SOCIAL CHALLENGES IN TECHNICAL DECISION-MAKING: LESSONS FROM SOCIAL CONTROVERSIES CONCERNING GM CROPS

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ABSTRACT

The modern world is becoming increasingly complex not only because of rapid progress in science and technology but also due to the emergence and spread of multiple values. As a consequence, demands for economic and physical security are gradually giving way to demands based on other values such as freedom, self-expression and quality of life. This shift – a turn from 'materialist' to 'postmaterialist' values (Inglehart, 1997) – has had a tremendous influence across all spheres of our lives. Scientific endeavors related to agriculture are no exception. This turn to postmaterialist values explains the shifting research agenda in agriculture. For instance, when we look at the dominant research agenda in modern biotechnology relating to agriculture and food, the area that I am most familiar with, the emphasis is now shifting from research on and development of varieties with improved productivity to those with improved nutrition. This shows the research agenda is moving away from a focus on the economic needs and benefits of producers, toward an emphasis on appealing to consumers and the wider society. Indeed, the Japanese government named nutritionally enhanced geneticially modified crops as one of four strategic research items for the further development of modern biotechnology, along with other traits such as disease resistant rice, drought tolerant genetically modified wheat, and genetically modified rice for bioremediation (MAFF, 2008). Such a turn to postmaterialist values might also explain shifts in our expectations regarding the role of science in society, by which science is viewed as one of the tools available to us to help improve our quality of life, but not the only available tool. Against these changes, the theme of this paper is to identify new social challenges arising from such a transformation, particularly by shedding light on the public's involvement in determining the course of agricultural research and development. Simply stated, the paper attempts to address the question: if we pre-suppose that greater involvement of the public in scientific and technical matters is a good thing to pursue, what do we need to know and how do we carry out the pursuit?

We can see the potential impact of increased public participation in scientific and technical matters if we consider past instances when public opinion determined the fate of a certain agricultural technology. When we consider social controversies concerning genetically modified crops (GM crops), for instance, the public's reaction to the technology has had a tremendous influence upon the ways in which GM crops are used or not used. When we realize that to date GM crops have not produced a single environmental disaster of the magnitude of Chernobyl or Three Mile Island, and that no one has died from eating them, yet social controversies have

resulted in several years of moratorium on approval of new GM crops in the EU (with no GM crops in commercial use in Japan), we begin to see that scientific and technical solutions such as dealing with bio- or food safety issues of GM crops alone will not suffice, but that social dimensions play an important role as well.

In order to grasp the implications of the public's involvement in scientific and technical matters, the paper will introduce two different modes of relations between scientists and the public. What I would call the "modes of relations" is an ideal type – a conceptual device that will sensitize our way of understanding our activities. Therefore, we will need to keep in mind that reality does not necessarily fit neatly into these conceptual categories; there are always gray areas. During the last decade or so, the public has been involved in scientific and technical matters in a number of ways. At one end of the continuum lies a "conventional" form of public participation such as public opinion surveys, public hearings, public comments on legislation and so forth. At the other end of the continuum exists a new form of public participation consisting of consensus conferences, citizens' juries, citizens' panels and others. When you compare these two forms of public participation, the major difference is the way in which information flows. The former presupposes a one-way flow – from the scientists to the public, while the latter posits a two-way information exchange, or dialogue between scientists and the public. The underlying thinking of the first model is that decisions regarding technical issues should be left in the hands of scientists, on the grounds that the public lacks the scientific and technical knowledge and capability to make complex and technical decisions. In contrast, the latter bases its argument on the proposition that scientific knowledge is not perfect and that the public is not necessarily unreasonable in wishing to evaluate the impact of a certain technology upon their lives. In other words, while the one-way flow of information does involve communication between scientists and the public to some extent, the decisions are ultimately made by experts, whereas two-way information exchanges granting some degree of authority to the public in decision-making.

By applying these two models to the social controveries concerning GM crops in Japan, we begin to see that the way in which the public relates to scientific and technical matters has changed over time. The paper will draw on findings derived from an analysis of the discourse surrounding GM crops in Japan. Our study has surveyed the contents of 1,121 Japaneses newspaper articles identified with a key word search for "genetic engineering." Prior to 1998, when newspapers covered news about genetic engineering technologies in agriculture and food, there was little mention of the public. However, in the period after 1998, the emphasis in the stories shifted to issues reflecting concerns raised by and for the public. In and around 2000, the emphasis of the stories shifted again in ways that suggest the importance of the public's input into public policy decision-making (Yamaguchi and Suda forthcoming). In addition, public opinion surveys done in Japan on the public's participation in decision-making related to scientific and technical matters also show a similar trend. Results from surveys compiled by the Cabinet Office in 2004 and by Mitsubishi Research Institute in 2005 indicate that the majority

of Japanese nationals feel that the public has the right and responsibility to be involved in scientific decision-making from the beginning to the end of research and development.

Analysis of the data suggests that the dominant thinking in contemporary society is shifting toward involving the public in decisions on technical matters. It is clear that the public feels strongly about the importance not only of participation in decision-making processes involving issues related to science and technology but also of obtaining authority to some degree to decide which types of technologies society will adopt. Given such a social trend, it is important that we devise methods that facilitate the public's participation in scientific and technical decisions. To begin, we need to have a clearer picture of the benefits and drawbacks of various public participation methods. Drawing on the matrix developed by Rowe and Frewer (2000), the paper shows the strengths and weaknesses of five different public participation techniques in light of four criteria: representativeness, independence, transparency, and early involvement.

The paper concludes that now the dominant discourse has shifted and the public feels strongly about the right to participate in decision-making procesess, and that it will be useful to compile examples of projects involving various participation methods to evaluate their effectiveness empirically so as to a gain better understanding of which methods to use in which contexts.

KEYWORDS

participation, technical decision-making, the public, modes of relations

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A paper submitted to JIRCAS International Symposium
November 5, 2009

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Characterization of Modern Society

- A turn from 'materialist' to 'post-materialist' values
  = Emergence of multiple-values

Economic and physical security

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Freedom, self-expression and quality of life

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Characterization of Modern Society

- A turn from 'materialist' to 'post-materialist' values
  - 'Perceived' changes about the roles of science in society
    - science is the "only" tool ⇨ "one of" available tools

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Social Rejection

Social Rejection

Characterization of Modern Society

Experts

Non-Experts

⇩

PUBLIC POLICIES

Questions to cover

- Examination of "Modes of relationship" between experts and non-experts
- Issues concerning evaluating public participation programs

Modes of Relationship

Conventional

⇕

New

Modes of Relationship

One Way: low level of public involvement

⇕

Two ways: high level of public involvement

Two Modes of Relationship

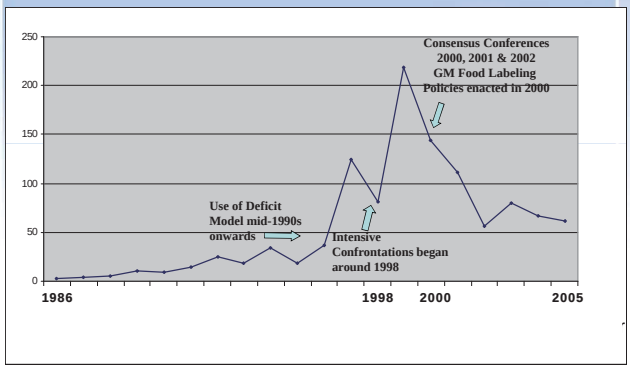
DEFICIT MODEL	HYBRID FORUM
One way	Two ways
Top down	Dialogue
Low level	High level
'Asymmetry'	'Symmetry'

(Callon, et al. 1986)

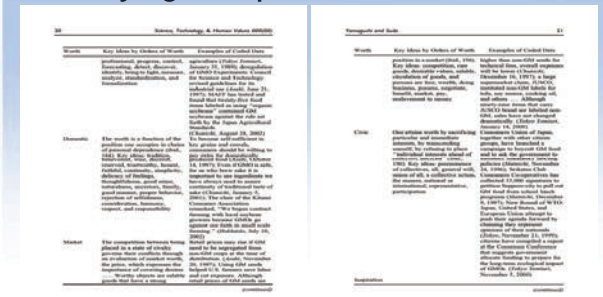
Data

- A key word search for "genetic engineering" in Nikkei Telecom Database
- Discourse analysis of 1,121 newspaper articles published between 1986 and 2005

Shifting Modes of Relationship



Identifying Multiple Values



Number of Articles by Values

Table 1. Number of Articles by Orders of Worth and by Phases

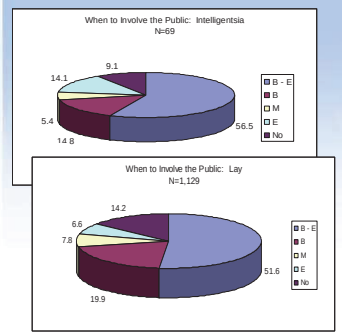
Orders of Worth	1986-96		1997-2001		2002-7	
Industrial	134	57.5	314	29.8	139	28.2
Domestic	0	0	3	0.3	10	2.0
Market	25	10.8	252	23.9	62	12.6
Civic	36	15.5	383	36.4	171	34.7
Inspiration	6	2.6	37	3.5	12	2.4
Opinion	2	0.9	26	2.5	22	4.5
Environment	30	12.9	38	3.6	77	15.6
Total	233	100.0	1,053	100.0	493	100.0

Source: Yamaguchi, T. and F. Suda: "Changing Social Order and the Quest for Justification: GMO Controversies in Japan" forthcoming in *Science, Technology, & Human Values.*

Public Participation Programs

- Citizens' Conference on Information Society, 1999
- Consensus Conference on GMOs, 2000
- Consensus conference on Research on the Human Genome, 2000
- Citizens' Panel on GMOs, 2001
- Citizens' Panel on GMOs, 2002
- Citizens' Panel on Agriculture, Food and GMOs, 2003
- Citizens' Meeting for Sustainable Society, 2003 - 2004
- Regional Communication Meeting on GMOs, 2005- 2006

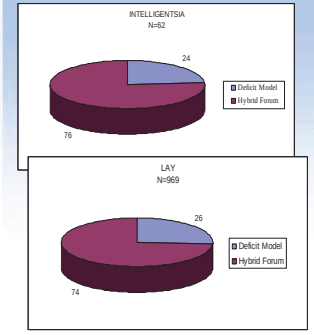
Survey: At What Stage of the R&D Should the Public Get involved in Decision-making?



B-E: From the beginning to end
B: At the beginning
M: In the middle
E: At the end
N: No involvement

Graphs created from data in MRI (2005)
Opinions Survey on the Relation between the Public and Technoscience.

Survey: What is the 'appropriate' level of public involvement?



Deficit Model includes:

1. Information dissemination by authorities
2. Public comments

Hybrid Forum includes:

1. Dialogue, 2. Consultation
3. Authorities

Graphs created from data in MRI (2005)
Opinions Survey on the Relation between the Public and Technoscience.

Schema for Evaluating Public Participation Techniques

- Representative-ness
- Independence
- Transparency
- Early involvement of the public

Evaluating Public Participation Techniques

	TECHNIQUES (DM)			TECHNIQUES (HF)	
	Referenda	Public Hearing	Opinion Survey	Consensus Cnf.	Citizen's Jury
REPRESENTATIVENESS	HIGH	LOW	GENERALLY HIGH	MODERATE	MODERATE to LOW
INDEPENDENCE	HIGH	GNERALLY LOW	HIGH	HIGH	HIGH
TRANSPARENCY	HIGH	MODERATE	MODERATE	HIGH	MODERATE
EARLY INVOLVEMENT	VARIABLE	VARIABLE	Potentially HIGH	Potentially HIGH	Potentially HIGH

Reconstructed from Rowe, G. & L.J. Frewer (2000) "Public Participation Methods: A Framework for Evaluation" in *Science, Technology, & Human Values*, 25(1) p. 19

Where does this leave us?

- transformation of modern society
- existence of multiple-values
- public support for participation

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- identify values
- develop a conceptual/methodological framework to reflect identified values in ag research

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Thank you!
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