase in rice production by genetically engineered rice could lessen wild fluctuations in the world prices for rice.
Ethical/religious problem	Genetic engineering in agriculture poses an ethical problem for religious people.
No effect on biodiversity	Spontaneous crosses in the field between transgenic rice and conventional or wild rice do not affect biodiversity.
Ecological risk	There is a potential ecological risk involved, because Bt rice will also affect non-target organisms.
Stringent guidelines	The National Biosafety Guidelines are clear, stringent and impede abuse of genetic engineering in the Philippines.
Implementation	The implementation of the Biosafety Guidelines is not effectively ensured.

TABLE 1 Statements with Regard to Genetic Engineering in Agriculture

The statements in Table 1 alternate in their attitude. The first statement is positive towards genetic engineering in agriculture, the second negative, the third is positive again and so on. These favorable and critical arguments on the subject of genetic engineering were selected from the debate on food security in general, and the debate on Bt rice in the Philippines in particular.

Figure 3 presents a global assessment of the assent/dissent mean regarding each statement. The statements which received the highest degree of assent concern the doubt that Bt rice production will be sustainable (due to the potential breakdown of the built-in resistance to pests) and the assumption that Alternative Pest Management (APM), as promoted by NGOs, might be a better strategy for resource-poor farmers to ensure their own food supply. On the other hand, the statement that Bt rice could pose a serious health risk for consumers received, surprisingly, a high degree of dissent.

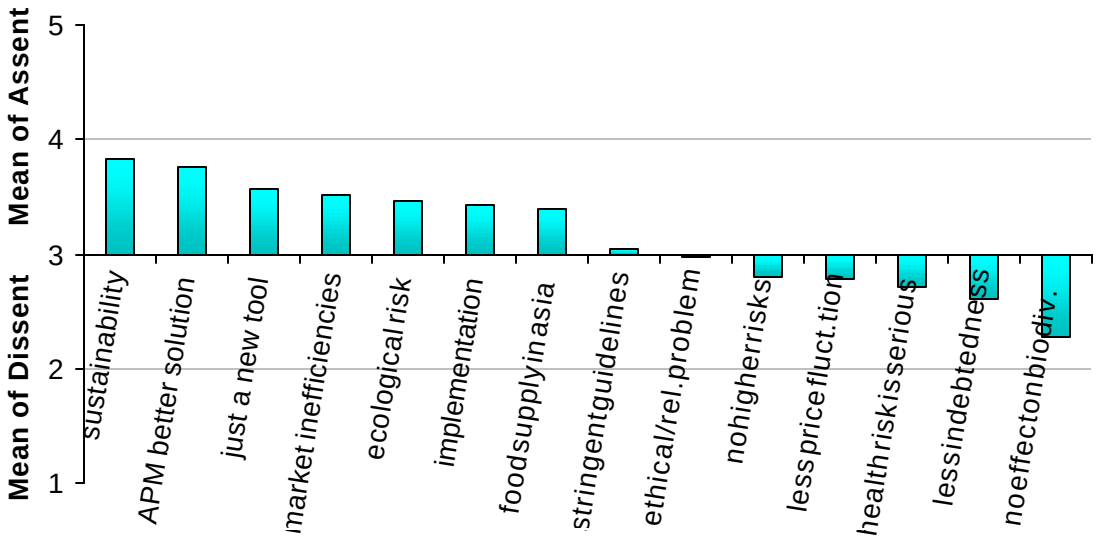

FIGURE 3 Global Assessment of Attitudes Towards Risks and Benefits of Genetic Engineering in Agriculture

In general, the technology itself is less feared (just a new tool). However, there is considerable concern that certain circumstances (bad implementation of the guidelines, market inefficiencies) in the Philippines might impede equitable distribution of the benefits and increase risks. Although a majority of the respondents consider genetically engineered rice as a potential aid towards ensuring food supply for the big cities in Asia in future, they doubt its ecological sustainability.

The third part contained statements about trust, communication and legislation. It is based on the hypothesis that public acceptance of new technologies depends not only on the perception of inherent risks and benefits, but also on trust in institutions, cultural values and individual experience. In general, it can be assumed that the effectiveness of the questionnaire for assessing the importance of trust in the debate is somewhat limited.

After all, respondents are hardly likely to admit that their attitude is based on distrust in institutions rather than on their concern about real risks or their conviction that genetic engineering will be the source of real benefits. Nevertheless, the ratings of some statements revealed interesting findings.

The ratings suggest that concern about ecological, health and agricultural risks is of prime importance when seeking to explain opposition to genetically engineered rice. In part, this contradicts the findings about risk perception in part 2. However it is not surprising, given that Greenpeace and the Southeast Asian NGO 'SEARICE' managed to convince a congress member in March 1995 to call for congressional hearings into the potential health and ecological risks of Bt rice imported from Switzerland.

With the exception of respondents of the media and representatives of international NGOs and international foundations, a majority of the respondents still believes that general distrust of institutions does not impede effective communication between opponents and proponents**.** IRRI seems to be most firmly convinced of this. However, the initial reactions to our survey provided clear evidence of a subliminal distrust among the stakeholders in the debate. In particular, opponents were wary about the purpose of this study. It was suspected that a study conducted by ETH would merely serve Swiss agribusiness interests. Thanks to our partner at the University of the Philippines in Los Baños, who enjoys the confidence of the opposing NGOs, it was possible to convince them that the survey would be absolutely neutral and that they would have free access to the results afterwards.

Finally, results in part 4 showed that a large number of the respondents feel it would be desirable to give consumers and producers a free choice via labeling (38 respondents out of 65), to promote Alternative Pest Management as a good alternative (34) and, with lower priority, to create more stringent regulations (33) designed to gain opponents' confidence. Only a minority demands discontinuation of Bt rice research in the Philippines (2 respondents rated it as a high priority in order to gain the confidence of opponents, while 8 mentioned it as a lower priority).

Perception Patterns and Political Influence of the Stakeholders

In this part, a cluster analysis is used to identify different perception patterns among the various political actors involved in the debate. Perception patterns regarding genetic engineering in agriculture are evaluated by considering the answers given in the first two parts of the questionnaire.

Briefly, the following seven new variables were created:

POTENA = The potential of genetic engineering for solving agricultural problems

POTENN = The potential of genetic engineering for solving problems related to natural calamities (facing the Philippine rice economy)

POTENM = The potential of genetic engineering for solving marketing and infrastructure problems

POTENR = The potential of genetic engineering for solving agrarian and long term problems

POTENTL2 = The assessment of the economic impact of six different genetically engineered food products

RISKBEN1 = Positive statements regarding risks and benefits of genetic engineering in agriculture

RISKBEN2 = Negative statements regarding risks and benefits of genetic engineering in agriculture

These variables were used for a cluster analysis performed by three different algorithms (WARD, TWOSTAGE and FASTCLUS)[7]. The 65 respondents were allocated according to their institutional membership. The cluster analysis revealed three different clusters with a similar perception regarding the risks and the benefits of genetically engineered food.

Figure 4 visualizes these three groups in relation to the variables (vectors). The Biplot presented is calculated by a principal component analysis and displays the observations, unclustered. The circles which have been added indicate the clusters produced (by WARD) in the foregoing cluster analysis. The positions of the political actors involved are interpreted with the help of the results obtained by the policy network analysis.

Group 1: The first group (close to the y-axis) contains respondents who mainly oppose genetic engineering. They see neither a potential for solving the problems facing the Philippine rice economy *(potenm*, *potenr*, *potenn*, *potena*), nor do they believe that genetic engineering will have a positive impact on the Philippine economy (*potentl2*). They perceive serious risks which accompany this new technology - they agree with all the negatively worded statements (*riskben2*), and disagree with all the positively worded statements (*riskben1*). This perception group comprises almost all respondents from NGOs (*N*). Moreover, this cluster also includes one artist, the leader of a consumer organization (*CO*) and a protestant church *(CH)*, two columnists (*ME*), two authorized respondents from international NGOs (*IN*), one respondent from IRRI (*IR*), UPLB (*UP*) and business (*BU*) plus one from a government agency. At first sight, the inclusion of respondents from the last four institutions is not easily understood. However, it must be taken into account that the governmental agency is the Philippine Council of Sustainable Development (PCSD[8]) and that the business group respondent belongs to the producers of organic fertilizers (albeit, not a member of the Organic Fertilizer and Manufacture Association). The fact that this group also includes professors and scientists from UPLB and IRRI shows that these institutions do not represent one unanimous opinion.

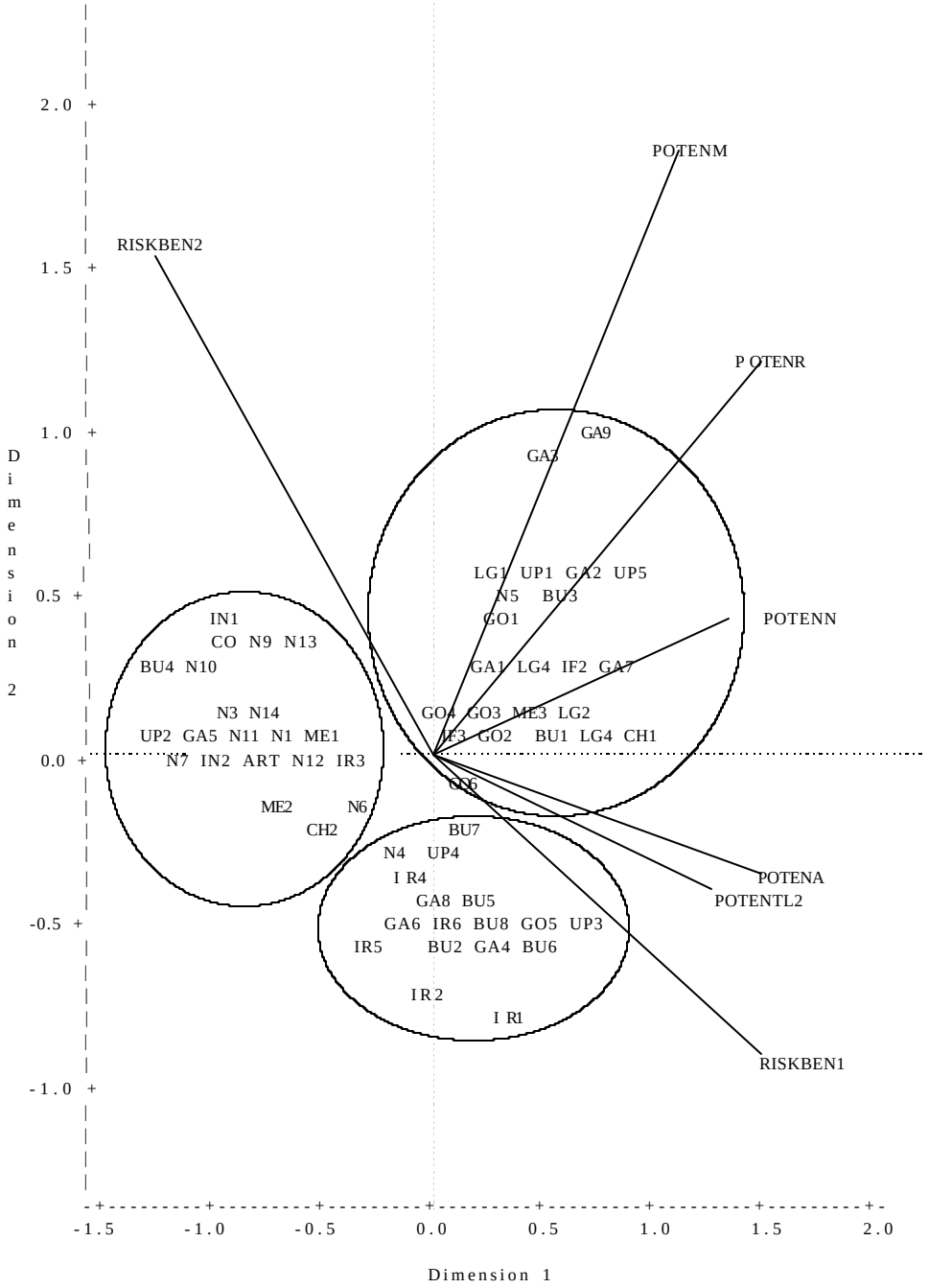

FIGURE 4 Biplot of the Acceptability of Genetically Engineered Food

In general, the group consists of representatives of the civil society group. Results of the policy network analysis have shown that their influence on public opinion is considered to be high, while their influence on political decision-making processes is thought to be negligible. They stand out within the policy network as active transmitters

of information (gathering and spreading information). Furthermore, they seem to be independent from the government with regard to directives and financial support since their main donors are international organizations. Moreover, four of the fifteen personalities who received most mention in the network are NGO-leaders.

Group 2: This perception group (furthest from the axes) tends to have very high expectations with regard to genetic engineering in agriculture. Respondents in this cluster do not merely envisage a positive economic impact as well as a potential for solving agricultural problems and problems related to natural catastrophes, but also a potential for solving structural problems such as market inefficiency and lack of infrastructure facilities *(potenm*), agrarian and long-term problems, such as erosion, diminished soil fertility etc. (*potenr*).

However, the group seems to have a rather ambivalent attitude regarding the perception of risks and benefits (*riskben1, riskben2*). The ambivalence of this group can be explained by the results of the descriptive analysis. The outcome of this analysis indicated that the respondents' main concern is the potential ability of pests to overcome the built-in resistance of genetically engineered rice. This perception is also closely associated with the general opinion that Alternative (or Integrated) Pest Management might be a better strategy for resource-poor farmers to ensure their own food supply. To a certain extent, the ambivalence of politicians (*LE*) and government officials (*GO*) reflects their dilemma: on the one hand they support Ramos' long-term economic policy with its emphasis on the promotion of domestic science and technology and, in particular biotechnology, which is deemed to be 'the flagship' program to achieve NIC-hood' (PCARRD 1995). On the other hand, they are also concerned about sustainable development and peoples' empowerment which can only be achieved in cooperation with non-governmental organizations.

The group consists mainly of members of government (5) and legislative institutions (4). Moreover, an editor from a national daily (*ME*), two managers from business, two professors from UPLB, one respondent from the Catholic Bishop Conference (*CH*), two managers from international organizations (*IF*) and one NGO leader are found in this group. It is interesting to note that the two Churches (Protestant and Catholic) are not found in the same group. It is obvious that they do not share the same opinions, in particular on the ethical aspects. According to the findings of the policy network analysis the actors of this group are felt to have a high degree of influence on political decision-making processes, as well as on public opinion. Moreover, they play an important role in terms of issuing directives, as well as granting financial support within the network.

Group 3: Respondents in this perception group believe in the potential of genetic engineering for solving agricultural problems and, to some extent, problems caused by natural catastrophes (drought and flood) and expect it to have a positive impact on the Philippine economy. However, they do not expect any contribution from genetic engineering in agriculture to solve structural problems (*potenm, potenr*). Basically, they

are very much in favor of genetic engineering (*riskben1*) and do not anticipate high risks (*riskben2*).

The group is dominated by business (5) and IRRI (5) respondents. The rest are members of government agencies (3), UPLB (2), GOs (1), international organizations (1) and NGOs (1). It is noteworthy that, with the exception of the NGO-respondent[9], they can be assigned to science community (private, national, international research centers). According to the policy network analysis this group has not much influence on public opinion but a relatively high influence on political decision-making processes. Furthermore, political actors in this group are felt to be central to the debate on genetic engineering and genetically engineered rice. They seem to be the most important suppliers of information and receive financial support from many international and national institutions.

Conclusions

The main objective of the survey was to find out if the opposition to transgenic rice will have political consequences which are relevant with regard to future policy in development cooperation. The following interpretation of the results refers mainly to the perception of those involved and their political weight in the Philippine debate on this subject. These results permit an assessment of the effects on legislation and future food security strategies.

A comparison of the results of the survey leads to the following observations:

Marketing and infrastructure problems are perceived by all respondents to be the main difficulties facing the Philippine rice economy. In particular, lack of irrigation and post-harvest facilities, poor extension services and an inadequate transportation network are regarded as significant factors contributing to this deficiency. The contribution of genetic engineering in agriculture is seen mainly in terms of agronomic problems.

The cluster analysis revealed three major groups of perception.

The first group is dominated by NGOs and which actively oppose genetic engineering in agriculture as well as the big NGO umbrella organizations together with other members of the 'civil society' group. This group does not see any potential of genetic engineering in agriculture and, in general, anticipates that this technology will be accompanied by high risks and low benefits. The group is felt to have a remarkable influence on public opinion, however, is not considered important with regard to political decision-making processes.

The second group contains the majority of government officials and politicians. It is felt to wield considerable influence on political decision-making processes and, to a certain extent, on public opinion. Respondents in this group tend to overestimate the potential of genetic engineering for solving the problems confronting the Philippine rice

economy. However, their attitude towards genetic engineering in agriculture is somewhat ambivalent regarding risks and benefits of this new technology.

The third group consists mainly of scientists from private, national and international research centers. Their view of the potential is more modest, however, their attitude is definitely positive. This group is felt to be central in the debate on genetic engineering and genetically engineered rice. Their influence on political decisions is felt to be relatively high whereas their influence on public opinion is considered to be low.

Since NGOs and the other public interest groups are not represented in Congress as a joint political party, they have very little direct influence on political decision-making processes. Therefore, although effective interpretation of existing biosafety guidelines will continue to be an issue for the political debate, radical prohibition laws against genetic engineering in agriculture are not expected. In particular, it must be borne in mind that modern biotechnology is also considered the 'flagship' of the government's 'Vision Philippines 2000' for national economic growth.

Nevertheless, NGOs are very important to the implementation of the government's goals for sustainable development and people's empowerment. Former president Ramos' efforts for more intensive NGO/GO cooperation have increased NGO's influence on national politics[10]. In the perception pattern analysis, the ambivalent attitude of the second group indicates that, to a certain extent, politicians and government officials do care about the NGO's concerns. In particular, they assent to the statement that the NGO approach (Alternative Pest Management) might be a better strategy for resource-poor farmers to ensure their own food security. This shows that the State does not simply ignore NGOs and their demands. However, NGOs still exhibit an ambivalent attitude towards cooperation with government (and also with business) because they do not wish to sacrifice their autonomy and flexibility (Rocamora, 1994).

Furthermore, NGOs play a significant role in international development policy. Major international development organizations are increasingly seeking cooperation with NGOs (Alegre, 1996) which makes the situation of these organizations in the Philippines rather difficult. The policy network analysis shows clearly that international organizations are the principal donors among those involved. They not only support the government and its efforts towards progress in science and technology, but also the large NGO networks as well as the IRRI programs. Although respondents for international organizations have, in the main, a positive attitude towards genetic engineering in agriculture, they also approve of the NGO participatory strategy of sustainable development. Hence, international donors have reason to be concerned about any increase of the polarization within the Philippine debate on genetic engineering in agriculture (this also applies to IRRI which emphasizes the importance of NGO cooperation as well). Although the importance of trust in institutions among the political actors could not be confirmed by the results obtained in the survey, some incidences indicated mutual distrust among the stakeholders.

A majority of the respondents feels it would be desirable to give consumers and producers a free choice via labeling and to promote Alternative Pest Management designed to gain opponents' confidence. However, only a small minority demands discontinuation of Bt rice research in the Philippines.

In general, the opposition to genetic engineering will probably not have political consequences in the form of radical laws against genetic engineering in agriculture. However, policy makers might look for mechanisms to ensure strict implementation of the existing guidelines. Given the political polarization and the importance of NGOs as partners in national and international development cooperation, the opposition might well be relevant with regard to future development and food policy in the Philippines.

Endnotes

[1]Philipp Aerni and Sibyl Anwander Phan-Huy are research assistants at the department of agriculture of Swiss Federal Institute of Technology. Peter Rieder is professor at the same department.

[2]According to the IPR Sourcebook (1994) field tests yielded 5 to 6 t/ha.

[3]IRRI's research activities are based on the long-term strategy *'Toward 2000 and Beyond'*. There are five ecosystem based research programs and international support programs designed to meet the goals of this strategy. The Bt rice Project is just one element of the cross-ecosystem research program.

[4]Public acceptance of genetic engineering should not be confused with consumers' or producers' acceptance. In fact, the different levels of acceptance must not necessarily be cogently related to each other. However, public acceptance can be seen as a precondition of consumer and producer acceptance.

[5]The Philippines shows the characteristics of an 'elite democracy' where political and economic power is held by a relatively small number of families who derive their wealth and power from their ownership of land and industry (Timbermann, 1991).

[6]The connecting line between the points in the graph was only allowed if the points related to each other. In this case the line was used to show the gap between the perception of the problems and the perceived potential for solving them.

[7]These three algorithms were adopted from SAS/STAT User's Guide, Volume 1, Version 6, 4th ed. 1990.

[8]The Philippine Council for Sustainable Development is composed of representatives from 16 relevant government departments and 7 members from appropriate NGOs representing public interests.

[9]In general, this NGO respondent has critical views on genetic engineering. However, he appears in his group due to his very positive views on the economic impact of genetic engineering on the Philippine economy.

[10]According to his promises, the newly elected president Estrada intends to continue the policy pursued by Ramos.

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